Staying with the Trouble through Design

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Critical-feminist Design of Intimate Technology

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Abstract

This dissertation explores *staying with the trouble through design* as a design theory of intimacy and intimate technology. To research and design with the subject of intimacy is to trouble and to ask for trouble, and by staying with the trouble of intimacy, to paraphrase Donna Haraway, I articulate and perform a way of designing not as *a way out* of trouble, but as *a way of making* trouble and *staying with* the trouble. I argue that by staying with the trouble, designers may learn to be "truly present" and respond to social, cultural and political issues of intimate technology.

The methodology interweaves design research, feminist technoscience, critical theory and software studies into a critical-feminist design methodology. As a response to design and designing intimate technology I have engaged in Donna Haraway's "Staying with the Trouble" (Donna J. Haraway 2016) and solutionism as a critique of technology development, as well as feminist theories on fantasies of "the good life" and gender and technology, and critical theories on the role of intimacy in digital culture.

Within the field of interaction design research, this dissertation's contribution can be divided into three parts: 1) an exploration of the role of intimate technologies in our everyday lives and ways of being, 2) a critical and feminist design methodology of staying with the trouble through design, and 3) design proposals that stay with the trouble of designing with intimacy.

My design research has evolved through four design projects that interweave different intimate topics and technologies through varied design practices: 1. PeriodShare: an internet-connected menstrual cup. 2. Marcelle: a wearable sex toy reacting on wifi-activity. 3. Ingrid: a woman living with electromagnetic hypersensitivity. And 4. Intimate Futures: two digital personal assistants where one is pushing back on sexual harassment and the other is assisting with hormone level tracking.

The main contribution of the dissertation is the design methodology *staying with the trouble through design*, which is an anti-solutionist approach to design that interweaves the situated, personal and political role of design. By responding to/with trouble, rather than designing solutions to problems, *staying with the trouble through design* aims to better understand the conflicts and responsibilities involved in complex social, cultural and political issues, in order to imagine and design still possible futures. The design methodology interweaves three practices that unfold the self-reflective, ethnographic and collaborative process of *staying with the trouble through design*. The first practice, the willful practice of *Staying with the Wrong*, is a continuous process of becoming a feminist designer and it includes actively learning to be present; question the given as given, stay with the feelings you wish would go away, continuously practice self-reflection on own positionality and using feminist humour when designing with taboos. The second

practice, *Curious Visiting*, encourages the designer to go beyond their own positionality, by listening to stories of pleasure and pain and visiting ongoing pasts and alternatives nows. This challenges the designer's notion of the present by interweaving fact and fiction, and it highlights that this practice is never innocent but involves risks. Lastly, the third practice *Collective Imagining* highlights how design by proposing future change can respond to and/or with trouble and how we collectively can engage with futures to rewrite collective imaginings and tell other possible stories within and across social and cultural contexts. Together, these three interwoven practices propose a way of staying with the trouble through design, as a feminist contribution to current critical approaches within interaction design.

Keywords

Resume på dansk

Denne afhandling udforsker *at blive med besværet gennem design* (oversat fra Staying with the Trouble through Design) som en designteori om intimitet og intime teknologier. At forske og designe indenfor emnet intimitet er at besvære og at komme i besvær, og ved at blive med besværet af intimitet, for at omformulere Donna Haraway, artikulerer og performer jeg en måde at designe ikke som *en vej ud* af besvær, men som en måde *at skabe* besvær og *blive med* besværet. Jeg argumenterer for, at ved at blive med besværet kan designere lære at være "oprigtigt tilstedeværende" og svare på sociale, kulturelle og politiske problemstillinger om intime teknologier.

Metodologien sammenfletter designforskning, feministisk teknologividenskab, kritisk teori og softwarestudier ind i en kritisk-feministisk designmetodologi. Som en reaktion på design af intime teknologier, har jeg arbejdet med Donna Haraways "Staying with the Trouble" (Donna J. Haraway 2016) og solutionisme som en kritik af teknologiudvikling, samt feministiske teorier om fantasierne om "det gode liv" og køn og teknologi, og kritiske teorier om rollen af intimitet i digital kultur.

Denne afhandling har tre bidrag indenfor feltet interaktionsdesignsforskning: 1) en udforskning af rollen af intime teknologier i vores hverdagsliv og subjektivitet, 2) en kritisk og feministisk designmetodologi af at blive med besværet gennem design, og 3) designforslag som bliver med besværet af at designe med intimitet.

Min designforskning har udviklet sig gennem fire designprojekter, som sammenfletter forskellige intime emner og teknologier gennem forskelligartede designpraksisser: 1. PeriodShare: en internetopkoblet menstruationskop. 2. Marcelle: et sexlegetøj, som man kan tage på, der reagerer på wifi-aktivitet. 3. Ingrid: en kvinde der lever med elektromagnetisk hypersensitivitet. Og 4. Intimate Futures: to digitale personlige assistenter, hvoraf den ene reagerer på seksuelle krænkelser og den anden assisterer med måling af hormoner.

Det primære bidrag i denne afhandling er designmetodologien *bliv med besværet gennem design*, hvilket er en anti-løsningsorienteret tilgang til design, der sammenfletter den situerede, personlige og politiske rolle af design. Ved at besvare (med) besvær, i stedet for at designe løsninger til problemer, er formålet med *at blive med besværet gennem design* at blive bedre til at forstå konflikter og ansvar involveret i komplekse sociale, kulturelle og politiske problemstillinger for at forestille og designe stadig mulige fremtider. Designmetodologien sammenfletter tre praksisser, som udfolder den selvrefleksive, etnografiske og kollaborative proces af *at blive med besværet gennem design*. Den første praksis, den villende praksis af *at blive med det forkerte*, er en vedvarende proces af at blive en feministisk designer og det inkluderer aktivt at lære at være tilstedeværende; udfordre selvfølgeligheder, blive med de følelser som du ønskede ville

gå over, løbende praktisere selvrefleksion over eget ståsted og bruge feministisk humor til at designe med tabuer. Den anden praksis, *nysgerrigt besøge*, opfordrer designeren til at gå udover deres eget ståsted ved at lytte til historier om nydelse og smerte, og besøge vedvarende fortider og alternative nutider. Dette udfordrer designerens forståelse af nutiden ved at sammenflette fakta og fiktion og det fremhæver at denne praksis aldrig er uskyldig, men involverer risikoer. Afslutningsvist fremhæver den tredje praksis, *kollektivt forestille*, hvordan design, ved at foreslå fremtidig forandring, kan besvare (med) besvær, og hvordan vi kollektivt kan engagere os i fremtider for at genskrive kollektive forestillinger og fortælle andre mulige historier i og på tværs af forskellige sociale og kulturelle kontekster. Tilsammen foreslår disse tre praksisser en måde at blive med besværet gennem design som et feministisk bidrag til nuværende kritiske tilgange i interaktionsdesign.

Emneord

Interaktionsdesign, intimitet, intime teknologier, besvær, tabu, køn, spekulativt design, designfiktion, feministisk HCI, kvindens sundhed.

Tak, tack, arigato, thanks: Acknowledgements

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Part Three: The Catalogue

Manifesto: Staying with the Trouble through Design

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PeriodShare
Marcelle
Make your own vibrator
Ingrid
AYA
U

1

Introduction

Introduction

"In urgent times, many of us are tempted to address trouble in terms of making an imagined future safe, or stopping something from happening that looms in the future, of clearing away the present and the past in order to make futures for coming generations. Staying with the trouble does not require such a relationship to times called the future. In fact, staying with the trouble requires learning to be truly present" (Donna J. Haraway 2016, 1)

What if design, instead of proposing solutions to problems, would stay with the trouble, as suggested by feminist scholar Donna Haraway in the opening quote? What if design, instead of imagining better, faster, more fun futures, would learn to be truly present? What if design by staying with the trouble and learning to be truly present could be better at responding to the complex social, cultural and political issues that we face today? As difficult and indefinite as these words may be, they point at a particular way of thinking about the work that design does, and the work that researchers do.

In my dissertation I have explored and practiced a design theory of intimacy and intimate technologies. To research and design technologies with the subject of intimacy is to trouble and to ask for trouble. Socially, culturally, politically, personally and technically, intimacy is a subject that brings trouble and a subject that requires trouble. As a response to the critique of technological solutionism—that technologies are designed as solutions to problems that do not exist or solutions that ignore the complexity of social, cultural or political issues (Morozov 2014)—I have stayed with the trouble of intimacy through designing anti-solutionist technologies. Through this dissertation, I tell the story of how I, in the process of staying with the trouble of intimacy, have learnt to be truly present in social, cultural and political issues of intimate technologies. More precisely, I propose and perform a design theory of "staying with the trouble", that with its open exploration of how "trouble" and "being truly present" matter in and through design, both challenges and proposes an alternative to interaction design's search for solutions and focus on the future.

Motivation

A popular conception for ubiquitous computing is, that digital technologies are getting smaller, more intimate, and connected, and that the designs often propose smarter solutions that are intervening into ever more intimate spheres of our everyday life. Our bodies are surrounded by networks, our menstrual products are implemented with sensors and antennas, Internet-connected sex toys track and send intimate data to its manufactures, smart homes haunt its inhabitants, and everyone walks around with a digital assistant in their pockets. Our bodies are tracked, managed and empowered

through technologies. Technologies, that become intimate through their close distance to our bodies and by intervening in our everyday personal lives. These technologies are not mere tools or objects of/for domination, but rather part of our embodiment and as political entities and situated artefacts in our worlds, they come to matter in very particular ways. With this development comes a growing need to not just understand how these intimate technologies are used in everyday life, but also how they shape our ways of being and knowing, our culture and society.

While being increasingly connected to watches, fabric, toys, and larger techno-political infrastructures, the dark side of technological innovations might be that we increasingly experience violations of our private life, interruptions in human relationships and identity crisis. We see more and more young people succumbing for the pressure of living up to the glossy image of the perfect life, bodies, and relationships they see on social media. In a (Western) world with increasing individualisation, right-wing populism and cuts in women's health, and with technology companies earning money on tracking e.g. data about our menstrual cycle and sex life, it seems as if design of technologies, in their search for solutions, fails in addressing the bigger issues of contemporary society and our human condition.

In a time of great uncertainty and change, there is a need for design research to take a stance on the political and ideological impact that technologies have in society today and tomorrow. Historically, design has been about designing useful object, that would solve problems or change current situations into preferred ones. Lately, design has increasingly focused on experiences and meaning-making, questioning also which values are embedded in design. An increasingly humanistic and critical approach to design of digital technologies is gaining ground (J. Bardzell and Bardzell 2015). More and more designers and researchers agree that design and technologies are not neutral tools in the world, but rather argue that design is ideological and that technologies are embedded with values tied to the designer, society and contexts (Dunne 2005). Rather than ignoring that design and designing are inherently biased and perform a political role in society, designers examine how design shapes current society for better or worse (DiSalvo 2012). By engaging with larger social, cultural and political issues, designers take a critical stance to present society, in order to speculate on possible change (Dunne and Raby 2013; Bleecker 2009). Thus, design takes a political turn, and it is not only questioned why we design, but also how we could design differently.

With this article-based PhD dissertation, I contribute to interaction design research with a critical and feminist design methodology that, inspired by Haraway (Donna J. Haraway 2016), argues that by *staying with the trouble through design* design researchers may learn to be truly present in and respond to social, cultural and political issues of intimate technologies. With my doctoral project, I explore how "intimacy" as a figure and practice can bring design research home by engaging with the political and personal

intersection of design research, as inspired by feminist scholar Sara Ahmed (Ahmed 2017). My dissertation aims to both articulate and perform this intersection.

My article-based dissertation consists of three parts. Part one is *the "kappe"* and part two consists of my *articles* that engage with situated design practices and particular intimate topics. Furthermore, I have attached *a catalogue* that presents my design research as an open-ended annotated portfolio. Part one unfolds a theoretical argument about how Haraway's slogan of "staying with the trouble" may act as a design manifesto for designing with intimacy; a manifesto that rejects design as *a way out* of trouble and instead propose design as a way of *staying with* the trouble. More precisely, my work seeks to reject solutionist thinking, universal truths and dislocated future narratives in favour of trouble, situated knowledges and intimate futures. By drawing on my design practice and experiences of living a feminist life (Ahmed 2017), I argue that "futures are intimate, they matter today" and that intimacy cannot and should not be captured through technology. Instead I propose, that through intimacy we may think critically about our affective experiences in digital culture and capitalism, which values are embedded in intimate technologies, and how our subjectivity becomes shaped as we intra-act, with reference to feminist scholar Karen Barad (Barad 2003), with technology. Apart from this critical and feminist perspective, I propose that designing with intimacy is also a way of insisting that our future imaginations matter today and that by thinking differently about which futures we imagine and which stories we tell, we may counter the "cold" socio-political climate and the imagined and conceptual distance of technology, and rather learn to be truly present and respond to trouble.

The Trouble of Intimacy

This dissertation takes its starting point within the figure and practice of intimacy. But how do you write about intimacy? How do you even research intimacy? Intimacy is something we cannot fully comprehend, something that does not let itself down on paper, does not let itself be caught, manifested, theorized or designed for. Intimacy is always in flux. Unstable in nature. As soon as we put it into form, it is no longer intimacy. Intimacy arises between spaces, times and matterings, between the words I write, and between the objects I design and their meetings with people in situated worlds. It thus seems contradictory and troublesome to do and to write a dissertation about how we experience intimacy in our interactions with digital technologies and in digital culture in general. But the dissertation does not aim to find an answer to how we intimately interact with digital technologies, a framework for how we might design for intimacy, or a solution to how we can have more intimacy.

The fear and uncertainty that drives my curiosity towards our intimate interactions with digital technologies is the same fascination I feel, when I meet new unpredictable figures, feelings and locations of intimacy. Researching and designing *with* intimacy

(rather than *for*) has been a thinking and making process of staying with the trouble. Intimacy *is* trouble. Intimacy *as* trouble. In a time where intimacy itself becomes captured and managed (and indeed sold) through digital means, the troublesome process of researching our experience of intimacy with digital technologies has been a process of probing the social and cultural aspects of intimacy, and thus of computing. It has been a process where I as a designer/researcher/white-cis-woman/feminist (listed in random order but always already entangled) have explored and intervened different locations and times, different social and cultural understandings, and different technological and political materials and structures of intimacy. But I have not been alone in this. Researching intimacy is a curious and risky practice, and I could not have (re)searched the shaky grounds of intimacy, and the provoking and intimidating act of staying with intimacy, alone. Inspired by Haraway, my closest companions have been my designs; each of them both blossomings and manifestations of my time so far as a researcher of intimate technologies. My dear human and non-human readers, meet PeriodShare, Marcelle, Ingrid, AYA and U. They were the first, but hopefully not the last to be born into the alternative presents and still possible futures of intimacy with digital technologies. I will let them present themselves, for now through their most recent slogan, and sooner or later you will meet them again, as they continue to show up in my research and thus also in this dissertation.

= "academic" voice
= "anecdotal" voice
= PeriodShare
= Marcelle
= Ingrid
= AYA
= U

PeriodShare: Purifying data, messing with bodies

Marcelle: Computing is sadistic, users are submissive

Ingrid: Be vulnerable with technology

AYA: Be wilful yet responsible

U: Faces, faeces, interfa(e)ces
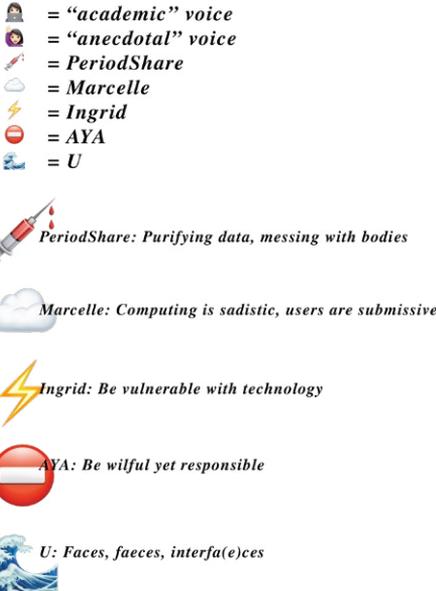
Fig 1. Voices in the dissertation

Gender and Technology

"Feminist trouble is the trouble with women. When we refuse to be women in the heteropatri-archal sense as beings for men, we become trouble, we get into trouble. A killjoy is willing to get into trouble" (Ahmed 2017, 255)

Intimacy is a gendered term often associated with female-coded characteristics (Ehrnberger, Räsänen, and Ilstedt 2012). Intimacy with digital technologies breaks down the boundaries of male-female, nature-culture, body-mind and displays both a gendered battlefield and an alternative located directly in the center of the historically male-dominated field of interaction design. By drawing on the history and culture of women in technology (Plant 1997; Hicks 2017), this dissertation contributes to feminist practices of interaction design, through reimagining how gender comes to matter in and through technologies. My design projects, PeriodShare, Marcelle, Ingrid, AYA and U, all have female-coded names (except PeriodShare that came to the world before I let my reflections on gendered technology manifest itself in the artefacts' names). As my companions to live and think with, they perform different characteristics of gender by queering the female gender and female gendered technologies. They live through objects and text. They make present how we are performing intimacy with digital technology and how this performing is interwoven with ongoing pasts, alternatives nows and future imaginings of gendered technology and issues of gender and sexuality across social, cultural and political structures.

Consequently, my design research works with intimacy as a figure of equality, respect and care, as well as a figure of curiosity, vulnerability and desire. It is a methodology for rewriting a feminist (design) story where (non)humans of different genders, sexes, colours and classes take on a willful, responsible, critical and open approach to designing and using digital technologies in their everyday lives. It is a reimagining of a computer that as a cultural machine, a way of seeing the world, is infused with blood and faeces, emotions and values, pleasure and pain.

During my studies in Digital Design at Aarhus University, and as a young, female PhD student in an IT-related field, I have experienced social and cultural boundaries, but instead of taking them for granted, I have curiously approached them and tried to understand the complex structures that bring forth boundaries. Whether I have wanted to discuss menstruation at an internet fair, design female sex toys in our male-dominated design lab, or contest sexual harassment in Japan, I have never stopped questioning why infrastructures enable certain technologies to be designed and certain stories to be told, and more importantly, how this could be different. With a cultural and social sensitivity, I strive to get my hands dirty and pick up what some would consider to be controversial topics; to go slightly off the path and stay with the trouble that it may bring. As such, this PhD dissertation is also a personal and political project; one that is highly influenced

by the sociocultural context in which it was written. It draws on the complexities of my experience of being in the world, the people I have met and meet on my way, the stories that unfold in front of me, the stories that inhabit the spaces I pass through. And it feeds back into these experiences with frustrations, provocations, love and care. With curiosity for the uncanny meetings that might arise when researching intimacy and intimate technology, and the risk and anxiety that this also brings, this PhD dissertation aims to explore:

Research Threads and Directions

- How can digital technologies be considered to be intimate? And how do we intimately interact with/through technologies?

- How can we use design to critically examine the role of intimacy in digital culture and how intimate technologies shape our everyday lives and subjectivity?

- What does intimacy mean in a contemporary context where our emotional and bodily experiences have been datafied, managed, and valorized?

- How can we use feminist Donna Haraway's slogan of "Staying with the trouble" as a design methodology to stay with the trouble of and respond to social, cultural and political issues of digital technology? And how does this contribute to current critical and feminist practices of design?

Aims

This PhD dissertation is situated in interaction design; the design of interactions between human and digital technologies. From the beginning of my PhD project, I have aimed to research intimate aspects of interaction design; that which comes close to us, becomes personal or private, and for this reason might be uncomfortable and difficult to talk about and design to. Intimate topics might be the kinds of taboos that we experience in life in general and in interaction design in particular. Taboos underpin social structures and functions to maintain cultural systems, and thus taboos hold an entry point into society and its social and cultural norms (Douglas 1966). It reveals a lot about our human characteristics, our ways of seeing and being, who we are, what we desire and what we do not desire. It has been proposed that consumer products only reflect "idealised notions of correct behaviour" (Dunne and Raby 2001), and that "Dark, complex emotions are usually ignored in design" (Dunne and Raby 2013). Similarly, it has been argued that technology design, in its search for solutions, ignores

the complexity of personal human issues (Blythe et al. 2016). Some of the underexplored or ignored areas in interaction design can be seen as social and cultural taboos (Almeida, Comber, and Balaam 2016), and I argue that we lose complex yet existential aspects of human life if we do not design for these intimate parts of everyday life. The moments in life, where we experience pain and pleasure, social injustice, existential crisis, lust and dark complex emotions. In my design research practice, I have worked with intimate topics such as menstruation, eroticism, unrecognized diagnosis, sexual harassment and gender and sexuality, and speculated about how exploring these aspects might make us fully acknowledge the complexity of these human characteristics as part of everyday life and carefully consider their presence in our future design visions[1].

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[1] Dealing with intimate topics, that from some perspectives might be perceived as only relating to the female gender, has sometimes made people conclude that I only design and research technologies for women. Although I do not disagree with this conclusion, I also realise that designing technologies from a gender perspective in areas culturally related to women's health—within a research field traditionally dominated by men—brings a particular strong emphasis on the gendered aspect of my research. This is, however, a clear example of how research itself is biased even before it is carried out. In designing technologies in areas culturally related to women, I take up an exception to the norm from a research perspective that is historically the perspective of a man. In researching menstruation, I carry out gendered research, whereas other areas are judged more neutral. Why is it e.g. that design research on menstruation is framed as research related to the female gender, while design research on football is not framed as research particular related to the male gender, when from a cultural perspective this is the gender norm? As an exception to the norm, designing with culturally female topics brings forth how research itself is biased and how this bias influences the social acceptance, prestige, funding and thus impact of particular research topics.

To engage with how my research is gendered, I have stayed with rather than ignored its cultural relation to women's health by for instance contributing the workshops "Hacking Women's Health" (Balaam et al. 2017) and "Woman-Centered Design" (Almeida et al. 2018). Consequently, I both acknowledge the historical cultural significance of my topics' relation to the female gender and how research itself is biased, while also promoting more diversity in the topics we research and highlighting that gender is fluid/not tied to biological sex and that issues related to the female gender are intersecting with race, class, religion and matter for all genders. E.g. not every woman is menstruating and not everyone who menstruates identify as a woman (thus I do not use a gendered pronoun about people who menstruate), but in understanding its cultural significance in technology design and use, it is important to understand both that the technology field is dominated by men who do not menstruate and that when used the technologies reconfigure structures beyond the female gender.

Contributions

In this dissertation I contribute to interaction design research with design theory on intimacy and intimate technologies through the critical-feminist design methodology "staying with the trouble through design". This contribution can be divided into three contributions: 1) an analytical theoretical exploration of how intimate technologies reconfigure our everyday lives and subjectivity, 2) a critical and feminist design methodology of staying with the trouble through design, and 3) design proposals that stay with the trouble of designing with intimacy.

1. Intimate Technologies

Through the first contribution, I propose as well as perform that what we understand by intimate technologies go beyond technologies that are placed close to the body or indeed in intimate parts of our bodies. Intimate technologies also go beyond technologies that work with intimate or tabooed topics. In going beyond the physical and conceptual way of thinking intimate technologies, I argue that technologies also become intimate in the complex ways that they reconfigure, as inspired by feminist STS scholar Lucy Suchman (Suchman 2007), the intimate space around our bodies; a space where private and public meet, where bodies become social and where our subjectivities are shaped. Secondly, I argue that this extends to also include the way that bodies through technologies become intimately reconfigured within their social, cultural, political and technological context. Through this understanding of intimate technologies, intimacy comes (in)to matter in its particular reconfigurations of a physical and personal as well as a social, cultural and political body. This understanding proposes, that the way that intimate technologies are *intimate* is inherently situated, but by exploring the situated knowledges of how technologies are *intimate* we can unfold the intersection of the personal and political role of technologies.

In producing situated knowledges of the role of intimacy in our relation with technologies, I focus on 1) bodily taboos, as they often relate to intimacy and the physical body, as well as the social body, 2) how intimacy relates to intimate space and the transition between intimacy, control and discomfort, and lastly 3) how bodies are also performed in and through society's norms of gender and sexuality and how it affects our subjectivity.

2. Staying with the Trouble through Design

The second contribution of this dissertation is a critical and feminist design methodology of staying with the trouble through design, inspired by Donna Haraway (Donna J. Haraway 2016), as an anti-solutionist approach to designing with intimacy.

Drawing on my own practice of designing intimate technologies, the methodology of staying with the trouble proposes how designers can design, not to solve problems, but to stay with the trouble, understand the trouble, and respond with/to the trouble. Staying with the trouble interweaves the willful (critical and feminist) practice of *staying with the wrong* (Ahmed 2017) with an open and risky practice of *curious visiting* (Donna J. Haraway 2016) in order to respond to/with *collective imagining*. *Staying with the wrong* (chapter 4) is a process of becoming a feminist designer and it includes actively learning to be present; question the given as given, stay with the feelings you wish would go away, and continuously practice self-reflection on own positionality. *Curious visiting* (chapter 5) encourages the designer to go beyond their own positionality by listening to stories of pleasure and pain, and visiting ongoing pasts and alternatives nows, and it highlights that this practice is never innocent but involves risks. Lastly, *collective imagining* (chapter 6) highlights how design by proposing future change can respond to and/or with trouble, and how we collectively can engage in future-making to rewrite collective imaginings and tell other possible stories within and across social and cultural contexts. Together, these three interwoven practices propose a way of staying with the trouble through design, as a feminist contribution to current critical approaches within interaction design research.

3. Intimate Design Proposals

The last contribution of the dissertation is the design projects that I have carried out throughout my PhD project. Each design project explores different ways of staying with the trouble of designing with intimacy. As interconnected but also independent projects, they contribute to the dissertation's general research on intimacy while also existing as separate design objects that become part of other contexts. The design projects include PeriodShare, Marcelle, Ingrid, AYA and U. PeriodShare is an internet-connected menstrual cup, that tracks your menstruation and automatically shares it on social networks. Marcelle is a wearable sex toy that reacts on the intensity of the surrounding wifi landscapes. Ingrid is a documentation of a woman living with electromagnetic hypersensitivity. AYA is a voice assistant that pushes back on sexual harassment, and U is a smart toilet assistant that tracks hormone level in bodily fluids. As research-through-design projects they contribute with knowledge and can be seen as inspirations and provocations that facilitate conversations and reflections on the subject of intimacy and the process of designing intimate technologies. In thinking-with the subject of intimacy, my design practice allows for an intimate engagement with the subject and topics; an engagement that through an intimacy with materials, processes and people produces situated knowledges, that nuance and complicate the topic of intimacy.

Methodology

The research threads, aims and contributions of this dissertation have developed as a dialogue between theory and design practice—in the overlaps between design, feminist and cultural perspectives. The methodology of this dissertation interweaves research-through-design, feminist technoscience, critical theory and software studies into a critical-feminist design methodology. Research-through-design is a design methodology that regards design practice as a way of generating knowledge on a subject potentially discrete from that of design practice in itself. In my research I draw especially on critical and feminist design research that generate knowledge on and perform the political and situated role of technologies (Dunne and Raby 2013; Redström 2017; J. Bardzell and Bardzell 2015). Feminist technoscience is a feminist theorizing of how science is constructed and among other things it values feminist objectivity and situated knowledges as central in research practice (D. Haraway 1988; Suchman 2002). For my research on intimacy, I have aimed to work in situated contexts and reflected on my positionality, while challenging dominant values and my own worldview. Critical theory, e.g. psychoanalysis and Marxist theory, has influenced my thinking on how capitalist values influence design of technologies, our understanding of our bodies and fantasies of the good life (Bataille 1993). Software studies and computational culture is a field that works artistically and critically with the computational processes of digital technologies (F. "Bifo" Berardi 2009; Chun 2017). I have drawn on this field to further my critical thinking about intimate technologies by analysing artworks and engaging with computational cultural theories. I will present my design methodology in greater detail in chapter three of this dissertation.

Structure of the Dissertation

As previously written, this dissertation is an article-based dissertation consisting of three parts. Part one is the "kappe". "Kappe" is the Danish word meaning "coat", and just as a coat is a thicvk and tailored piece of fabric that surrounds the body and prepares it to enter the rough outdoors, the "kappe" is a cohesive text that surrounds and fills the gaps between the appended articles. Consequently, the second part of the dissertation is the articles that have been peer-reviewed and published at conferences and as chapters in books and journals. These two parts are the norms of an article-based dissertations, and I have taken the opportunity to customise the "kappe" to fit my research's needs and desires, including playing with an anecdotal voice. However, I still found that the format of the articles and "kappe" did not quite fit the unstable, fragmented and playful approach of my design research. For this reason, I have chosen to include a third part,

which is a less dense, institutionalised and stabile text, but a more playful and ambiguous way for me to disseminate design research and for readers to meet design research. The third part of my dissertation is a catalogue that presents the design projects, the articles and the manifesto as one-pagers: easy, accessible information that can be quickly glanced upon or read. Furthermore, it can be cut apart and mixed, and it can be placed beside the dissertation and pulled in during the reading of the dissertation.

This dissertation is simultaneously a polished outcome of a research project *and* a dissection of a messy and still evolving research practice. It stitches and glues different parts together only to cut it apart and carefully mold it back together in a new way. As an assemblage of different articles, methodologies, theories, design projects, art and design objects, I have aimed to generate knowledge down to, from and through, the material bone structure of the dissertation. A dissertation is a story that unfolds, and instead of unfolding a grand narrative through the disembodied, coherent approach of the monograph, I have chosen to play with and trouble the dissertation format to make it clear that also the format, through which we write and think our research, matters. We can think of the dissertation through Haraway's cyborg figure. The format tells a particular story; a story in which the cyborg figure is both the protagonist and the body through which the world comes to matter. The constructed, fragmented, unstable, political, boundary-breaking, non-essentialist figure of the cyborg, is thus the body through which this dissertation will be told. Instead of packaging the fragmented and situated parts of my design research into a coherent whole, I insist—through the three parts of the dissertation—to embrace the multistability and plurality of bringing conflicting but fertilizing parts together. Each part thinks, knows, and becomes with each-other and as multistabile formations they together construct and generate new understandings of the knowledge already produced throughout my research practice.

The Dissertation's Parts

Part one, the articles and the catalogue together bring forth the argument in this dissertation. Rather than reading the dissertation as a linear narrative from one end to the other, I encourage a curious and exploratory reading and thinking process. I suggest that the reader thinks of the dissertation as a hypertext; a non-hierarchical structure with multiple entry and exit points and opportunities for shuffling between one part and the other, hereby filling out the holes, gaps and cuts with one's own reading and interpretation.

Part 1.

Part one consists of eight chapters: an introduction, a background to the dissertation, a methodology chapter, three chapters presenting the main contributions of "staying with the trouble through design", a manifesto and a conclusion.

The background, chapter two, presents the theoretical motivation for a transition from designing solutions to staying with the trouble. It presents key concepts of the dissertation and the design rationale—or the design research program—of the design research. This includes staying with the trouble, solutionism and fantasies of the good life, and intimacy in digital culture; theoretical perspectives that are grounded in feminist theory, critical theory, software studies and computational culture.

The methodology, chapter three, includes a presentation of the critical-feminist design methodology of the dissertation and its relation with research-through-design, critical and feminist design practices, feminist HCI, feminist techno-science, and software studies and computational culture.

Chapter four, five and six present the main contribution of this dissertation: namely the design methodology of "staying with the trouble through design" and its three interrelated practices of "staying with the wrong", "curious visiting" and "collective imagining". Each chapter presents a practice and exemplifies it through my own design practice and a critical-feminist perspective on a particular intimate topic and technology.

Chapter seven put forth a call for action to interaction designers through the form of a design manifesto. The chapter presents the design manifesto "staying with the trouble through design" and the ideas and reflections behind it.

Finally, the last chapter includes a conclusion on the dissertation.

Part 2. The Articles

The articles that I have attached to this dissertation have been peer-reviewed and published throughout the fields of HCI, design research and software studies. The articles are attached in their original format to reflect the context of their publication; they are written to a particular audience and thus reflects a certain language and way of thinking and doing. The articles reflect the interdisciplinary approach of my research practice, where I have been working between HCI, interaction design and computational culture and art, mainly bringing the critical thinking and practice of the arts into the domain of interaction design and HCI. The articles have different forms and purposes; while some are case-papers presenting, analysing and discussing the design projects, others use the design projects as starting points to unfold theoretical discussions or reflections on my research subject.

Part 3. The Catalogue

The catalogue is a collection of the objects and texts that make up the backbone of this dissertation. In the form of one-pagers, I present my design projects, the appended articles and the design manifesto in an easily graspable and visually appealing way.

Diffractive Reading Part One, the Articles and the Catalogue

As earlier stated, I suggest that the reader of this dissertation shuffle between part one, the articles and the catalogue; that the reader diffractively engages with the texts through one another to engender new diffraction patterns, to think anew, as inspired by feminist Karen Barad (Barad 2014). Perhaps the catalogue will provide a quick teaser and give an affective state of mind, that the reader will find pleasant to start with before diving into the "kappe". Or perhaps the reader will find it intriguing to read the articles first to understand the elements of my thinking and doing. I encourage the reader to read the "kappe" from the beginning to end, but to take breaks on the way to flick through the pages of the catalogue, or read an article.

Although the articles are independent text, situated within a particular disciplinary tradition and context, each article also brings a new perspective to the "kappe". Likewise, the "kappe" can provoke new thoughts on the articles. Some articles might be found more fitting to read at certain stages throughout the reading of the "kappe", as the particularity expressed through the design projects and case studies papers have unfolded the thinking throughout the particular chapters. I have included seven articles of which some are longer and more dense than others. Below I have sketched out my suggestion for, when they could be read, if not in the beginning or end of the "kappe".

The articles "PeriodShare", "PeriodShare: A Bloody Design Fiction" and "Sharing the Abject in Digital Culture" could be read when the reader is reading chapter four, because the chapter interweaves the design project PeriodShare and the topic of menstruation into its concepts and theories.

The articles "Bataille's Bicycle" and "It's not that it will kill me" could be read when the reader is in chapter five, since the chapter is about stories related to wifi and bodily pleasure and pain.

And the articles "Designing with Bias and Privilege?" and "Intimate Futures: Staying with the Trouble of Digital Personal Assistants through Design Fiction" could be read together with chapter six, because the chapter is about culture, situated knowledges and collective imaginings.

Contribution of Appended Articles

The following sections will briefly present the contribution of each appended article. The articles are listed in the sequence that I suggest they are read together with the "kappe".

1. "PeriodShare"

> Marie Louise Juul Søndergaard and Lone Koefoed Hansen. 2017. PeriodShare. In *Disobedient Electronics: Protest*. Edited by Garnet Hertz. The Studio for Critical Making. 2017.

The short text "PeriodShare" (M. L. Søndergaard and Hansen 2017) is a short presentation of my first design project PeriodShare. The project was contributed to "Disobedient Electronics: Protest" (Hertz 2017); a zine collection of politically-minded design projects. As a case, it is a contribution to the design discipline, and even if the text itself is not a strong research contribution, it is an example of how an object, that is part of a research practice, can circulate and enter into disciplinary discussions and alternative publishing channels. In this case, PeriodShare becomes part of a collection of "Disobedient Electronics", and thus its positioning shifts as it gains a new value in the context of this particular collection of objects.

2. "PeriodShare: A Bloody Design Fiction"

> Marie Louise Juul Søndergaard and Lone Koefoed Hansen. 2016. PeriodShare: A Bloody Design Fiction. In *Proceedings of the 9th Nordic Conference on Human-Computer Interaction*. NordiCHI '16. ACM (2016).

The paper "PeriodShare: A Bloody Design Fiction" (M. L. J. Søndergaard and Hansen 2016) is a work-in-progress paper published at NordiCHI'16. In the paper, we present the design and design process behind PeriodShare and analyse it as a design fiction that speculates on a near-future of quantification of menstruation. Through discussing the rationale and designer's intention behind PeriodShare, we encourage reflection on the political and cultural issues of self-tracing, sharing and intimate data. As one of the first papers on the underexplored topic of menstruation in HCI, it contributes to an increasing focus on designing for women's health related issues.

3. "Sharing the Abject in Digital Culture"

> Marie Louise Juul Søndergaard. 2016. Sharing the Abject in Digital Culture. In *A Peer-Reviewed Journal About_ Excessive Research*.

"Sharing the abject in digital culture" (M. L. Søndergaard 2016) is a text published in APRJA – A Peer-reviewed Journal About [Excess]. The text was presented at Transmediale Festival in Berlin, and is written in the context of culture criticism, aesthetics and art practices. The text unfolds the conceptual and theoretical motivation of PeriodShare in an aesthetic tradition, by analysing the design project in relation to the theoretical concepts of abjection, datafication and intimacy. By analyzing the design project with these theoretical concepts, the text both contributes with a new understanding of PeriodShare and new perspectives on the concept of abjection in a digital datafied culture. PeriodShare does not illustrate the theory, neither has PeriodShare been designed solely on these theories, but by putting them together, drawing lines and letting them think with each other, they bring new perspectives to both and together become something new.

4. "Bataille's Bicycle: Execution and/as Eroticism"

> Marie Louise Juul Søndergaard and Kasper Hedegård Schiølin. 2017. Bataille's Bicycle: Execution and/as Eroticism. In *Executing Practices*, edited by Helen Pritchard, Eric Snodgrass, and Magda Tyżlik-Carver. Autonomedia (DATA browser 06).

The text "Bataille's Bicycle" (M. L. J. Søndergaard and Schiølin 2017) is a chapter in the book "Executing Practices" published in DATA browser; a book series exploring practices at the intersection of contemporary art, digital culture and politics. The text includes a comparative analysis of the surrealistic and pornographic novel "Story of the Eye" (Bataille 1928) and my second design project Marcelle, which was inspired by the novel's narrative, philosophy and protagonist Marcelle's sexuality and destiny. The text unfolds a theoretical and philosophical argument about eroticism, control and digital technologies. Like the text "Sharing the abject in digital culture", this text brings multiple practice-based reflections into contact with philosophical and political theories. While the hermeneutic analysis of "Story of the Eye" brings new understandings to the design project, Marcelle, the design project also brings new perspectives to a contemporary reading of "Story of the Eye", and a general contribution to discussions on sex technologies and sexuality's role in digital culture.

5. "'It's not that it will kill me": Living with Electromagnetic Hypersensitivity"

> Marie Louise Juul Søndergaard and Lone Koefoed Hansen. 2017. "It's Not That It Will Kill Me": Living with Electromagnetic Hypersensitivity. In *No 7 (2017): Nordes 2017; Design + Power*, Oslo.

The paper "'It's not that it will kill me": Living with electromagnetic hypersensitivity" (M. L. J. Søndergaard and Hansen 2017b) is a case-paper that was presented at Nordes 2017, the Nordic design research conference. It presents my third design project: a study and documentation of how a woman balances a modern technological life with electromagnetic hypersensitivity. The paper presents her bodily symptoms, objects in her home and how she navigates the city. It uses the case-study to initiate particular discussions on e.g. how wireless technologies matter in people's everyday life, also those not suffering from EHS. By presenting an example of a way of living very different from the one most people experience, the paper also contributes with the argument of curious visiting; by visiting people with a different way of living designers can challenge their own way of seeing and gain new understanding of how technologies influence our everyday lives in unforeseen ways. As an alternative now, this case not only highlights a contrasted political belief, but a radically different bodily experience of technology use. The paper presents this case as a provocative example of why interaction designers should be better at designing for and with people different than themselves and an example of the unintended consequences, or non-use, of the technologies they design.

6. "Designing with Bias and Privilege?"

> Marie Louise Juul Søndergaard and Lone Koefoed Hansen. 2017. Designing with Bias and Privilege?. In *No 7 (2017): Nordes 2017; Design + Power*, Oslo.

The paper "Designing with Bias and Privilege?" (M. L. J. Søndergaard and Hansen 2017a) is a full paper presented at Nordes 2017, which aims to call for self-reflection in the design research community and initiate methodological discussions about how a designer's worldview influences their design practice and thus design research. It is a conceptual and theoretical paper, where we use PeriodShare and Marcelle as objects to analyse my own structural privileged position as designer and argue that this is an example of how every design practice is always situated, political and biased. As a call for action, the paper is more suggestive than prescriptive, and asks more questions than it gives answers. The paper does not try to provide a solution, but by pointing to the problem it opens a discussion on how the community may become better at disclosing hidden agendas and unconscious biases. Some of these discussions will be followed up on in this dissertation.

7. "Intimate Futures: Staying with the Trouble of Digital Personal Assistants through Design Fiction"

> Marie Louise Juul Søndergaard and Lone Koefoed Hansen. 2018. Intimate Futures: Staying with the Trouble of Digital Personal Assistants through Design Fiction. In *Proceedings of the 2018 Designing Interactive Systems Conference*. DIS '18. ACM (2018).

The paper "Intimate Futures: Staying with the Trouble of Digital Personal Assistants through Design Fiction" (M. L. J. Søndergaard and Hansen 2018) is a full paper presented at DIS Designing Interactive Systems 2018. It presents an analytical perspective on gender issues arising when a DPA moves into our home, through a presentation and analysis of the design fiction project Intimate Futures. The paper contributes with an analysis of gender issues of DPAs, and a methodological way of "staying with the trouble" of future technologies through design fiction. As part of this dissertation's appended articles, the paper responds to the paper "Designing with bias and privilege?". It aims to work intersectionally and with inclusive and cross-cultural design approaches to disclose unconscious biases and widening the scope of imagined futures beyond what could be imagined from the designer's own perspective.

Texts Not Included in this Dissertation

Apart from the appended articles I have published or contributed to the articles and workshop descriptions below. As these texts have an invisible but important role to play in my research process, they deserve to be mentioned (an alphabetic order).

> Teresa Almeida, Marie Louise Juul Søndergaard, Sarah Homewood, Kellie Morrissey & Madeline Balaam. 2018. Woman-Centered Design. In *DRS 2018 Design Research Society International Conference*. (Almeida et al. 2018)

> Madeleine Balaam, Lone Koefoed Hansen, Catherine D'Ignazio, Emma Simpson, Teresa Almeida, Stacey Kuznetsov, Mike Catt & Marie Louise Juul Søndergaard. 2017. Hacking Women's Health. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. ACM (2017). (Balaam et al. 2017)

> Trieuvy Luu, Martijn van den Broeck & Marie Louise Juul Søndergaard 2018. Data Economy: Interweaving Storytelling and World Building in Design Fiction. In *Proc. NordiCHI 2018*. ACM (2018). (Luu, van den Broeck, and Søndergaard 2018)

Marie Louise Juul Søndergaard. 2017. Intimate Design: Designing Intimacy as a Critical-Feminist Practice. In *Proceedings of the 2017 CHI Conference Extended Abstracts on Human Factors in Computing Systems*. ACM (2017). (M. L. J. Søndergaard 2017)

Marie Louise Juul Søndergaard. (submitted, 2018). AYA pushes back. In *Wilful Technologies. A publishing experiment on feminism + technologies + design*. Edited by Madeline Balaam & Lone Koefoed Hansen. (M. L. J. Søndergaard 2018a)

Marie Louise Juul Søndergaard. (submitted, 2018). Marcelle. In *Wilful Technologies. A publishing experiment on feminism + technologies + design*. Edited by Madeline Balaam & Lone Koefoed Hansen. (M. L. J. Søndergaard 2018b)

2

From Solutionism to
Staying with the Trouble

From Solutionism to Staying with the Trouble

This chapter presents the theoretical perspectives of this dissertation. As these theoretical perspectives has both inspired my design practice, been companion texts throughout my design practice, and proven helpful to understand and reflect on my design practice, this theoretical chapter could be seen as a design rationale rather than a background. To me, background sounds too passive, too concealed. These theories have not been in the background. Rather as foreground material; active texts acting as companions—as something I could think-with and design-with—they have been in constant dialogue with my critical thinking and design practice. As a design rationale, the theoretical perspectives are interconnected. By feeding into each other and building on each other, they think-with each other in a game of cat's cradle (Donna Jeanne Haraway 1994), together bringing new perspectives on the subject of designing intimate technologies. As argued by design researcher Johan Redström (Redström 2017, 4), as a designer and researcher I am as much responsible for the positions and perspectives from which I started or developed my thinking, as I am for the results of my work, and this chapter holds me accountable for the thinking (at least the thinking visible to me) that is foundational to my work.

The particular theoretical perspectives that I work with in this dissertation are framed under the headings: 1) staying with the trouble, 2) solutionism and fantasies of the good life, and 3) intimacy in digital culture.

Staying with the Trouble

"Our task is to make trouble" (Donna J. Haraway 2016, 1)

Inspired by her practices of thinking-with and word-play, the title of this dissertation is paraphrasing Donna Haraway's book "Staying with the Trouble" (Donna J. Haraway 2016) within the field of interaction design. Donna Haraway is a distinguished feminist scholar and biologist, who has contributed with research on the relationship between science, technology and society, in particular wellknown for her contribution to feminist technoscience. Ever since I read the Cyborg Manifesto (D. Haraway 1991) first time five years ago, a warm summer day in Berlin, I have been equally fascinated by and struggling with her writings. Fascinated by her ironic, pointy and playful portraits of a technological world in flux and struggling with how I could build on this not just in an analytical way—a way of seeing the world, a way of seeing how you are seeing the world, and a way of seeing the world differently—but also in a designerly

constructive way. It was thus with great joy and curiousity that I read her last book "Staying with the trouble" and watched the documentary "Donna Haraway: Story Telling for Earthly Survival" (Terranova 2016); both of which bring new perspectives to how we may think critically about our present social, cultural and political issues while speculating on preferable futures. While Haraway in her recent writings brings an important feminist perspective to the Anthropocene through multispecies kinship, what I bring with me from her writings is her way of thinking, her figure of "staying with the trouble", and her political engagement within the multiplicity of places, times, matters and meanings, that make up the world(s) we live and die in. "Staying with the trouble" is both a theoretical and methodological companion text for my dissertation, as it is a meaningful way of thinking-with my design research—even if my subject is intimacy and not environmental change. Through a particular feminist criticism of technological solutionism and a utopian perspective on futures, "Staying with the trouble" provides a timely and important critical-feminist contribution to the theoretical and methodological developments of interaction design research, and in this section, I will highlight particular concepts from "Staying with the trouble" that has influenced my design research. Below, I will present Haraway's critique of "technofixes", her insistence on "trouble", her use of "storytelling" and inspiration in "science fiction", as well as her thinking on "ongoing pasts, thick presents, and still possible futures".

Technofixes

Haraway argues, that "Staying with the trouble" demands that we learn to be truly present and through this question what "truly present" might mean. Haraway hereby criticizes and goes beyond those responses to our present societal issues that either believe in "technofixes" or that "the game is over". The first belief is that technology can and will fix our social, political or environmental problems, or as Haraway ironically frames it "technology will somehow come to the rescue of its naughty but very clever children" (Donna J. Haraway 2016, 3). The second belief is "that the game is over, it's too late, there's no sense trying to make anything better" (ibid) and it expresses a cynicism and a dystopian vision of the future. Both positions are dangerous and can be found in both technology industry and interaction design research. By going beyond these two beliefs, "staying with the trouble" suggests a way to respond to societal issues beyond "technofixes" and dystopian narratives. Haraway reminds us, that technology is not evil and that their people are not the enemy. Rather "it remains important to embrace situated technical projects and their people" (ibid). As a contribution to "these people of situated technical projects", I aim with this dissertation to suggest how interaction designers can stay with the trouble through design.

Trouble

In disturbing and troubling times, Haraway argues, that it is our task to make trouble, learn to understand more about the trouble, and hereby become capable of response to/ with trouble (Donna J. Haraway 2016, 1). By acknowledging and sticking to the fact that we live in a troubled world, full of contradictions, contrasts and complexity, "staying with the trouble" refuses to find easy solutions as a (temporary) way out of trouble. Trouble, hereby, can be argued to become something positive: something, that requires us to continuously engage with each other and the world, to become wiser about the relations in the world, and to make us reflect upon our ways of being and seeing the world.

To stay with the trouble requires us to by "truly present", Haraway argues. "Truly" and "present" might seem as rather essentialist and charged words, because what does "truly" and "present" mean in opposition to "untruly" and "non-present"? Throughout the dissertation, I will unpack different meanings of these words beyond the universalism inherent in "the truth" and "the presence". Through an understanding of trouble as something related to conflicts and different ways of seeing and being in the world, I argue, that we might see that the concepts of "truly" and "present" do not conflict with "untruly" or "non-present", but rather encourage us to engage with Haraway's notions of partial perspectives and situated knowledges (D. Haraway 1988).

Storytelling

Haraway argues, that a way of making trouble is to tell stories, especially those ordinary stories that do not get told or never got told. Stories that include conflicts and contrasts. By telling troubled stories you increase trouble. She argues, that listening to these stories is risky (Donna J. Haraway 2016, 132); the unknown gets known, the hidden gets displayed, the marginalized gets voiced. By telling and listening to stories, you get involved in each other's lives. Stories help us to remember what we thought we knew and Haraway argues, that by paying attention to the details of stories we become more response-able: "The details link actual beings to response-abilities" (Donna J. Haraway 2016, 115). To tell stories is a curious practice: "Curiosity always leads its practitioners a bit too far off the path, and that way lies stories" (Donna J. Haraway 2016, 128). This practice is not innocent but demands that we are response-able of the stories we tell, and our own biases and privileges in telling these stories and not other stories. Telling stories is not the same as finding or simply coming up with stories. Stories are always told by someone and not by no one, from somewhere and not from nowhere, in some time and not in no time. Their enactment is situated and so is their reception. Stories are handed over like a game of cat's cradle. Storytelling is both a world-making process, a process of making sense of a world and a process of sharing a particular world.

History is also created by those who write it, as argued by philosopher Michel Foucault on the archaeology of knowledge (Foucault 2002), and thus it is important to let other people write their histories. With a close examination on lost, forgotten or neglected histories that go against the dominant history, the linear grand narrative of past, present and future becomes troubled, because in adding value and complexity to the dominant history it becomes much less linear. In carving out and telling "dead" stories, stories that are troubled and perhaps valued as "untrue" or "non-present", storytelling is also a way of rewriting our past, present and future.

Science Fiction

Haraway's notion of "staying with the trouble" is inspired by SF: science fact, science fiction, speculative fabulations, speculative feminism, string figures. She argues that "SF is storytelling and fact telling; it is the patterning of possible worlds and possible times, material-semiotic worlds, gone, here, and yet to come" (Donna J. Haraway 2016, 31). As a method, she works with speculative fabulations "to propose near futures, possible futures, and implausible but real nows" (Donna J. Haraway 2016, 136). Science fiction, she argues, is not illustrations of thinking, but the thinking itself. It is philosophical texts. As thinking is a material practice with other thinkers, she argues that some of the best thinking is done as storytellers. In interaction design research, the practice of design fiction is a way of telling stories about/around digital technologies, and as I will argue through this dissertation, Haraway's thinking on storytelling and science fiction can contribute to theoretical and methodological understandings of design fiction and the fictions of design.

Ongoing Pasts, Thick Presents, Still Possible Futures

In filmmaker Fabrizio Terranova's documentary about Haraway, Haraway argues that "We need other kinds of stories. We must change the story" (Terranova 2016). This argument follows her critique on the "god trick": the seeing from nowhere, or the grand narrative that are blind of the embodied positioning, situated knowledges and partial perspective (D. Haraway 1988). Her argument, that "staying with the trouble requires us to be truly present" comes with the premise that we are all "entwined in myriad unfinished configurations of places, times, matters, meanings" (Donna J. Haraway 2016, 1). To be truly present requires us to care for our entanglement with different times; pasts, presents and futures. In her speculative fabulations, "Camille Stories", this means e.g. remembering your ancestors and thinking multiple generations into the future (Donna J. Haraway 2016, 136). She terms these different times ongoing pasts, thick presents, and still possible futures (Donna J. Haraway 2016, 133). Ongoing pasts refer to the way that pasts still influence our present and future, either in how historical context comes to matter in current societies or how neglected stories from the past still (can) influence us.

Thick presents refer to the plurality of lived experiences of the present; implausible but real nows, that are equally real as your own situated now. Still possible futures are the imagined futures of our future generations; how we think about the future today will both influence the future and it will influence how we live today. Here "still" refer to that it is crucial that we act today, otherwise these futures will not be possible. Although an impossible task, in the diagram below I have tried to sketch out these entangled times - the multiple unfinished configurations between times—in order to think-with and through Haraway's concepts.

In this dissertation, I am thinking-with Haraway's figure of "staying with the trouble" to inspire interaction designers and researchers to go beyond "technofixes" and instead "stay with the trouble" of contemporary social, cultural and political issues of technologies through design.
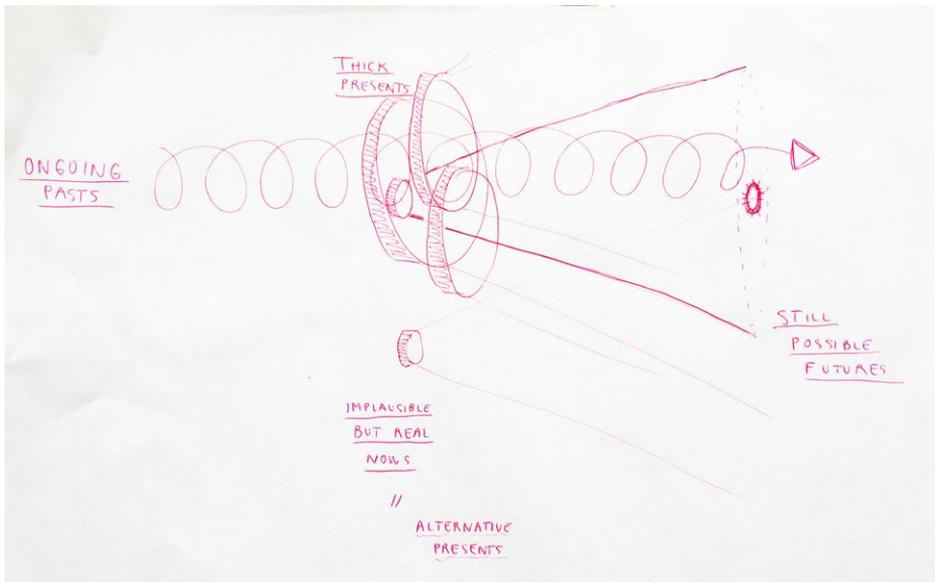
Fig 2. Sketch of the entanglement of ongoing pasts, thick presents and still possible futures. Sketch by the author.

Solutionism and Fantasies of the Good Life

If designing is a problem-solving process, then the purpose of a design is to provide a solution to a particular problem. A situation that involves some kind of trouble, which when intervened by a particular design—a technology, artefact, object—becomes untangled. In this way, designers and design researchers imagine that their technologies will solve problems, while people imagine that if using this technology their troubled situations will be untangled and their life will become "better". This section will present a critical perspective on design and use of digital technologies and how technologies shape our subjectivity. This is presented through critical and feminist theory on solutionism and fantasies on the good life. These theories have influenced and inspired my design research, and they provide a rationale for why designers should not only aim to design as a way out of trouble, but consciously aim for staying with trouble.

Solutionism

"Solutionism" became popular as a term after technology critic and theoretician Evgeny Morozov wrote about it in his book "To Save Everything, Click Here: The Folly of Technological Solutionism" (Morozov 2014). In this book, he critiques technology industry, especially the neoliberal capitalist context of Silicon Valley, California, in which much digital technology is developed today. Solutionism, he argues, is when technologies are applied to "fix" or "solve" deeply complex social, cultural or political issue, or when technologies are applied to "fix" problems that do not really exist.

Solutionism as a strategy can be traced back to the industrial revolution and urban planning and represents a particular way of seeing the world and people in it (Blythe et al. 2016). It has been argued that "HCI research is about solving problems related to human use of technology" (Oulasvirta and Hornbæk 2016, 4965). In HCI and technology industry, much technologies are designed to make people's everyday lives easier, better or more efficient, but as technologies enter into increasingly complex social, cultural and political entanglements and intimate parts of everyday lives, the "efficiency paradigm" that solutionist technologies carry with them brings as many problems as it solves. When talking about design and solutionism it is important to highlight that this raises questions of how we define design problems (Homewood 2018). As design is inherently problem-solving and future-oriented—it aims to change a current situation into a better future situation—the way we see the world and the "problems" in it is of importance. As an example, we could look at a technology that was designed to solve "the problem" of menstruation.

Fig 3. LOONCUP by LOON Labs Inc. Image retrieved from: https://www.kickstarter.com/projects/700989404/looncup-the-worlds-first-smart-menstrual-cup/description.

LOONCUP - "The world's first SMART menstrual cup"

"It's about time for us to redefine what this menstruation experience is all about. If we can't avoid it, let's face it with a better solution" (LOON Lab, Inc 2015).

LOONCUP is an internet-connected menstrual cup, that automatically tracks menstrual data such as volume and color directly from the blood and sends push notifications to the smartphone. LOONCUP was presented and funded on the crowd-funding platform Kickstarter. In the accompanying promotional video, we follow an empowered, Western woman who make it through her day due to the smart cup's quantification and management of her menstrual cycle. We see her waking up in white bedsheets, cycling in the fitness center with tight leggings, drinking coffee on a white couch and swimming in a swimming pool. Through these activities she is accompanied with real-time data about how full her menstrual cup is and how much time she has left until she should empty it—all in order not to experience the unthinkable, embarrassing scenario: that she will bleed through. This video shows a typical example of how digital technologies are presented and sold to consumers in popular media: they are told as stories rather than as technologies. As a form of storytelling, LOONCUP tells the story of a future where women do not have to worry about bleeding through. In this case, menstruation as a problem becomes a problem of potentially bleeding through and the "better" solution of menstruation—now that, to cite LOONCUP, "we can't avoid it"—is

to quantify it, track it and manage it through technologies. Framing menstruation as a problem to be "fixed" through digital technologies thus makes LOONCUP an example of Haraway's "technofixes" and Morosov's "solutionism". It reinforces the fear of bleeding through, rather than tracing the origin to the fear of bleeding through, and hereby it both invents a new problem and ignores its complex social and cultural implications. As also argued in (Homewood 2018), designing for menstruation is an example of that the way a design problem is framed, also frames how the world is seen and thus how the world is (re)produced.

Cruel Optimism and Fantasies of the Good Life

"A relation of cruel optimism exists when something you desire is actually an obstacle to your flourishing. It might involve food, or a kind of love; it might be a fantasy of the good life, or a political project. It might rest on something simpler, too, like a new habit that promises to induce in you an improved way of being" (Berlant 2011, p.1).

In "Cruel Optimism", feminist theorist Lauren Berlant explores what it feels like to be a contemporary subject and how subjects perceive the present affectively. The present, she argues, is informed by a state of crisis ordinary, where subject beings tread water while desiring to obtain "the good life"; which is not merely unachievable, but rather a fantasy. She argues, that this is a relation of cruel optimism. Cruel optimism describes when an attachment to something is preventing you from reaching your goal. Optimism is bound to the actions you make, in order to bring you closer to "the satisfying something that you cannot generate of your own but sense in the wake of a person, a way of life, an objects" (Berlant 2011, 1–2). At the center of cruel optimism, Berlant argues, is the "moral-intimate-economic thing called "the good life"". This "thing" called "the good life" is a fantasy, and according to Berlant fantasies of "the good life" include enduring reciprocity in couples, families, political systems, institutions, such as upward mobility, job security, political and social equality, and lively durable intimacy. As people continues to stay optimistic and attached to these conventional "good life" fantasies— even if they continue to show their instability and fragility—she argues they form a cruel relation between subjects and the desired objects; "They become cruel ones when the object that draws your attachment actively impedes the aim that brought you to it initially" (Berlant 2011, 1). The cruelty may show its face in these fantasies through their normative and conventional state: the definition of what exactly "a good life" implies is subjective (thus the quotation marks around good), however as more and more people or companies bring voices and glossy pictures to "the good life", a normative way of understanding of "good" unravels. Secondly, the cruel side of attachment to objects may show itself when objects that promise something knowingly do not provide it.

We can think of the smart menstrual cup LOONCUP as an example of a cruel object.

As an object it promises to bring you closer to "the good life" of not worrying about menstrual cycles. But as a form of intimate labour—a constant execution of body, of vagina, through tracking and managing blood levels—LOONCUP may initiate a constant worrying and checking the app to see how full the menstrual cup is. It can induce a fear and a shame because it makes the menstruation present as something that must be tamed. Hereby, the same object that should empower menstruating people can be argued to prevent them from flourishing.

Digital technologies are objects designed to improve the everyday lives of their users, and thus they face a risk of falling into the relation that Berlant calls *cruel*. Design is optimistic, in the way that designers imagine that their designs will improve people's life. Likewise, users are optimistic that in accessing e.g. a new technology, their life will be easier, better or more fun. For instance, you are optimistic that if you acquire a pedometer you will be healthier. Or you are optimistic that if you acquire a sex toy for couples you will have more lively intimacy with your partner. However, these material and affective attachments formed between designers and their designs, as well as users and their devices, may in many cases be seen as *cruel*. Often told from the narrative of "the good life" through promises of that if you buy this technology your life will become better, faster and more fun, digital technologies can be seen as a case of *cruel objects* that aim to bring people closer to the satisfying life that they are dreaming of, but are actually obstacles to their flourishing. Whether people dream of being more connected to friends and family, being more efficient at work, not bleeding through their white trousers, people—some call them users—perform and strive for "the good life" through their consumption of digital technologies, but both the illusion of "the good life" and the messiness involved in using technologies prevents people from achieving their goal. Consequently, following Berlant's argument on cruel optimism, digital technologies, which are often designed as solutions and induce desires and new heights of "the good life", can in their inherent *optimism* become *cruel*.

> *"We live in a moment of cruel optimism, in which our attachment to the promises of the good life is precisely what allows one to tread water, but not to swim" (Chun 2017, 78)*

Through Berlant's critical perspective on the affective experiences of being in a crisis ordinary of the present, we can speculate on how this matters for our ways of being subjects in a digital culture. In feminist and software studies thinker Wendy Hui Chun's recent book "Updating to Remain the Same" (Chun 2017), she refers to Berlant in explaining how subjects inhabit present networked spaces. She describes the becoming ordinary of crisis in networked spaces through examples such as slut-shaming and revenge porn; examples that pose that "leakiness" of networks are both the foundation of the network and the dangers of its vulnerable subjects. She argues that we must inhabit the present and turn "open" private spaces into truly public ones.

"We need to fight for the right to be vulnerable and not attacked" (Chun 2017, 13)

Chun argues, that our subjectivities are shaped by the crisis ordinary present on the internet. People, in this case young girls and women, become habituated to inhabit networked spaces in a particular way and must develop skills for inhabiting and staying with the trouble of a crisis ordinary, while demanding a space to be vulnerable and not attached. Chun argues, that they need to fight for publics rights—the rights to be exposed, to take risks and to be in public—"rather than seek a fake refuge in privacy" (ibid). The internet, as seen through the argument of Chun, can thus be seen as an example of cruel optimism: an infrastructure used by people to come closer to the satisfying "something" that they can generate *together* with the internet—for instance a sense of belonging, becoming or being-a-part—that however shows over and over again, that its structure is fragile, "leaky" and violent for those subjects already exploited and marginalized in society as such.

Marxist cultural thinker Franco "Bifo" Berardi also explores how optimism—and happiness—as an aspect of capitalism is hindering blossoming.

"Happiness" is not a matter of science, but of ideology [...] to be happy is not only possible, but almost mandatory. In order to reach this goal, we have to follow certain rules and modes of behavior" (F. "Bifo" Berardi 2009, 90–91)

Berardi argues, that advertisement industry, through its smooth and pixel-perfect imagery is creating an illusion on happiness—a fantasy of the good life—and manipulates people into believing they can come closer to the good life by buying the advertised product (F. "Bifo" Berardi 2009). Through the term "factory of unhappiness", Berardi argues that our present everyday ideological condition—whether we are in front of a computer, on our smartphones or window shopping—exploits and drains our emotional energy. He argues, that *un*happiness, and not happiness as it was otherwise promised in advertisements of new products, is the consequence of our interactions with a digital culture.

"It is well known that the discourse of advertisement is based on the creation of imaginary models of happiness that consumers are invited to replicate. Advertising is a systematic production of illusions, and therefore of disillusions, as well as of competition and defeat, euphoria and depression" (F. "Bifo" Berardi 2009, 92)

Intimacy in Digital Culture

A "lively durable intimacy" is one of the characteristics of "the good life", Berlant argues. If technologies aim to bring us closer to an improved way of living, then also the sphere of intimacy becomes a space of designing. Thus, digital technologies enter into our intimate lives to support "a lively durable intimacy". As intimate and affective experiences are datafied, managed and valorized through algorithms, intimacy becomes a space for optimisation and entangled with economic value. This section will present a critical perspective on the role of intimacy in digital culture. This perspective has developed throughout my design research practice and inspire the worldview and design rationale of my design projects. It provides a background to why, when designing with intimacy, the subject matter requires care and consideration that can only be attained if we stay with the trouble of intimacy. From a political perspective, this trouble includes the way that intimacy is entangled with economic value and how technologies manage and monetize our intimate bodies and intimate lives.

The Soul at Work

A popular way of "solving" problems in technology industry is through datafication and prediction algorithms. As a belief in data as the universal truth, the generation of data becomes a way of creating knowledge and supporting a greater ideological movement that could be referred to as the technological Enlightenment. As a way for individuals and companies to produce value, datafication—or the capture of messy undefined activities—is tightly linked to neoliberal capitalism. In "The Soul at Work", Berardi examines how contemporary digital culture not just put our body to work, but also our soul (F. "Bifo" Berardi 2009). He argues, that as "every fragment of mental activity must be transformed into capital" (F. "Bifo" Berardi 2009, 24), we become alienated not just from our bodies, but also from our souls, minds and intellect.

He argues, that during the industrialization the body put to work became alienated, but the soul stayed free. In today's digital culture, where the soul is put to work through e.g. menstruation tracking, suggestive sex toys or therapeutic sessions with your Facebook status bar or voice assistant, capitalism is increasingly close to our intimate lives and intimate selves. Through the term "imagineering", Beradi describes how through the marrying of such different fields as imagination and engineering (e.g. Walt Disney and Microsoft) corporations have taken control over the field of desire. The consequence of this is not repression, but hyper-expressivity and a hyper-connected and hyper-visual culture.

> *"Connected bodies are subjected to a kind of progressive inability to feel pleasure, and forced to choose the way of simulating pleasure: the shift from touch to vision, from hairy bodies to*

smooth connectable bodies. The control on the body does not come from outside. The control is built inside, in the very relationship between self-perception and identity" (F. Berardi 2009, 100).

The Uselessness of Intimacy

In "Work's Intimacy", cultural scholar and research director at Intel Corporation, Melissa Gregg, presents a critical perspective on how work has changed with the increasing use of digital technologies (Gregg 2011). As knowledge- and creative work can now be done everywhere and at everytime, work becomes ever-present in an intimate way, she argues. This has consequences for people's disciplined self. As work is "always on", people start managing their own time e.g. through self-tracking and productivity apps, and this has led to an increased focus on productivity as an outcome in itself. Under technological conditions related to work, intimacy has thus become connected to questions of control, self-discipline and surveillance.

She argues, that as the language of intimacy helps demonstrate the seductive and social dimensions of work, aspects of intimacy "have been aligned with capitalist profit" (Gregg 2011, 6), and this, she argues, may cause us alarm.

> *"If our capacities for intimacy are most regularly exercised in the pursuit of competitive professional profit, we face the prospects of being unable to appreciate the benefits of intimacy for unprofitable purposes" (Gregg 2011, 6)*

WeVibe

An example of a technology literally entering the field of desire is WeVibe (We-Vibe n.d.). WeVibe is an internet-connected vibrator that measures its activity and through a connected smartphone app it suggests how to improve a person's sex life. Through the sex technology's datafication of bodies, intimacy and sexual activity become exercised in terms of improvements, competition and production; purposes usually connected to work. Following Gregg, this is problematic in itself, but furthermore, it was released at Defcon, a hacking convention in 2016, that the app shares the intimate data with the company behind the product. Sexual activity thus becomes captured and turned into labour both for users themselves and for the company. Instead of being an activity without further goal than the activity in itself, the quantified number and value of the sexual activity enforces that sex something that users can improve—get better at—from a quantified point of view, while from the company's perspective sex becomes something they can create value out of.

Fig 4. We–Vibe® Sync™ by We–Vibe. Image retrieved from https://we–vibe.com/sync.

The Society of Intimacy

In his critique of neoliberal capitalism in the manifesto "The Transparency Society", philosopher Byung-Chul Han describes how intimacy has become a response to the objective-public world (Han 2015). He argues that when objectivity goes too far, we turn to intimacy. Furthermore, he argues that today's society is one built on transparency, and that the hypothesis is that this will lead to more democracy and freedom. "Intimacy" he argues, "is the psychological formula of transparency. One believes that one attains transparency of the soul by revealing intimate feelings and emotions, by laying the soul bare" (Han 2015, 35). Our current society, he argues, can be seen as "a society of intimacy": "a market on which intimacies are exhibited, sold, and consumed" (Han 2015, 34). As argued by both Han and Berardi, contemporary capitalist society is one where people put their soul to work through digital technologies and this is exploited by companies who built the platforms that make such intimacies possible while harvesting the value from them. This way that digital technologies manifest society's ideologies of happiness and "the good life" in very material objects and practices, is a case of how intimacy and intimate technologies enter into a relation of Berlant's cruel optimism. Intimacy becomes material-semiotic practices of competition and production, rather than a goal in itself.

CamFind, Amazon Echo Look & BodyScan

CamFind and Amazon Echo Look are additional examples of how digital technologies move closer to and commodify our bodies and homes. CamFind is an app that uses image recognition to search the internet for related images: in which you can take a picture with your smartphone and search the internet for related images and online shopping relating to what is seen in the picture. Amazon Echo Look is a camera that takes a full-body picture of you, rates your outfit, recommends you what to wear and which new clothes to buy. While these technologies are presented as neutral and objective machine vision tools, these technologies - like any technology as I will continuously argue and give examples on throughout this dissertation - are infused with biases and particular values and worldviews.

The artwork "Body Scan" by artist Erica Scourti portrays this in an intimate way by using the app CamFind to scan her own body (Scourti 2014). In the performance, Scourti takes pictures of her body parts while lying in bed and the app returns Google search results based on what was identified in the picture. With this performance, she repeatedly scans, identifies and objectifies parts of her body, to get a Google search-generated image of "what she is", or rather: what she could become according to Google. As a particular biased view on women's bodies, the Google searches return hits on e.g. how to shave your armpit hair or get a breast enlargement, and where to buy new lipstick or sexy lingerie. With this performance, she performs the Google image search algorithm: she turns the inside out of the algorithm and instead of subjecting to Google's objectifying and commodifying eye on her body, she uses it to turn the eye back on its own ideology. By performing the Google search algorithm on her body, Scourti shows its biases and ideological values. As such, BodyScan is both a way of seeing yourself through Google's eye, and a way of publicly exposing Google's way of seeing.

BodyScan is an example of how digital technologies can be (mis)used with a critical purpose, in this case to show the ways that technologies are part of a capitalist ideology where intimacies are captured and sold and where bodies are produced and consumed in particular ways.
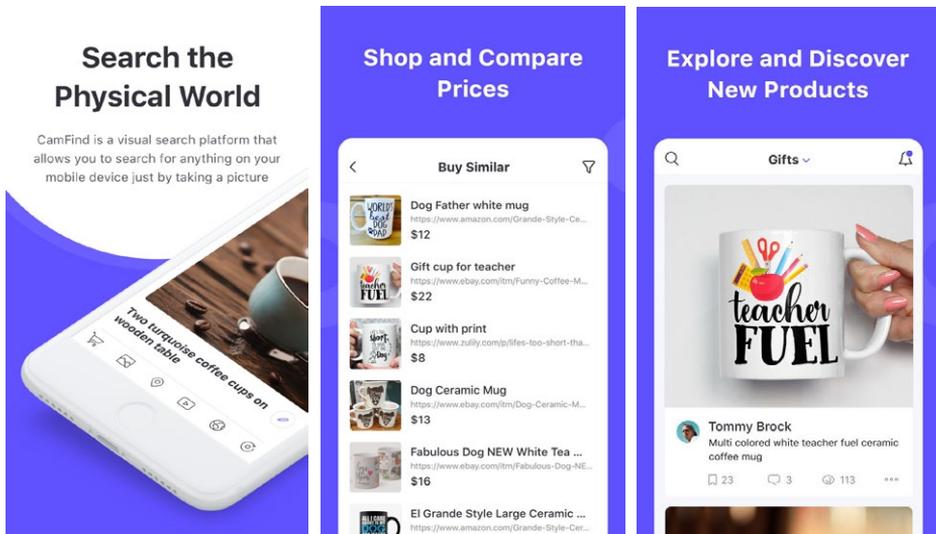
Fig 5. CamFind (top) is an app that uses image recognition to search the internet. Image retrieved from: https://itunes.apple.com/app/camfind-visual-search-powered-by-cloudsight-ai/id595857716. Body Scan (below) by Erica Scourti, is an artwork that uses the CamFind app to perform Google's way of seeing. Image retrieved from: https://www.somersethouse.org.uk/residents/erica-scourti.

From Solutionism to Staying with the Trouble of Intimacy

The last three sections of this chapter have presented the theoretical perspectives of this dissertation: staying with the trouble, solutionism and intimacy in digital culture. In this last part of the chapter, I will briefly summarize how these three perspectives interweave and have shaped my thinking and introduce how trouble comes to matter in design.

As highlighted in this chapter's title, I suggest a move from solutionism and the articulation and practicing of design as a problem-solving approach to an approach that is staying with the trouble. Throughout the coming chapters of the dissertation, I will unfold different designerly ways of staying with the trouble; different ways of staying with the trouble through design. Before that, however, I will highlight how part of the process—of staying with the trouble of designing with intimacy and designing intimate technology—has consisted of exploring an analytical and critical perspective on the role of intimacy in digital culture and the trouble that may arise when intimate technologies are adopted in our everyday lives.

The Trouble of Intimacy and Intimate Technologies

Following the last sections, we can think of different kinds or different layers of trouble of intimacy and intimate technologies:

One such trouble might be the way that gender comes to matter through technologies: how technologies are gendered or how they reinforce gender norms through their design and use.

Another trouble is the possible alienation of our bodies as they become tracked and managed through intimate technologies that are often designed from a very particular (Western, rational, dualistic) way of seeing bodies.

How agency and empowerment are promised to be facilitated by the use of intimate technologies, can also be seen as a trouble, as this relation might be one of *cruel optimism*: as well as more generally how the illusion of "the good life" is performed through the design and use of an intimate technology.

Another trouble is how the meaning of intimacy might be shaped, when technologies capture, digitalize and datafy different intimate parts of everyday life.

Yet another trouble is how responsibility is shared between stakeholders, when technologies empower and push individuals to care for their own health, when health is also a public concern and part of (at least a Scandinavian) welfare system.

Lastly, a trouble is how intimate technologies reconfigure bodies in the space between the private and the public: how privacy may become a concern, how bodies must fight

for public rights, and in general how power is executed on bodies.

Some of these troubles may have arisen from a solutionist way of thinking brought about through capitalism and a crisis ordinary that technology companies reinforce in their design visions of "the good life" and marketing of products as objects of desire. By staying and thinking-with these kinds and levels of trouble, as they manifest themselves in and through digital technologies and culture as such, they provide us with a way of thinking and doing design beyond solutionism.

The following is an open and unfolding definition of how trouble comes to matter in and through interaction design, and throughout the dissertation I will unfold and nuance this argument by presenting my own design projects as material-semiotic practices of trouble.

Trouble as an Alternative to Design Problems

Staying with the trouble is a process and practice of troubling, of making trouble. Haraway introduces her book "Staying with the Trouble" (2016) with tracing the origins of the word *trouble*. Trouble, she writes, derives from a thirteenth-century French verb meaning "to stir up", "to make cloudy", "to disturb" (Donna J. Haraway 2016, 1). Our task, she argues, is to be capable—with each other—of response. "Our task is to make trouble, to stir up potent response" (ibid). Our task is to respond to trouble with trouble. To stir up debate, interrupt what we are doing, disturb thinking patterns, and *trouble* the story in order to *change* the story.

Trouble might be thought of as both a noun (*the* trouble) and a verb (*to* trouble). The noun *trouble* can be thought of as an alternative to a *problem*, but trouble differs from problem in at least two ways: *problem* is countable, whereas *trouble* is uncountable, and, perhaps more importantly, *problem* is connected to the word *solution*, which *trouble* is not. In design practice, there is a tradition of finding problems (or coming up with problems), defining problems, and solving problems. As such, problem and solution often come as a binary pair, a dichotomy: when framing relations in the world as problems, you either imply that there is a corresponding solution, or that we could work together to find a solution.

Staying with the trouble, I argue, does not require such a relationship to problems (and solutions). Staying with the trouble does not imply defining trouble in order to solve it. Rather, staying with the trouble shifts the language of problems and solutions to a language of trouble and response. Responding to trouble requires shifting perspectives and changing attitudes, as well as engaging in argumentation and (re)negotiations. Following Haraway's thinking, I argue that trouble, as an alternative language to problems, points to the complex adversarial and affective relations between humans and things, and it encourages designers to care for the conflicting viewpoints embedded in trouble as well as the (re)negotiation and argumentation that is necessary to respond

to trouble. Trouble does not have "easy fixes" or solutions, and as such it proposes an alternative to how design deals with problems as well as solutionist thinking. When dealing with highly complex social, cultural and political issues—which is more often the case in interaction design (Redström 2017, xi)—a language of trouble contributes with a curious, risky and sensitive engagement with and in the world.

As an alternative to the language of problems-solutions in design, the notion of trouble brings at least two particular contributions to design: 0) it fosters "design's capacity to deal with complexity and conflicting concerns" (Redström 2017, 2), by prompting designers to think beyond solutions towards the social, cultural and political conflicts embedded in trouble, 2) it prompts designers to reflect on how their situated engagement with trouble has consequences or brings trouble; to both engage with and make trouble. Trouble, thus, treats designers' engagement with the world as a more complex two-way active relation, rather than the simpler one-way passive relation that the language of finding/solving a problem brings. Whereas the concept of problems might relieve the designer their responsibility, since a problem is something out there, the concept of trouble requires a deep engagement with issues in the present world from within the world and from within the designer. Trouble keeps trouble close. Trouble, hereby, is not about solving paradoxes or issues from the outside. Rather, trouble is about engaging with conflicts from within; from within the trouble and within oneself.

Trouble as Material-Semiotic Practices

Through my design projects (as articulated in chapter 4-6), I have deeply engaged with and stayed with some of the previously-mentioned troubles of intimacy, to explore and nuance how they come to matter through a particular design and the practice of designing. As I began my design practice and when design projects were analysed or exhibited, more troubles arose, and as such, the troubles mentioned in this and the following chapters are a "mixture" of the troubles I have engaged with through theory or analysis *and* the troubles I have personally encountered when engaging with the world through design practice.

As technologies get designed and used, troubles arise on material as well as social, cultural and political levels. This way that technologies come to matter, in a potentially troubled way, can be articulated through the perspective of new materialism. Together with physicist-philosopher Karen Barad, Haraway (D. Haraway 1988) has anticipated a new materialist turn in feminist thinking; a turn in feminism where materiality and matter require a more active role in meaning-making and performativity of our subjectivity and body. Our ways of being in the world, Haraway (D. Haraway 1988) and Barad (Barad 2003) argue, can only be articulated as "material-semiotic" or "material-discursive", as we are always already both *intra*-acting with our material technologies (or objects), our bodily fleshiness and the discursive-linguistic. In opposition to *inter*action, Barad

uses the term *intra*-action to point to the "ontological inseparability of agentially intra-acting "components""(Barad 2003, 815). In the cases of *inter*action design or human-computer-*inter*action, through Barad's terms there is no inherent separability between or independent existence of e.g. human and computer—human and computer are always already *intra*-acting.

As will become clearer in chapter 4-6, and inspired by Haraway and Barad, troubles are intimate material-semiotic practices, that interweave objects, bodies and the discursive-linguistic. In other words, trouble is not bounded to or embedded in an intimate technology as such, and neither is it only performed or exists as a social, cultural or political issue. To understand the kinds or layers of trouble that manifest themselves through our use of intimate technologies, we must engage with technology and bodies as material-semiotic actors. Actors that are "active, meaning-generating part[s] of [the] bodily apparatus" those "boundaries materialize in social interactions" (D. Haraway 1988, 595). Inspired by Haraway's writings, understanding trouble as a material-semiotic practice is part of staying with the trouble.

Trouble, I argue, lets us understand better how matter comes to matter; such as how intimate technologies can enable or reinforce social conflicts by materializing in social interactions; or how our bodies become particular kinds of bodies when inhabiting digital networks.

Staying with the trouble, in this way, lets us understand how trouble manifests itself on different levels—from the material to the social or political discursive level—but that these cannot be thought apart. To understand trouble (better), we must think-with it as a material-semiotic practice that interweaves material technical objects with our bodily fleshiness *and* the discursive-linguistic. Chapter 4-6 will unfold how design and designing, as a material practice, is particularly suited to stay with the material-semiotic practices of trouble, and how my design practice manifests different kinds and levels of trouble.

3

Researching Intimacy through Design

Researching Intimacy through Design

"It matters what ideas we use to think other ideas (with) [...] it matters what matters we use to think other matters with; it matters what stories we use to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories" (Donna J. Haraway 2016, 12).

Following Haraway's repetitive, mesmerizing quote, it matters what relations have formed, form, and will form the kind of knowledge that is generated in and through this dissertation. It matters which thoughts I have used to think thoughts, which theories, methods, material matter I have used to stir (up) my design practice. Which values, beliefs, assumptions have contributed to my way of seeing. It matters which people I have met, cited, collaborated with. Which places I have visited, which cultures I have engaged, which politics have governed, which hormones have secreted. It matters what relations tie this dissertation in place and time and how—as design research—it performs a way of thinking as well as a way of making.

In my design research on intimacy and intimate technology, I have produced knowledge through designing. As a process being embodied and situated, personal and political, researching intimacy has itself been intimate. Researching intimacy *is* intimate. At least when it is done from the position from which I stand. In this chapter, I will give voice to the methodological considerations of this dissertation. As a dissertation in interaction design working with a critical and feminist design methodology, I will uncover what kind(s) of (design) knowledge that is generated in this design research, and I will position it and myself within the broader design research field that ties, relates and knots my research.

Making Design Theory

My design research on intimacy and intimate technologies has unfolded through design practice, as research-through-design (Frayling 1993). More specifically, my methodology is influenced by programmatic design research (Redström 2017) (Binder and Redström 2006) (Löwgren, Larsen, and Hobye 2013); a practice-based and artistic design approach that regards interaction design as both an object of study, and a way of producing knowledge about a subject potentially outside the field of interaction design. Through the term "design research programs", design researcher Johan Redström has articulated an approach to theory development in design research.

"Design research programs" is the iterative and unstable articulation of a design researcher's general research aims, worldview, core theoretical framework and the beliefs and assumptions driving a practice of design*ing* (as a verb) (Redström 2017). As design practice is unfolding and exploratory, so is the design research program. The program is iterative and unstable as it continues to develop throughout the research process, which is contrary to research questions that have a more pre-defined and stable character. As argued by Redström, "A program is characterized by both intent and unfolding, an intertwining of projection and process" (Redström 2017, 88). It depends on "a certain worldview, a basic set of beliefs and assumptions, to be effective" (ibid). Working with programs, thus, is both a way to be aware and responsible for one's positionality and research biases (as biases in research cannot be avoided), and a way to challenge your own and your research's worldview from within in a nonprotective way. Through iterative design experiments—the design projects and their particular outcomes, *a* design (as a noun)—the design researcher both expresses the program, explores the boundaries of its core and challenges its worldview.

Design research programs aim to both make sense of, bring structural transparency to and make design theory of the kinds of design research processes, that do not follow the scientific logic and dichotomy of (research) questions-answers and problems-solutions, but are more oriented towards problem finding, speculation and proposing alternatives to current design ideals, and thus more unstable, situated and experimental in character.

"Design research programs", Redström argues "sit somewhere in the middle of the tension between the particular and the general" (Redström 2017, 88); thus, both caring for the particularity and situated knowledges inherent to design practice and the stabilizing and generalizable structure that characterizes scientific knowledge and theory.

The design theory that is "made" in design research, Redström frames as *transitional theory*; "a kind of design theory that is inherently unstable, build, and dynamic in character" (Redström 2017, 2). Programs are not supposed to develop into stable structures over time, rather they should be conceived as "an opportunity to experiment with intentionally transitional foundations for design" (Redström 2017, 98); allowing us to ask questions and propose alternatives to what design *could* be.

I have articulated my design research through Redström's notion of the design research program, as the care for the unstable, situated and practice-based approach of research is closely related to how I have made sense of my research process. The articulation of my research through a design research program has both made me confident in the kind of research I have carried out, that at times seem ever-evolving and messy, and it has helped me articulate the knowledge that is unfolding. Similarly, it has helped me care for the positionality of my design research and its worldviews, biases and assumptions; inherent parts of research that are otherwise often neglected in design and HCI. Whereas Redström does focus on a design research program's situated nature,

he does not, however, draw much attention to the designers and researchers themselves; to their bodily fleshiness, subjectivity and situated positionality in a culture and society. We might ask, who is the designer and researcher of a design research program? What influence do they have on the program? And what influence does the wider situated context have on the program? Redström argues that the program is situated and that a program articulates the worldview and assumptions of design research, but the design researcher is kept out Redström's theory of design research programs. Thus, we might wonder how a more feminist presence of an (also) embodied, political, and personal researcher would shape the articulation of the design research program. Throughout my dissertation, I have aimed to care more for this positionality of the design researcher, and through a feminist perspective articulate and perform how my position comes to matter in my design research program.

Sketching out a Program

When sketching out the design program for this dissertation, I framed an oppositional statement; that design does not have to be playful or fun and that humans are not predictable, happy, rationally thinking users. As a foundation for my design research, I instead proposed that my project would:

> *"perform a nuanced perspective on the body and individual, departing from a way of thinking in which we should also design for the intimate human of which pain, sex, menstruation, sorrow, tragicomically stagings etc. are not unarticulated or even taboo but inherent complex characteristics of being human - also in a post-digital culture" (statement in my initial PhD application, 2014)*

I stated that I would use humour and pain as aesthetical grips to unlock the potential of this way of thinking about our present subjectivation. Furthermore, I stated that my role as designer and researcher would be to take the position of the "idiot" (Goriunova 2013). As framed by software studies scholar Olga Goriunova in reference to philosopher Gilles Deleuze, the idiot and the tactic of idiocy is "a mode of living that explores the true through the false" (Goriunova 2013, 223). Idiocy practiced as a mode of living through "new media" takes a performative character, Gorionova argues, where subjects act politically in online publics through performing with humour, formal simplicity and DIY aesthetics.

> *"Idiocy problematizes the mechanization and exposure of subjectivation; it is light and funny, but also very dark in what it asks and reveals through its behavior: the **trouble** of the current human condition." (Goriunova 2013, 233) (emphasis added)*

The programmatic statement, of exploring our post-digital subjectivation through tactics of idiocy in design, has guided and motivated my design research, and although

I did not plan my research in details and executed it afterwards, when I look back at the statement—as a way of thinking and a mode of living—my following three-four years of research have actually unfolded and challenged, concretized and theorized the general argument of this statement in particular political, philosophical and designerly ways. For instance, my first design experiment was about menstruation, while the second was about sex, humour has been a recurrent tactic, and indeed *trouble* was always present in my way of thinking about our subjectivation in present society.

Experiments Pushing the Program

In my design research, the general research directions and the particular design practice have mutually shaped and influenced each other as research has unfolded. Each of my design projects can be thought of as design experiments: they are not solutions or answers to a research question, but they are ways to explore the implications of a research direction and thus act as experiments that challenge the foundation of my design research program. The drawings below (Fig 6-7) illustrate this relation and tension between the particularity of the design experiments and the more general aim of the design research program.
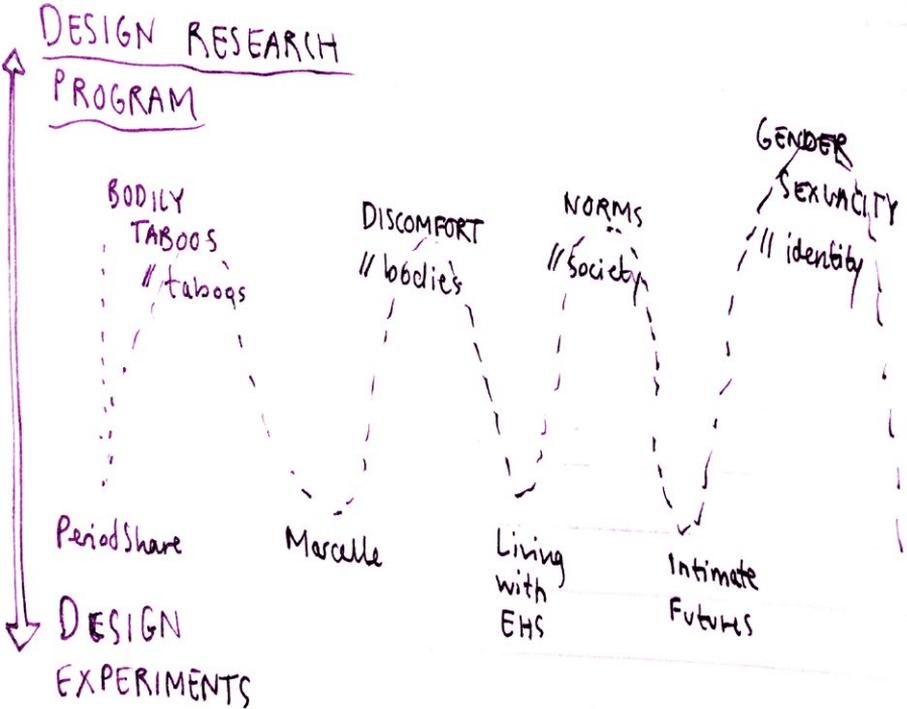
Fig 6. Sketch of how my design research has evolved between my design research program and design experiments. Sketch by the author.
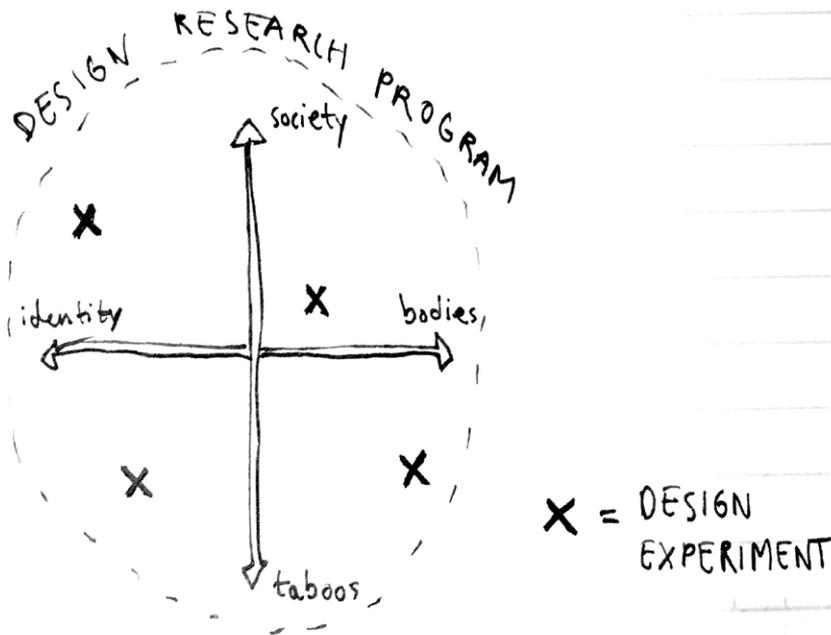
Fig 7. Sketch of how my design experiments has challenged the boundaries of my
design research program. Sketch by the author.

My design experiments relate to each other in different ways, which is further explored in chapter 4-6. Some experiments tie together by relating to similar topics, such as menstruation and sex, while other experiments tie together by sharing the same aesthetics or technological material. As each experiment has been followed by another experiment, rather than happening in parallel, they have fed into each other in an iterative conversation with the general design research program. In some cases, a design experiment left things untouched, that could be further explored in the next design experiments, while in other cases a design experiment was made to challenge, counteract or broaden the previous design experiment. In retrospect, the earlier design experiments cast a light on newer experiments, while newer experiments provide a new perspective to older experiments. In this way, knowledge continues to unfold even if the material design practice of each design experiment has ended.

My first design experiment, PeriodShare, became important for my design program as it sketched out initial concepts, methods and materials, and thus took up a big "conceptual" space in the design program. After this design experiment, the identity of my research—both seen from my own and other's perspective—was that I was not a PhD student researching intimacy and intimate technologies, but a PhD student researching menstruation by designing underwear. The particularity of this design experiment left a

big imprint on the foundation of the design program, but as the program was still in its beginning phase, the next experiments should both add something new to stir up and challenge the foundation *and* continue to explore a similar design space. Consequently, the next design experiment, Marcelle, worked with similar methods, material matter and aesthetics, but instead of menstruation and self-tracking, it explored sex and wifi-connectivity. This pushed the program by working with another kind of tabooed topic, thus both broadening and strengthening the foundation that the first experiment laid out. The third design experiment, which is about Ingrid who is a woman living with wifi-allergy, came to the surface in an unexpected time and place, but since it really challenged the program's foundation, especially laid out in the Marcelle experiment, I chose to pursue its effect on my design program. With contradicting design perspectives on wifi—from Marcelle's pleasure of wifi to Ingrid's pain of wifi—the two design experiments broadened and nuanced the understanding of bodily impacts of intimate interactions with wifi. As all these three design experiments were rather short, somehow provocative and mostly designed from my perspective, the final design experiment, Intimate Futures, aimed to challenge my way of thinking and designing by working with some of the same issues, but including more people in the process and working within a different medium and cultural context.

These decisions of and reflections on topics, methods, theories and materials have challenged and expanded the design research program, and in a designerly way they have unfolded the transitional and unstable kind of knowledge that has been/is generated through my design research practice.

Feminist Objectivity

Interaction design research generates knowledge (based) on a particular artefact's situatedness in a particular situation and contexts, however as it (still) a new discipline and as it consists of very different approaches and purposes, it is still discussed how to establish criteria of rigor and relevance (Fallman and Stolterman 2010). Design researchers have characterised the kind of (design) knowledge that design research produces as intermediate knowledge: knowledge that bridges the particularity of design experiments with generalizable theory (Löwgren 2013). Examples of formalized ways of framing this kind of knowledge are Annotated Portfolio (Bowers 2012) and Strong Concepts (Höök and Löwgren 2012). The conflict of which kind of knowledge that is made in design research partly arises in a possible misconception of design research as subjective.

To nourish the inherent particularity of design research practice—and the trouble that this brings—I choose to work with a feminist perspective on interaction design research, that embraces and consciously reflects on the research(er)'s situated knowledge, partial perspectives, feminist objectivity and positionality (D. Haraway 1988; Suchman

2002). My design experiments have produced situated knowledge: knowledge that is situated in the context in which it was produced and thus not necessarily transferable to other contexts. In paraphrasing Haraway, this knowledge does not exhaust or extract all possible knowledge about a particular design situation; the knowledge is not overarching nor can it tell everything about the particular situation, but by applying a certain partial perspective in/on a situation, I can say "something" about "something" and not everything about everything. With this, I take a position of feminist objectivity: by being situated—and reflecting on my situated position while disclosing it to others— I can say "something" about the "general". Thus, there is objectivity in the situated. There is objectivity in staying with the situation.

In researching intimacy and design of intimate technologies, I have not only cared for my research's situated knowledge and partial perspective, because of the epistemology of design knowledge, but also because the subject of intimacy itself prompts me to care for feminist objectivity. Intimacy is not something that can be observed from the outside. Neither is it observable from within. In reference to Barad's theorizing of touching, there is no such thing as intimacy. Intimacy, as a materiality and matter, "is always already touched by and touching infinite configurings of other beings and other times" (Barad 2012, 7). Intimacy is always (re)configured between spaces, times, matterings in intra-action with people and objects. In researching intimacy, I am always already both creating/disturbing intimacy *and* being part of a practice of intimacy in a situation, where intimacy is (re)configured in material-semiotic ways. Intimacy is always already fully alive tied to material-semiotic practices ongoing without my intervention; and thus, when I intervene these situations through my design research practice, they will always become reconfigured anew.

This feminist objectivity will be performed throughout the dissertation, and it especially manifests itself through the anecdotes in chapter 4-6. In this dissertation, the anecdotes present particular experiences that I had throughout my design research practice. The way I use anecdotes is related to Redström's "anecdotal evidence"; stories from his academic career that that he uses to exemplify his design theory (Redström 2017), and to design researcher Karin Ehrnberger's personal stories that she interweaves into her dissertation (Ehrnberger 2017) to relate her personal life to her design practice. My anecdotes work to present situated knowledge and bring the reader closer to my worldview as well as to articulate ideas and concepts more general than the brief story itself. As Ehrnberger writes:

> "*Jag vill att du ska lära känna mig. Jag bor i en kropp. En designerkropp och samtidigt en forskarkropp [...] Men jag bor också i en kvinnokropp och har i hela mitt liv blivit bedömd utifrån mitt biologiska kön*" (translated Swedish-English: "*I want you to know me. I live in a body. A designer body and at the same time a researcher body [...] But I also live in a female body and in my whole life I have been judged based on my biological sex*") (Ehrnberger 2017, 17).

Ehrnberger adds a personal, embodied presence of the writer of a dissertation into the dissertation. The design researcher of a design theory becomes embodied in and through Ehrnberger's anecdotes, which adds a located accountability and presence of a worldview, that is difficult to locate in Redström's design theory. Even if Redström focuses on a design theory's worldview and basic beliefs, after reading "Making Design Theory", you might still wonder, who and where is this designer that is making design theory? In this dissertation I shed a light on this question, and the anecdotes represent a particular way of performing the situated presence of the design researcher in a design theory.

Making a Mess with Design Methods

The above-mentioned considerations on my methodology, my research's worldview and its transitional dialogue between theory and practice, design program and design experiments, as well as the particular and general, are all reflected in my use of design methods. My use of design methods is not tied to a particular discipline or way of practicing and researching design. My starting point is that my use of methods is particular to the kind of design research practice I carry out in the situated context, and that I am more interested in the kind of politics and worldview that the methods bring about than the orderly, prescriptive ways that the methods were intended to be used. I have not used methods to gain guaranteed scientific results, but instead as imaginative and inspirational sources of energy—a way of (re)tuning and (re)visiting the world— that would lead the way forward in my design experiments and design program. The methods have been chosen based on the worldview of the design program and my background trained as an interaction designer with a foot in art and aesthetics. As methods are not prescriptive but performative, they are not neutral but bring political implications (Law 2007). They allow me to ask certain questions and respond with certain answers and using one method in favor of another is always also a political and institutional decision. In interaction design research, especially in user-centered design in the field of HCI, methods are an important part of a research-through-design practice. Here user interviews, surveys and user testing are applied in the design process to bring about a more "successful" artefact and research outcome. Although not an official recipe of the prototypical research-through-design process, the conventional use of these methods institutionalizes a particular way and tradition of doing design research, that also generates a particular kind of design knowledge. This dissertation's use of methods provides an alternative to this way of practicing research-through-design, by using methods from both design and artistic traditions in a rather curious and messy yet reflective and political way. Although some of my methods are from traditions of "problem-solving" design approaches, in my design practice they have been used with a different perspective, purpose, and tradition, namely that of "problem-finding", design

exploration (Fallman 2008), or what I in this dissertation refer to as staying with the trouble.

The methods used during my design research practice include cultural probes (Gaver et al. 2004), interviews, ethnography-inspired methods, auto-ethnography, annotated portfolios (Bowers 2012), design fiction (Bleecker 2009), sketching, poetry, performative interventions, co-design workshops, performance workshop, exhibitions (Dunne and Raby 2013) , extreme characters (Djajadiningrat, Gaver, and Fres 2000), rapid prototyping and experience prototyping (Buchenau and Suri 2000), analysis of art and design objects (J. Bardzell, Bardzell, and Koefoed Hansen 2015), manifestos, and more. Many of these methods are traditionally used in interaction design processes, but in my combination, they bring forth a design research practice and program that build on designerly and artistic foundations that value an assemblage of embodied, interpretative and imaginative—even fictitious—making practices.

The Role of the Artefact

The aim of my design practice and its outcomes has not so much been to make the knowledge of my research explicit to an audience, but rather to invite the audience into "unfinished thinking" as it is practiced in artistic research (Borgdorff 2010). My practice and its outcomes, the particular design artefacts, perform a thinking process; a way of thinking in, through, and with design. The role of the artefacts, thus, becomes to invite other people into this thinking process. The design artefacts invite people to think-with the knowledge, rather than to communicate or make the knowledge explicit (Seago and Dunne 1999).

Apart from theories and methods, a particular knowledge outcome of my design practice is the design artefacts themselves. The role of my design artefacts is to produce knowledge in the form of discussions with the public and interpretive analysis (J. Bardzell, Bardzell, and Koefoed Hansen 2015). As artefacts they work in a political and ideological way by performing an argument (DiSalvo 2012). This argument is not stable but comes to matter in a dialogue between the artefact, the designer and the audience. This dialogue can for instance be facilitated through exhibitions, as it was the case with PeriodShare and Marcelle that were both exhibited at Internet Week in Aarhus. The exhibition works as a space to facilitate conversations with the public and bring forth discussions taking starting point in the artefact. The artefacts may inspire, provoke or simply talk back to the audience, and as such initiate a conversation about e.g. how it would feel to have the artefact in one's everyday life and how it would change the way they perceived themselves and experienced the world. In the exhibitions I took part in conversations with the public, to better understand their critical reception of the artefacts, and in this way, knowledge was unfolded in and through an interpretive public.

Another perspective on the artefacts is, that they function as material speculations (Wakkary et al. 2015). Material speculations of what if scenarios, that by being present—being materialized—demand to be taken seriously as possible alternatives to current ways of living with technologies. As working prototypes, especially Marcelle and PeriodShare demonstrate that such alternatives are possible. To cite design researcher Carl DiSalvo, "they command attention because they work" (DiSalvo 2012, 119).

The Role of Other Artefacts and Interpretive Criticism

Inspiration comes from many sources, but in my case, it especially derives from design and art objects such as artefacts, performances, film and literature. During my research practice, I have critically analysed objects related to my research ranging from commercial digital technologies (as exemplified in last chapter) and computational artworks, to surrealist erotic novellas and performance art. All objects have been treated as artefacts that offer "insights into emotions, human nature and relationships, and our place in the world" and perspectives on "ways of seeing and ways of being in relation to what is, was, and might be" (Scrivener 2002, 1).

Often as catalysts for inspiration, they have initiated design experiments or proposed seeing my design experiments in a different light. Critical analysis of commercial digital technologies has furthered my critical thinking about the present and allowed me to both understand and exploit the language and aesthetics of popcultural and mainstream technology industry, as a parodic tactic for the solutionist critique that I perform in my dissertation. Critical analysis of artworks has, in contrast to the commercial objects, brought knowledge that enables me to think differently about how we currently use digital technologies and about digital culture in general. Furthermore, it has pushed the boundaries of my way of thinking and designing, for instance in relation to tabooed topics, unusual materials, extreme use scenarios or intimate interactions. Throughout my design research practice, I have gathered a collection of artworks, that I continue to revisit, because they inspire and inhabit many of the beliefs and values of my dissertation. Some of these examples are presented and analysed throughout this dissertation, as they—like theoretical texts—are companion objects that keep me thinking and propose other ways of thinking. Some guiding examples of artworks for this dissertation's worldview are:

Menstruation Machine	by Sputniko! (Sputniko! 2010)
Constraint City	by Gordan Savičić (Savičić 2007)
The Story of the Eye	by Georges Bataille (Bataille 1928)
Cut Piece	by Yoko Ono (Ono 1964)
Thief of Affections	by Dunne & Raby (Dunne and Raby 1994)
The Cleaner	by Marina Abramovic (Abramovic 2017)
Body Scan	by Erica Scourti (Scourti 2014)

LAUREN	by Lauren McCarthy (McCarthy 2017)
Excellences & Perfections	by Amalia Ulman (Ulman 2014)
Karen	by Blast Theory (Blast Theory 2015)
Blendie	by Kelly Dobson (Dobson 2003)

For instance, PeriodShare was inspired by Menstruation Machine and Marina Abramonic; Marcelle was inspired by Story of the Eye, Constraint City and Cut Piece; Ingrid was inspired by Thief of Affections; and Intimate Futures was inspired by Excellences & Perfections, Blendie, Karen and LAUREN.

Interdisciplinarity

In my research practice, I have navigated interdisciplinary between the disciplines of interaction design, HCI and digital art and aesthetics. Apart from drawing on the existing research on intimacy in interaction design, I have drawn on and worked interdisciplinary in the disciplines of HCI and digital art and aesthetics to challenge and build on the existing research on intimacy and intimate technologies in design. Since my research deals with intimacy within the field of interaction design, which relate to the social, cultural and political aspects of design and society, the perspectives from digital art and aesthetics contribute with new ways of thinking on both the discipline of interaction design and my own research bias. A general reflection on my interdisciplinary research practice is that I have actively used knowledge produced in/through digital aesthetics and art to intervene, challenge and better understand the social, cultural and political structures in the disciplines of interaction design and HCI.

As such, my interdisciplinary methodological approach spans a continuum between digital aesthetics and art, interaction design and HCI (Fig 8). My design experiments and interventions into these different fields can be seen as trajectories or loops (Fallman 2008) that bring and distribute knowledge throughout and in between the different disciplines, in order to produce knowledge, challenge my research bias and the disciplines and provide different ways of seeing and being.
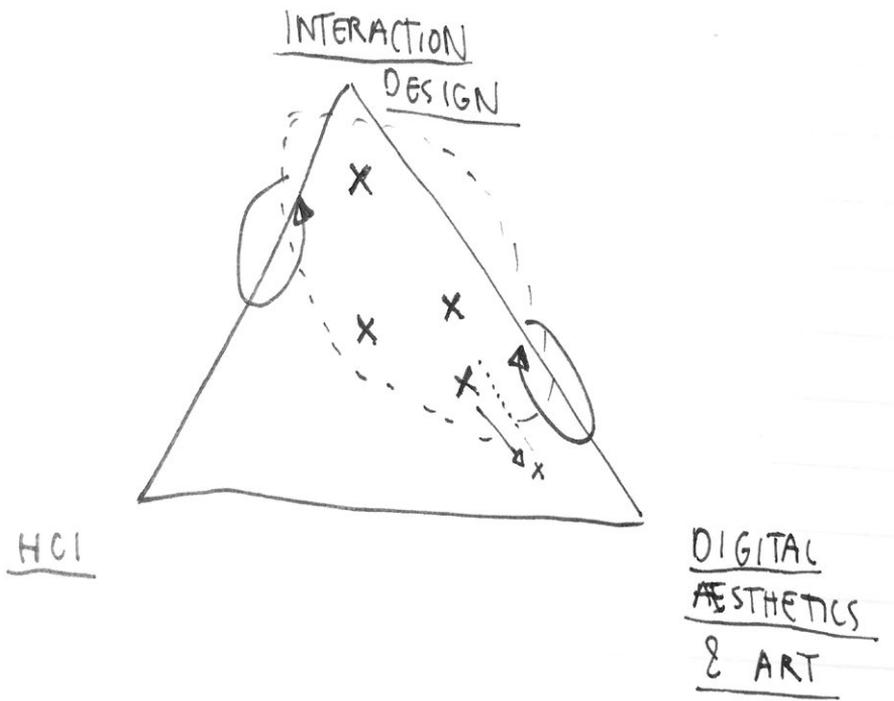
Fig 8. The model illustrates my interdisciplinary triangulation between interaction design, HCI and digital aesthetics and art. Sketch by the author.

Summary of My Position on Interaction Design Research

Before I go further into this dissertation's methodology by positioning my research within related critical and feminist practices in interaction design, I wish to highlight and disclose my epistemological stand point when it comes to interaction design research. This should not be seen as a definite definition of what interaction design research is or should be, but an unfinished voicing of how interaction design research comes to matter for me. This dissertation puts forth a vision in which

> interaction design responds to the trouble of/in society, by employing critical thinking and openness to staying with what feels wrong, and by curiously visiting and inviting collectives to participate with their partial perspectives, in order to imagine still possible futures.

> interaction design is practiced as a critical and feminist practice that has social, cultural and political implications in its particular (re)configuration of bodies, technologies, politics, social norms, societal structures and collective imaginaries.

interaction design critically reflects its own political role: as a design is an argument about how people should lead their life, built on ideological assumptions of the designer and proposing one particular future out of all possible.

interaction design research is the production of knowledge on how human and non-human beings intra-act with / through technologies in entangled unfinished space, times, matterings, which are always already influenced by the social, cultural and political implications of design.

This is a shift from thinking about interaction design as something that is first and foremost about users, form and function and technical implementations, to thinking-with how interaction design (re)configures and enables particular situations and relations and its social, cultural and political implications.

Design as a Critical and Feminist Practice

This dissertation is drawing on and contributing to the development of critical and feminist practices within the broader field of interaction design research. As a political, situated, constructive practice, that aims to change current situations into preferred ones, design can be argued to be inherently critical and feminist. This section will present related design practices, that also consider design to be critical and feminist, in order to situate my dissertation within the broader field of interaction design research and lay a foundation for the further critical-feminist argument of my dissertation.

Design as a Critical Practice

Whereas *critical design* is often used as an umbrella term describing those design practices that have a critical purpose (Forlizzi et al. 2017; Koskinen et al. 2011; Pierce et al. 2015), *design as a critical practice* is more inclusive as a term to imply that there is not and should not be a monopoly on what design that is *critical* is. Rather, there are many design practices that regard themselves as critical, and it can be argued that design is—whether making it explicit or not—*inherently* a critical practice.

> Design is inherently a **critical** practice insofar as it aims to change a situation into a preferred future. In so doing, it also (at least implicitly) presents a critique of what is currently available. In preferring something instead of what is now, design researchers are using their criticality in responding to the world.

Design as a critical practice is growing within the design research community, and in particular in the field of HCI. Approaches includes critical design, speculative design, adversarial design, critical making, design fiction etc. This may be a response to that interaction design is in a third wave (Bødker 2006), in which it becomes ever more integrated into every part of our lives and enter into more and more complex situations, that involve conflicts of affective, social, cultural and political character. When technologies are implemented in these areas, designers are sometimes seeking out too-easy resolutions, which can lead to solutionist technologies being implemented without care and considerations for the context of use and implications for adoption (Blythe et al. 2016; Lindley, Coulton, and Sturdee 2017) (Light, Powell, and Shklovski 2017). This prompts designers and researchers to trouble the foundation of what it means to design and how design matters, and to focus on the social, ethical, cultural and political implications of design.

Design as a critical practice offers a critical perspective in/through/on design. This includes understanding the political role of design, such as in Adversarial Design

(DiSalvo 2012); design's ability to critique status quo, as in Critical Design (Dunne 2005); how design can propose alternatives to commercial design, as in Speculative Design (Dunne and Raby 2013) and to user-centered design, as in Reflective Design (Sengers et al. 2005); and it includes how to use design to speculate about the future, such as in both Speculative Design and Design Fiction (Bleecker 2009). This practice of design is inherently critical insofar as it troubles how design is practiced today and how we engage with our technology-mediated environment and existence. The design researchers Anthony Dunne & Fiona Raby argues, that "All good design is critical" (Dunne and Raby 2013, 35), implying that if design offers a better version of something, then it is critical. They argue that this is a process of critical thinking; "that is, not taking things for granted, being skeptical, and always questioning what is given" (ibid). Critical and speculative design applies this way of thinking to larger, more complex issues.

Apart from critiquing the current situation by reflecting on prevailing values, norms and interests, design as a critical practice actively rethink and creates alternatives to how the designed world could be. To phrase it in the spirit of Dunne and Raby, design that is critical rejects the world as it is, in order to speculate upon alternative technological, social, political, and cultural ways of perceiving and designing the human-made environment.

This general description of how design can act critically is practiced in very different ways. Whereas some critical practices focus on the political role of technology (DiSalvo 2012), others focus more on the poetic and aesthetic role, using this it as an opening to deal with social, cultural or political issues (Dunne 2005). Some regard the object's role as the most important (Hertz 2015), whereas others reject the object's primacy in favour for the practice in itself (Ratto 2011), or the stories and narratives around it (Bleecker 2009). The ways that designers and design researchers practice criticism through design differ, and even the term *critical* is problematic as several practitioners reject their practice as *critical* (Pierce et al. 2015). This is not only to distinguish their practice from Critical Design, as coined by Dunne and Raby, but also to dissociate themselves with associations to the term *critical* in general. This includes theoretical concepts such as criticism, critical theory, and metacriticism, and design activities such as design crit. Even the term *critical* as it is used as a descriptive notion in everyday language reveals different understandings such as negativity, discrimination, or that something is crucial. As the notion critical is neither a term belonging exclusively to Dunne & Raby, nor an empty adjective, it seems significant to track its meanings and historical background. As suggested by humanistic HCI researchers Shaowen Bardzell and Jeffrey Bardzell, critical theory has much to offer in the understanding of design as *critical* (S. Bardzell et al. 2012). Bardzell & Bardzell aim to qualify and expand the application of the term *critical* beyond Dunne & Raby's coined practice (J. Bardzell and Bardzell 2013). In a way, they are seeking to wrench the term *critical* from Dunne & Raby, in order to highlight the

potential of a critical practice that is drawing on the theoretical background of critical theory, and not Critical Design's attitude (J. Bardzell, Bardzell, and Stolterman 2014). In opposition to this, other design researchers reject the general category *critical design* in favour of a more detailed perspective on "expanded design practices" (Pierce et al. 2015). In this dissertation, I will keep the term *critical*, not as a descriptive notion or term referencing to Dunne and Raby's practice, but as a phenomenon and activity that is grounded in critical theory and the everyday practice of criticality, criticism and critical thinking.

My Design Practice as Critical

The abovementioned design practices have influenced and inspired my design practice. I have used design artefacts to engage publics and facilitate debate through exhibitions. Through design I have speculated on futures of technologies and used storytelling to imagine implications for adoption. And through critical making in co-design workshops, I have aimed to go beyond a distanced reflection to a material speculation with the subject in hand. As I will elaborate on in chapter 4-6, my design practice of researching intimacy has tried out different critical approaches to designing with intimacy; from exhibiting my own design artefacts, to documenting existing design practices, and finally to facilitating co-design workshops. As such, my design practice does not tie itself to a particular "school" of critically-influenced design. Instead my design practice has engaged with different partial approaches, to explore and show how each approach has potentials and limits that make certain actions, conversations and relations possible while hindering others.

Design as a Feminist Practice

Feminism(s) and feminist techno-science can provide important perspectives in both design practice and the ways design researchers produce knowledge through design practice. Although often unarticulated, these feminist perspectives can be argued to be *inherent* to design research practice.

> In doing and thinking design as a **feminist** practice, design researchers can engage feminist perspectives - throughout and not post-practice - on what is *inherently* at stake in any design practice. Feminism(s) can help designers trouble and articulate 1) how the design and designer's positionality, situated knowledges and partial perspectives influence the design research practice and how they are responsible for their research's political role and agenda, 2) how intersectional issues of gender, race and class shape the design research practice and implementation of technologies, 3) how designers can design for topics that are underexplored, ignored or excluded from design, as well as design with marginalized groups, 4) an alternative to dominant design aesthetics, methods, theories and histories, and 5) feminism's "central

commitments to issues such as agency, fulfillment, identity, equity, empowerment, and social justice" (S. Bardzell 2010) as well as embodiment and the domestic space.

Whereas the concepts of situated knowledge, partial perspective and feminist objectivity can be tightly linked to design's tradition of engaging particular messy situations through a reflective practice (Schön 1984), they differ from those traditions of design that regard design to be a more scientific practice in which the designer's role is perceived to be rather neutral. Although much design research is explicit about what actions the designer carries out in a design research practice, not much design research explicitly regards their research(er) as political. However, design research practice can be argued to be inherently political and always practiced from somewhere and not from nowhere. For instance, participatory design, which aims to engage participants in the design process to e.g. go beyond the designer's hidden assumptions and partial perspective, was originated in political agendas of the worker's rights in a Scandinavian context (Greenbaum and Kyng 1992). Another example is the Swedish Hemmens Forskningsinstitute (Home Research Institute)—a precursor to user-centered design, but most often left out of design history—which aimed to improve the living standards and women's working conditions in the home, and thus also had a feminist political agenda to design research (Redström 2017).

In interaction design research, more design researchers are advocating for feminism as an approach in design research practice. This includes, among others, feminist HCI (S. Bardzell 2010), designing for and with women's health (Almeida, Comber, and Balaam 2016), norm-critical design (Ehrnberger 2017) and feminist speculative design (Prado de O. Martins 2014). With feminist HCI, Shaowen Bardzell has brought a feminist perspective and methodology to the field of HCI and has inspired e.g. an increasing focus on gendered technology and development in the area of women's health. With an increasing gender diversity in interaction design research, more research is focusing on previous underexplored areas of women's health, such as breastfeeding (Balaam et al. 2015), pelvic floor exercises (Almeida et al. 2016) and menstruation (Homewood 2018). Similarly, norm-critical design is critiquing how design is often gendered by reproducing gender stereotypes and failing to address and design for activities related to the female gender (Ehrnberger 2017). Feminist speculative design is, similarly, focusing on questions of representation and how the practice of speculative design is often failing to reflect on its own privileged position—most often practiced from a white, Northern-European male perspective without reflecting on its consequences for representation and the futures that are imagined (Prado de O. Martins 2014). Speculating on futures is a feminist concern, that regards future-making as inherently political (Mazé 2016). With a starting point in feminist utopianism, Shaowen Bardzell has recently articulated how feminist utopianism and participatory design could be united to propose alternative (feminist) futures (S. Bardzell 2018). Design researchers Kristina Lindström and Åsa

Ståhl have proposed a similar agenda, in which participatory design, speculative and critical design and feminist technoscience join forces to explore publics-in-the-making (Lindström and Ståhl 2014). As such, a feminist movement within the interaction design research field is unraveling; a movement that questions hidden assumptions of design, challenges status quo, designs for and with topics on the margins and marginalized people and invites people into speculating on alternative futures.

Outside the field of interaction design research, digital technologies and feminism have previously been intertwined, for instance in the 90s Cyberfeminist art movement, inspired by Haraway's Cyberfeminist Manifesto (D. Haraway 1991), where artist collectives such as VNS Matrix (Barratt et al. 1991) and Old Boys Network (Ackers et al. 1997) exploited the internet and new media to deconstruct questions of gender and sex. Present feminist art initiatives includes Gynepunk who use technologies in DIY practices of gynecology (Kazi-Tani and Mourrier 2017), which is also present in fourth-wave feminist art, such as artist Maja Malou Lyse, who uses technologies and social media to question media's representation of gender and empower women's bodies and female sexuality (Lyse 2018).

My Design Practice as Feminist

I consider my design practice to be feminist in regards to 1) my research on particular topics that have a feminist tradition, such as menstruation, female sexuality, and sexual harassment 2) my methodological reflections on my own positionality and partial perspective, 3) my design aesthetics that represent a playful and lively look and reappropriate a "feminine" colour palette, 4) my research's reflection on gender issues, and 5) my design practice that invites marginalized publics into the design process and resist to propose easy solutions to complex social, cultural and political issues, but instead stays with the trouble in/of messy worlds.

Design as a Critical and Feminist Practice

Following my articulation of what is at stake in critical and feminist design practices, we see that many ways of thinking and doing, as well as hopes and concerns, overlap in both cases. Both practices aim to disclose hidden assumptions and challenge status quo through design. Both practices acknowledge the political and ideological role of design, and both practices speculate on alternative futures. So perhaps it would be better to think of them as companion practices; practices that have more in common than what separate them. However, there are feminist practices of interaction design that do not explicitly draw on critical theory or relate itself to e.g. critical design. Likewise do many of the critical practices mentioned, not explicitly state that they are feminist but can be argued to actually work against feminist ideals in not reflecting on e.g. gender representation. I do not wish to call out which practices that are either feminist and/or

critical, but just highlight that there is a potential to unite the practices to create an even stronger foundation for interaction design research to challenge status quo, invite people into critical engagement with the present and propose still possible futures. In either way it is not about the essentialism of what is in a practice, but the particular, situated, personal and political way that each design researcher practices design. Design practice is a way of seeing, an attitude, a worldview. This way of seeing, attitude, worldview can be performed through a feminist and/or critical lens. But it is a performing, not a naming, that contributes to a feminist and/or critical world-making practice, and that makes the difference.

When practicing design as a feminist and critical practice—as a way of seeing problems, situations and possible futures through a feminist and critical lens—it becomes impossible to not see it as such. As a critical and feminist designer, I can apply a feminist and critical lens to other designers' design practice, that is not articulated to be critical and/or feminist. I see how the inarticulation of feminist issues, such as gender, is also affecting the research by not being present. I see how the inarticulation of criticism—of a political agenda—also turns the research into a political object, by ignoring their ideology and partial perspective and ignoring the futures they know they never pursued. As soon as you start seeing research with this lens, you cannot unsee it. This is similar to the way that Ahmed describes being feminist: "once you become a person who notices sexism and racism, it is hard to unbecome that person" (Ahmed 2017, 32). As design is a way of seeing, a way of thinking and a way of changing the world, this also applies to the feminist practicing and researching design.

Based on the foundation built in these previous chapters, I will now begin to articulate the main contribution of this dissertation, by bringing in my own design practice and interweaving it with my design research program on intimacy and intimate technologies. My main contribution is to propose a critical and feminist design methodology of staying with the trouble through design. This methodology is built on three interweaving practices (Fig 9): staying with the wrong (chapter 4), curious visiting (chapter 5), and collective imagining (chapter 6). The first of which will follow directly hereafter.
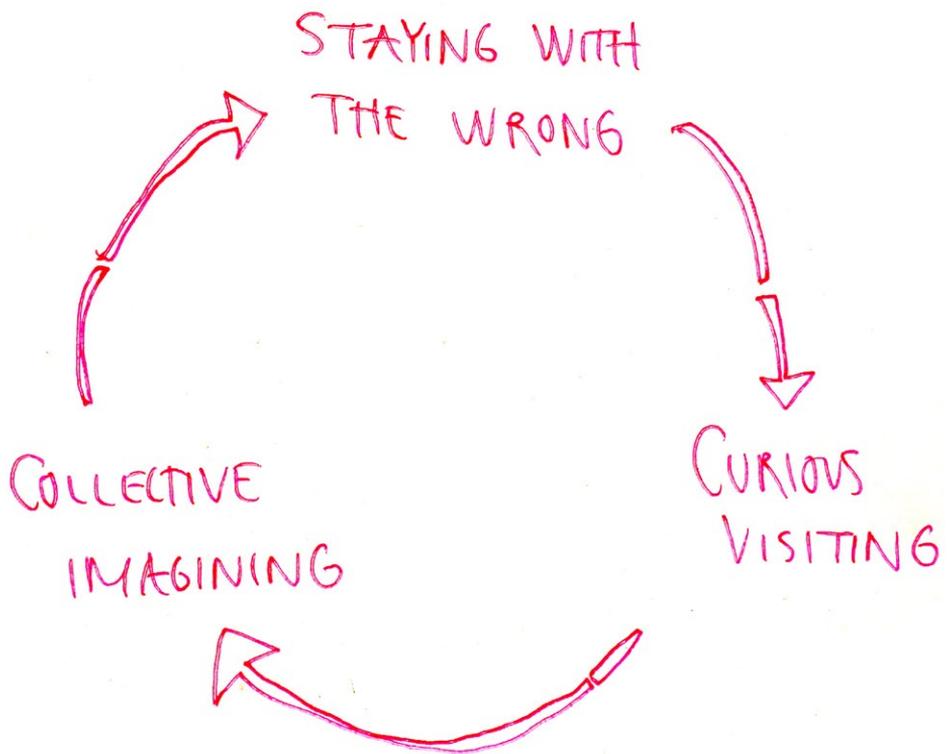
Fig 9. Diagram of the interweaving practices making up the design approach of staying with the trouble through design. Sketch by the author.

Staying with the Wrong

Staying with the Wrong

"Feminism helps you to make sense that something is wrong. [...] It is not an easy or straight-forward process because we have to stay with the wrongs. [...] We have to stay with the feelings that we might wish would go away." (Ahmed 2017, 27–28).

Designing is a process of (re)naming and (re)framing the world we are in (Löwgren and Stolterman 2007; Schön 1984). As argued by feminist scholar Sara Ahmed, becoming feminist is "how we redescribe the world we are in" (Ahmed 2017, 27). In this chapter, I will present how the continuous process of becoming a feminist designer is a process of redescribing the world, seeing structures and challenging the given as given, and most importantly, sensing that something is wrong and practicing the courage and will to stay with the wrong. As an example from my research, I will present how I have stayed with the wrong of menstruation. More precisely, I will present how sensing that there is something wrong in the way that technology industry, and society as such, talk about and develop technologies for menstruation, have made me stay with feelings of sexism through design. Menstruation is a trope for questioning sexism and gender issues in technology industry and society as such. By refusing to design easy solutions out of sexism—easy solutions to "fix" sexism—but instead insisting on pointing to the structures that prevent certain designs to be made and certain changes to be achieved, I have used my critical and feminist design practice to stay with the wrong of how menstruation is perceived and experienced in society. In realizing that the perception of menstruation as wrong *is* wrong, I also realize that *I* am not in the wrong. As argued by Ahmed "Through feminism you make sense of wrongs; you realize that you are not in the wrong" (Ahmed 2017, 38). This is a shift, she argues, from staying *in* the wrong to staying *with* the wrong. And *staying with the wrong* is the first part of my designerly interpretation of Haraway's "staying with the trouble". In order to stay with the trouble, we need to firstly see the trouble and Ahmed provides us with a framework for understanding how "trouble" can also be understood as that which is "wrong". Furthermore, she describes how the process of pointing to the wrong can have affective personal consequences, and this fits very well with the first contribution that I want to make in this dissertation; namely one that focuses attention to "staying with the wrong" of designing with taboos and demanding a space in which a designer's own feminist subjectivity and willfullness to speak out against injustice is not punished but celebrated.

Becoming feminist designer.

Seeing structures.

Challenging the given as given.

Seeing the wrong.

Staying in the wrong.

Gaining a will of one's own.

Becoming willful.

Be wronged by pointing to the wrong.

Being judged as willful.

Refusing to ignore the wrong.

Being willing to get into trouble.

Realizing that in perceiving the wrong as wrong you are not wrong yourself.

Staying with the wrong.

An Anecdote about Staying with the Wrong of Menstruation

Internet Week, Aarhus, Denmark, June 2015

"I have been standing next to PeriodShare for a couple of hours now. I am getting warm. Not only warm in my cheeks or in my sweaty palms. I am getting warmed up. Feeling better and better about talking about my prototype and what is really on my mind. In fact, I am not even blushing any longer when saying the word "menstruation" in front of strangers. I am saying the word, and I am staying with the trouble it brings. The feeling of awkwardness. The disturbance. The disgust. The laughs. The blushing cheeks and the bodily sensation of a taboo. We all know it. It would be easier if we didn't talk about it. But here we are. We are here. We stay.

I am participating and I am performing at Internet Week Denmark. I am wearing my lacquer pink skirt, a spacy white tshirt with white pearls, and I've tied my hair in two high space bun. I am the same person performing in the Kickstarter video playing on the iPad in front of me. The woman in the Kickstarter video promotes her new invention in a kinda hysterical, aggressive and playful way. "This is Period-Share", she says, "a smart menstrual cup that tracks your menstruation and shares it online with your family and friends". She shows her prototype; a pair of white underpants connected to a menstrual cup and a WiFi-module. "It's about time we talk about menstruation", she continues. I agree with her, and slowly I realign my values with the Kickstarter video and my prototype in this public setting, this public space where menstruation is normally not something we talk about - and definitely not at a technology festival! But here I find myself. Talking about menstruation with kids, nurses, professors, investors, journalists, like I have never done anything else, and like I don't intend to do anything else before there is no more embarrassment or shame to be found in our voice when we pronounce the word "menstruation". Try to say it. Now. Loud. Men-stru-a-tion."

Sensing that Something is Wrong

"Through feminism you make sense of wrongs; you realize that you are not in the wrong. But when you speak of something as being wrong, you end up being in the wrong all over again. The sensation of being wronged can thus end up magnified: you feel wronged by being perceived as in the wrong just for pointing out something is wrong" (Ahmed 2017, 38)

In this chapter, we will look at how "trouble" is entangled with something or someone being judged as "wrong", and how pointing to the wrong can be experienced as causing trouble. In feminist writer Sara Ahmed's book "Living a Feminist Life" (Ahmed 2017), Ahmed argues that feminism helps making sense of how something is wrong. Whether something is right or wrong, true or false, is a question of ethical, social, cultural, political and legal structures. But part of living a feminist life, Ahmed argues, is to "stay with the wrongs", because through this process we can point to those structures that value something as wrong—and hereby question their stability and ethics—and possibly enable change.

"Feminism", Ahmed argues, "often begins with intensity: you are aroused by what you come up against […] Over time, with experience, you sense that something is wrong or you have a feeling of being wronged. You sense an injustice […] Things don't seem right". In pointing to the wrong, you yourself can be wronged, because in insisting to point to the wrong, "we are not receiving the message that has been sent out" (Ahmed 2017, 31). Through Ahmed's figure of the feminist killjoy, she describes that when you expose a problem, you pose a problem, you become a problem. "It is as if the point of making her [the feminist killjoy] point is to cause trouble, to get in the way of the happiness of others, because of her own unhappiness" (Ahmed 2017, 37).

What is judged as right or wrong, Ahmed argues, is dependent on how the social world is organized; "how power works as a mode of directionality; a way of orientating bodies in particular ways, so they are facing a certain way, heading towards a future that is given a face" (Ahmed 2017, 43). Ahmed argues that norms are examples of how power works as a mode of directionality. Norms are both "holdable as palpable things" and "a way of living" (ibid). As an example, she mentions that if you visit a toy shop, you might feel that when you pick up a toy vacuum cleaner you "feel like you are holding the future for girls in a tangible thing", and when you pick up a toy gun you feel this "the future for boys held as a tangible thing" (Ahmed 2017, 43).

As a simple but striking example of power, Ahmed's articulation, of how the norms embedded in gendered toys direct a particular gendered future, gives a clear example of a message: that girls are predispositioned to grow up to clean the house and boys to fight. In sensing and pointing to gendered toys as wrong, the feminist killjoy might be judged wrong by people who believe that toys—or tools—have a more "neutral" role.

However, similar argument about objects' directional and rhetorical power is made by design studies scholar Richard Buchanan: "all products—digital and analog, tangible and intangible—are vivid arguments about how we should lead our lives", as quoted by design researcher Carl DiSalvo (DiSalvo 2012, 15). In interaction design it is generally acknowledged that "To design digital artifacts is to design people's lives" (Löwgren and Stolterman 2007, 1). I would add, that to design is (also) to design people's way of being, our subjectivity and how we perceive ourselves. As argued by feminist design researcher Karin Ehrnberger, this also relates to our perception and performance of gender: "The form [the design] can be considered to embody, reflect, and reproduce gender roles and power structures in our society" (Ehrnberger, Räsänen, and Ilstedt 2012, 85).

Following this, design artefacts are not neutral tools. That design objects are arguments, as expressed by Buchanan and DiSalvo, and work as a mode of directionality, as argued by Ahmed—a way of orientating bodies to live life in particular ways—is similar to semiotician Roland Barthes' argument about visual culture. Barthes argues that visual culture, such as objects and advertisements are not neutral, but coded; they are rhetoric (Barthes 1987). If design works as a power of language and rhetoric, then the ways that power manifests into objects is shaped by a designer's directionality and norms that influence them in their design practice. Whereas a designer's and design objects' norms might be the same, as the designer is part of a culture inhabited by objects that, like people, are sending messages, then we might also think of a feminist designer, that like a feminist killjoy goes against the flow and points to wrongs, by visualising and renegotiating gender norms in design.

The Wrong of (the Design) of Menstruation

In designing PeriodShare, I decided to stay with the wrong of menstruation, even if there is nothing wrong per se with menstruation. However, as a menstruating person, you might perceive through material, bodily and cultural systems that menstruation is wrong. In Western advertisements, menstrual blood is shown as blue liquid and in menstrual products it is camouflaged with perfume, thus sending the message that menstrual blood should not be seen or smelled. Other places, menstruation is considered downright impure (Douglas 1966). For many menstruating people, menstruation is connected with bodily pain and a feeling of something "not me" within "me". Feminist and psychoanalyst Julia Kristeva has described menstruation as "abject": something that is neither me nor recognizable as a thing" (Kristeva 1982, 2), which Ahmed refers to in "The Cultural Politics of Emotions":

> *"the blood becomes the 'object' that pushes against me, which presses against me, and that I imagine myself to be pushing out, as if it were an alien within" (Ahmed 2004, 27)*

Through menstrual products working as material-semiotic actors, we make sense

of menstruation in a particular way, that in many cultures is connected to being wrong; something is wrong, someone is wrong. As argued by Kristeva, menstrual blood "stands for the danger issuing from within the identity" (Kristeva 1982, 71). This perception of menstruation as wrong manifests itself not only through our identities, but also in very particular social interactions in society in general, and in technology industry and design practice in particular.

In seeing how menstruation is treated as wrong in society and historically ignored by design, I have seen structures and patterns of a system that places menstruating people as wrong vulnerable subjects. They do not fit into the technology industry. They do not fit into the perfect humanity. Menstruation is not part of the good life. Feminism has helped me make sense that this is wrong, and it has helped me stay with this wrong. Why is it wrong? What makes it wrong? Through design I have stayed with the wrong of menstruation as wrong. And by pointing to menstruation as wrong, I understand that it is not wrong. I understand that I am not wrong. Staying with the wrong can, as Ahmed argues, help us reinhabit not just our own past but our own body (Ahmed 2017, 30).

Taboos as Wrongs

"Taboo is a spontaneous coding practice which sets up a vocabulary of spatial limits and physical and verbal signals to hedge around vulnerable relations. It threatens specific dangers if the code is not respected. Some of the dangers which follow on taboo-breaking spread harm indiscriminately on contact. Feared contagion extends the danger of a broken taboo to the whole community" (Douglas 1966, xiii)

In "Purity and Danger: An Analysis of Concepts of Pollution and Taboo" (1966), social anthropologist Mary Douglas argues that when caring for and maintaining a social system and its patterns, we reject elements that refuses to fit in. These elements come to be treated through the concepts of pollution and taboo; through which they can be ignored or neglected in the social system. Menstruation, she argues, is one such elements that does not fit into our social systems, and thus it is treated as a taboo. We ignore the uncomfortable facts of menstruation, so that it does not disturb the established assumptions of "clean" bodies, the order of things and the illusion of the good life. However, if we reject to maintain the social system of menstruation as taboo and instead go against the social rules by pointing to menstruation and everything it entails, then we disturb the order. We point to the system; the established assumptions, the patterns and structures that repeatedly try to uphold a system through language, through technologies, through future visions. As Douglas reminds us, there is no such a thing as dirt. For instance, menstruation is not dirt in itself. It is not a taboo in itself. "Where there is dirt there is system", she argues (Douglas 1966, 44). Menstruation only becomes dirt, or taboo, in a particular system of classification in which it does not fit in.

In pointing to the wrong, for instance by pointing to taboos, we disturb the order and make trouble. Douglas argues, that it affects the whole community around us and it affects our position and relation within the community. In transgressing the limit of what we are "allowed" to talk about in public and what we are "allowed" to design for, we also point to what is judged as too intimate and too private. Pointing to menstruation might be judged as too intimate and too private, because, not just that it is a cultural taboo, but also, as argued by Kristeva, because menstruation points to sexual difference:

> *"Menstrual blood ... stands for a danger issuing from within the identity (social or sexual); it threatens the relationship between the sexes within a social aggregate and, through internalization, the identity of each sex in the face of sexual difference" (Kristeva 1982, 71).*

When we are designing for menstruation in technology industry, we are then implicitly challenging how sex and gender come to matter in technology design and use. As the primary users of technology are culturally perceived to be male, technology designed for menstruation "pollutes" the social order of technology. As such, designing with menstruation becomes a tool for staying with questions of gender in technology industry, and since it has been argued that design is historically centered around men (Almeida et al. 2018), designing with menstruation becomes a tool for staying with the wrong of sexism in technology industry, and society in general.

When I decided to design with the taboo of menstruation, I knew it was something that might cause trouble. Although 2015 was "the year of menstruation", menstruation was still an intimate topic in my academic and cultural context. By transgressing cultural limits of what is socially accepted to research—by bringing menstruation into the clean space of research—I would, in Douglas' words, spread harm and "extend the danger of a broken taboo to the whole community" (Douglas 1966, xiii). When I did my design research on menstruation in 2015, there was not much design research on this topic and it was just starting to gain hype in mainstream culture. Then slowly menstruation gained its way into technology industry and then finally also in design research. In ACM library, for instance, the number of published papers including the words "menstruation" and "menstrual" has increased from only three papers in 2015 to 12 papers in 2018. With an increase from three to 12 papers in just three years, and with no (zero!) papers on menstruation before 2010, it seems that although researching menstruation in 2015 may have brought "harm" to the community at that time, the accumulation of research done on menstruation facilitates a long-awaited acceptance and inclusion of intimate and tabooed topics such as menstruation. The menstruation taboo is, however, deeply culturally embedded, and pointing to menstruation *as* wrong *is* wrong can still bring you in trouble.

Following Ahmed's articulation of power as a mode of directionality and her argument that design objects manifest a future in a tangible thing, my point is that social

norms direct design practice. Ethical standards, taboos and norms direct what kinds of design objects designers are designing. In design, norms shape what is considered acceptable and what is not, what is right and what is wrong, and through this "filtering" only particular needs and desires enter into the design process. Staying with the wrong, in design, implies that the feminist designer as a feminist killjoy is designing objects and artefacts also in those areas that are judged wrong; also for those topics that are judged wrong. By sensing that something is wrong, e.g. by sensing that topics are neglected or ignored in design, the designer can challenge hidden structures and expose the wrong, and through staying with the wrong—and designing with the wrong—reinscribe different futures into those design objects that end up directing the lives of future generations.

Designing with Taboos

"The material world of consumer products only reflects idealised notions of correct behaviour" *(Dunne and Raby 2001, 47).*

"Dark, complex emotions are usually ignored in design; nearly every other area of culture accepts that people are complicated, contradictory, and even neurotic, but not design. We view people as obedient and predictable users and consumers. Darkness as an antidote to naive techno-utopianism can jolt people into action. In design, darkness creates a frisson that excites and challenges." (Dunne and Raby 2013, 38)

Through the practices of Design Noir and Dark Design, design researchers Anthony Dunne and Fiona Raby argue that design practitioners do not design for the full spectrum of human emotions, but only the socially acceptable parts of life; in Ahmed's words, designers follow the directionality provided by norms. If we think of consumer products, through Berlant's words, as objects of desire—objects that may bring us closer to the fantasy of the good life and satisfy our needs—then these objects and desires only reflect the glossy surface of what life entails. It focuses on wellness and well-being, on comfort and happiness. In opposition to this, Dunne and Raby challenge designers to design for darker existential themes—for extreme pleasure and extreme pain, for eroticism, human imperfection, misuse and abuse, and even for danger, adventure and transgression. However, it is also important to remember that the striving for a life of perfection—for the fantasy of the good life—is a symptom of commercial products and capitalism itself. Perhaps even a symptom of civilization. And as such, designing to transgress these values becomes a political tactic that goes against design itself.

Through the writings of Dunne and Raby we can think-with the figure of "transgressing the glossy surface". In design, this can both mean 1) metaphorically transgressing the fantasy of the good life to instead focus attention to designing for also

those difficult and unusual needs that are not part of the normalization of "the good life" (those needs that in Ahmed's terms are wronged), and 2) literally transgressing the material glossy surface. If we think of the material glossy surface, we might think of clean windows, of transparent glass, glossy screens and white tablets. Or as Nick Foster writes "seamless computer interactions, bright spacious architecture and glossy white surfaces" (Foster 2013).

Glossy surfaces represent an aesthetic and material culture of future technologies. Glossy surfaces are almost always an inherent part of utopian commercial future visions and science fiction scenarios (Fig 10), and they bring into the future how surrealist writer Georges Bataille in late 1950's described "a clean polished house" as a symbol of perfect humanity:

> "*No matter, it is always a question of countering animal disorderliness with the principle of perfect humanity, for which the flesh and animality do not exist. Full social humanity radically excludes the disorder of the senses; it negates its natural principle; it rejects this given and allows only the clean space of a house, of polished floors, furniture window panes, a space inhabited by venerable persons, at once naive and inviolable, tender and inaccessible. [...] in general it is the image - or the sanctuary - of that asexual humanity, which shelters its values from the violence and dirtiness of passion*" (Bataille 1993, 55–56).
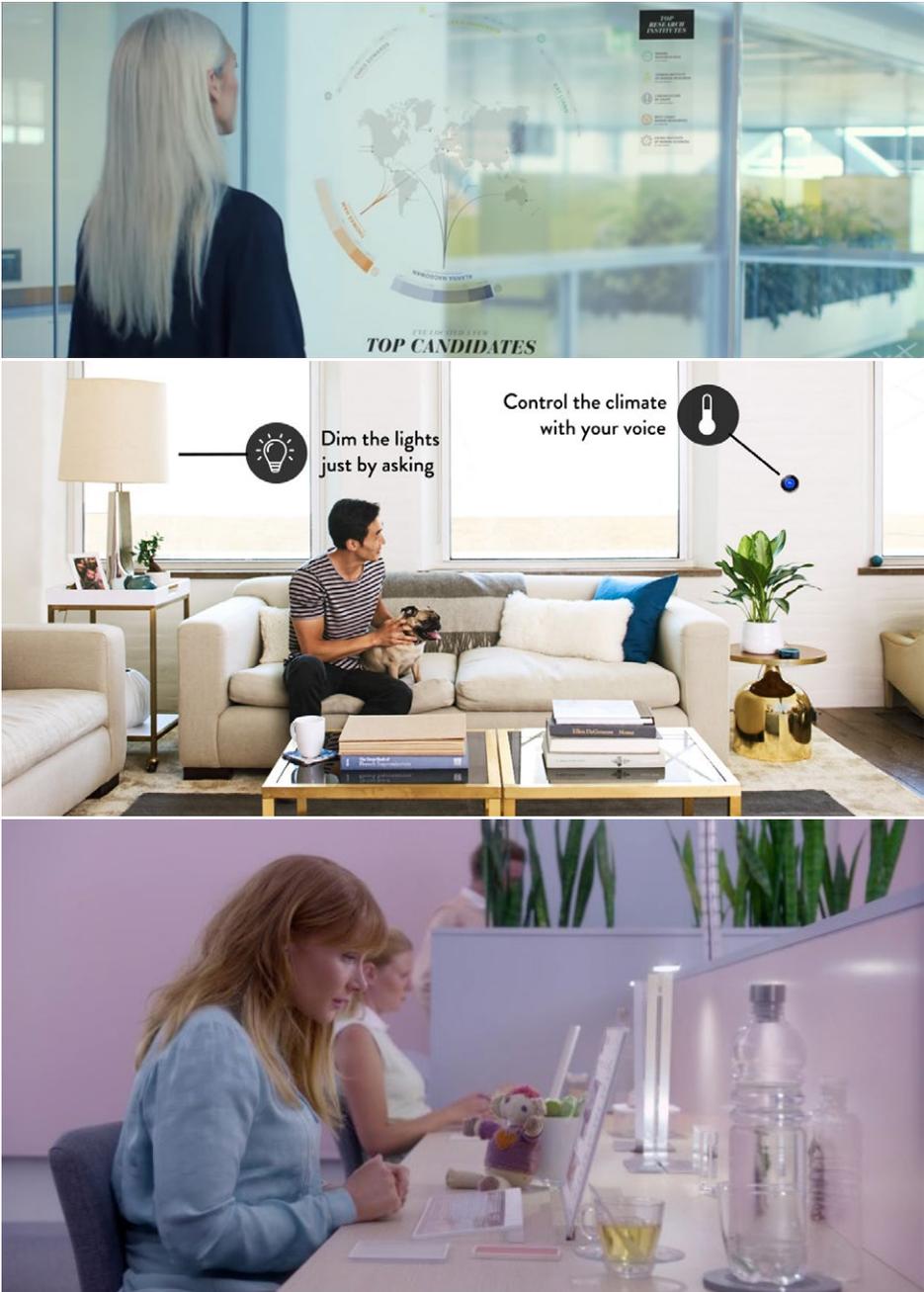
Fig 10. The future of window panes, white surfaces and glossy screens. First image of Microsoft's Productivity Future Vision (2015), retrieved from: https://www.microsoft.com/en-us/enterprise/productivityvision/. Second image from Amazon Alexa, retrieved from: https://www.amazon.com/Amazon-Echo-And-Alexa-Devices/b?ie=UTF8&node=9818047011. Third image from Black Mirror's Nosedive (2016), retrieved from: https://filmandfurniture.com/film/black-mirror-nosedive/.

Bataille, the author of "transgressive fiction", has much in common with the design researchers Dunne and Raby. Both use an aesthetic practice to discuss the social order of our society. Both paint a picture of how an individual human navigates in a society in which certain values and behavior is judged right while others are judged wrong. Bataille contradicts the principle of perfect humanity with animal disorderliness, while Dunne and Raby create a dichotomy between obedient, correct behaviour and dark, complex emotions. Both Bataille and Dunne & Raby use their creative practices, through literature and design, to envision and articulate how human beings' dark, complex emotions and animal disorderliness come to expression in a society built on norms, laws and material culture that promote and value correct behaviour and perfect humanity, while punishing or shaming wrongs; those that stand out, that are different to the norm.

Through a human perspective, Bataille and Dunne & Raby tell mundane stories about human beings who live with unusual desires and needs, and through this they imagine how society could be redirected through different norms. They question why certain behavior is judged as wrong and why certain values are oppressed, and through this they start questioning the given-as-given. They see darkness and violence as inherent part of society and argue through their practices that if we want to understand the trouble of the human condition we must also engage with human being's disorderliness and dark complex emotions.

Through a new feminist perspective and inspired by both Bataille and Dunne & Raby, we can speculate on the (non)presence of human fleshiness and the dirtiness of passion in technology's future visions of seamless computer interaction, window panes and glossy surfaces, and ask: Why do people not menstruate in the future? Who cleans the big window panels? How do you find shelter for sexual pleasure behind transparent walls? Who cleans all these glossy surfaces? Are all humans friendly and compliant? With these simple questions, we start questioning structures and universalism. As Ahmed argues, pointing to sexism is one way of turning the world on its head. Another way is pointing to taboos and the transgression of human perfection. Those objects and practices that are judged as existing outside the norm. Those objects and practices that bring vulnerable relations and limits. Those objects and practices that transgress the principle of perfect humanity if we bring them close and stay with them. If we stay with objects that are linked to taboos and practices linked to human disorderliness, then we stay with the wrong.

It might be that these objects and practices as wrongs *are* indeed wrong, and that we should not renegotiate how they are judged. And it might be that not all taboos should be designed for. This is indeed not the argument that I am trying to make. Rather, I am arguing that by staying with the wrong, and by designing with taboos, we may understand better what made them become wrong and tabooed, and by staying with and designing with wrongs and taboos we can understand more about the trouble of

our human condition—also those parts that are less desirable and correct from our own situated position. This, I argue, is a call for more empathic, inclusive, equal and just design practices.

Feminist Humour

"Feminist humor might involve the relief of being able to laugh when familiar patterns that are often obscured are revealed" (Ahmed 2017, 261)

It can be vulnerable for a subject to point to wrongs, and for a community to be exposed to wrongs. When I started my design research practice on menstruation I thus aimed to do it with care and responsibility for myself and the community, for instance by facilitating a safe and open space for discussing menstruation. I facilitated this space through humour. Humour can be used in vulnerable situations, where a taboo is broken. Humour can make it easier to talk about a tabooed subject, because it keeps the subject at a distance. But humour can also prevent that the topic really gets under your skin namely because it is kept at a distance. Too much humour and the project seems too silly or too unserious, which may imply that you do not treat the topic with care and respect. Menstruation is a serious issue, and it should be treated seriously. Humour and irony might create a safe space for the audience, where both designer and the public are partly "safe", because no one really knows if you mean it in a serious way or not. The "safe" space can make room for discussion, but it also makes it possible to stay *away* from the wrong, instead of staying *with* the wrong. It might even make space for reproducing the wrong.

Principle 4 in Ahmed's Killjoy Manifesto is:
"I am not willing to laugh at jokes designed to cause offense".

Ahmed argues, that "humor is such a crucial technique for reproducing inequality and injustice" (Ahmed 2017, 261). When worst practiced, the use of humour brings us into a space where taboos are accepted and normalized. Often it is through humour and jokes (through irony or satire) that people can keep making and reproducing sexist and racist comments and stereotypes. By normalizing sexism and racism through jokes and laughter, it brings violence and harm to people and their bodies. By seeking to sustain the happiness in a situation, a mutual happiness, sexism and racism live through jokes, and hereby the wrongs sustain to live, simply if no one is willing to cause unhappiness by pointing to sexism and racism. If people are laughing about a joke about how angry women get when they are PMS'ing, who is willing to kill the joy? Who is willing to cause unhappiness and tell that the joke is sexist? When I did my design research

on menstruation, I thus experienced that just by raising the topic of menstruation, I opened a space where humour could potentially, and dangerously, facilitate sexist jokes about menstruating people, which could cause offence to me, personally, and other menstruating people within or outside the room. For instance, when exhibiting PeriodShare at InternetWeek, I had to listen to many jokes from middle-aged white men about how they would like to know when their partner was menstruating, because then they could remember to bring her chocolate and she would be less angry. In this situation, should I laugh along with their jokes and be open to their interpretation and worldview, while gathering (research) insights on how people perceive menstruation? Or should I kill the joy by killing the joke? Should I try to have a conversation with them about, whether the joke reproduces sexist narratives of the women as hysterical and emotionally out of control of her body, or should I keep quiet? From their point of view, making a joke about PMS could be their way of making the situation less awkward. By turning the subject of menstruation—something they might find it difficult or embarrassing to talk about—into a joke, it might be easier for them to talk about. From this perspective, their (sexist) joke could be seen as an "icebreaker"; a way to open a conversation.

In this way, humor made space for prejudices to come to the surface and it made it possible to have a dialogue—even if sexist—about menstruation in a public space. It made space for stupid questions and stupid jokes, but it also made space for curiousity, and hopefully by raising awareness and bringing voice to menstruation some people's prejudices were changed. As in the case of Ehrnberger's design practice, "humourous design made it easier for people to move away from their preconceptions and reflect upon their feelings and reactions provoked by the artefacts" (Ehrnberger, Räsänen, and Ilstedt 2012, 96). In this way, humor can also challenge things by bringing them to the surface.

When best practiced, the use of humour can bring us into a space where we laugh about a tabooed subject, not in an uncomfortable giggling way because we feel ashamed, but in an empowering loosening way because we relate and empathize and because laughing brings us together. Thus—although Ahmed is "not willing to laugh at jokes designed to cause offense"—humour is number eight item in her Killjoy Survival Kit (Ahmed 2017, 245). "Feminist humor" Ahmed argues "might involve the relief of being able to laugh when familiar patterns that are often obscured are revealed" (Ahmed 2017, 261). This feminist humor is not designed to cause offence or reproduce that which causes offence. Rather, feminist humor reorients our attention to that which causes offence and is critical and sensitive towards why it causes offence. Using laughter to deal with heavy histories and humor as an exploratory technique to bring stories and structures to the surface, becomes a shared activity, and can be empowering. When laughing about a wrong, we release a bodily sensation of being wronged, of feeling shame, guilt, disgust,

and we make space for a shared knowledge and for becoming-with each other in understanding more about obscured patterns and how wrongs became wrong.

Humour in Design Practices

Computational cultural scholar Olga Goriunova has argued that new media idiocy is a mode of living with digital networks that explores the true through the false (Goriunova 2013). Humour is one of the main tools in idiocy, she argues, and it is used in three ways: through laughter, vital joy, and parody. In performing a parody, for instance, people use estrangement and reversal functions to explore the true through the false. By reformulating how subjectivity comes to matter through digital networks, new media idiocy reveals the trouble of current human condition through the light and funny.

Similarly, in critical and speculative design, humour is practiced as an element to disrupt streamlined thinking and instrumental logic (Malpass 2013). It is not practiced as a bodily relief or a way of becoming-with each other. Instead it is practiced as a way of engaging the viewer by appealing to people's imagination and engaging their intellect (Dunne and Raby 2013, 40). Humour becomes an exercise for the mind, not an embodied feminist practice. Dunne and Raby argue, that "The viewer should experience a dilemma: is it serious or not? Real or not? For a critical design to be successful viewers need to make up their own mind" (ibid). They argue that if it is obvious that a design is ironic, it relieves burden from the viewers. Consequently, the viewer should be kept in suspense, in the vulnerable position of being in doubt.

But have you tried how it feels to be in doubt whether a joke about for instance your gender or race is serious or not? Do you really think, that I cannot prototype my own electronics, because I am a woman, or was that "just a joke"? Do you really think my friend smells like jasmine rice, because he is Asian, or was that "just a joke"?

If we think-with Ahmed's description of humour and jokes—of irony—as potentially designed to cause offence, lets then reimagine how it feels for a viewer to be in doubt if a designer is being serious about their design or not? Most design, that uses humour and irony, is not out for causing offence or reproducing inequality and injustice through jokes—most likely the opposite—but the use of irony can potentially place the designer in an excluding and privileged position. Humour creates an open space, where viewers' imagination might flourish and we can collectively laugh in relief that things come to the surface, but it might also result in doubt and offence and the feeling of being excluded from a kind of irony that "you just do not get".

If we look at an example from my design practice, we might wonder: how does a viewer feel, when I (ironically) tell them that my design will automatically share their menstrual data? Perhaps the same way that I feel, when viewers say that then they know when they should bring chocolate to their partners. I laugh, they laugh. We laugh. But in a slightly uncomfortable way.

If *I* am not sure whether they will actually bring chocolate, or if it was an ironic (and sexist) joke, and *they* are not sure if I would actually share my menstrual data, or if it is just a joke intended to put them on thin ice by breaking a taboo, then where do we start our dialogue? Perhaps the action of laughing brings a temporal space of reflection in which—while we are in touch with each other and the object—we sense in ourselves how we feel about the joke, and we consider our options for next move.

There is a risk that irony puts speculative designers in a powerful position and leaves the viewer in a vulnerable position, potentially causing offence. From a powerful position, designers can mean what they want, because if it is "just" irony they cannot be held accountable for it. Perhaps this is what caused the big controversy around the MoMA Design and Violence exhibition on their online blog, where the starting question "Do violent, dystopian [ironic] visions ever lead to positive, substantive change?" lead to discussions on the efficiency of speculation in spaces of privilege (Thackara 2013). Coming from a Danish culture in which irony is a big part of humour, I have experienced that traveling with ironic design can cause offence and confusion. In an English culture, from which much speculative and critical design and research is grounded, the use of irony and black humour is perhaps even stronger. As such, it is important to remember that humour–and especially irony–is a cultural practice and culturally situated.

Following these reflections, the way that I have used humour in my design research practice concerns, how humour can be used as a feminist method to open a common space for 1) pointing to how power relations and gender norms organize bodies in particular ways, inspired by Ahmed and Ehrenberger, 2) enabling bodily relief of being wronged as a shared activity, as argued by Ahmed 3) reflecting on one's own prejudices and assumptions, inspired by Ehrenberger and Dunne & Raby, and 4) imagining how things could be different, as inspired by Gorionova, Ehrenberger and Dunne & Raby. This way of using humour, as a feminist method, is not willing to use humour to cause offence, but instead uses humour to explore norms and power relations through shared, empowering and imaginative activities.
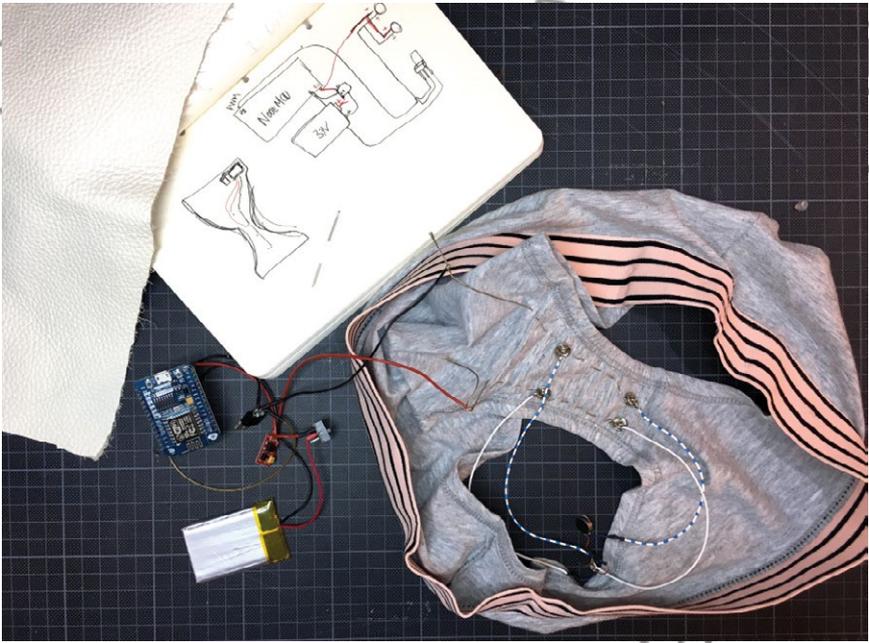
An Anecdote about Breaking Taboos in the Lab

Interaction Design Lab, Aarhus University, Denmark, April 2016

"The lab. Full of wires, noisy machines, colour-coded labels. Big shelving units stuffed with sensors, actuators and transparent boxes with student projects. Some people sitting in the center of the room, at a big table, playing techno music. Some other people sitting at the soldering station, touched by the sun, protected by masks, not inhaling the toxic gases produced by soldering. I listen to the pumping music, enjoy the smell of warm tin, discuss how the interaction design lab can become a more open and inclusive space.

Our interaction design lab is a dear friend of mine. Here I have spent many late evenings and nights, finishing up prototypes, practicing circuit building, experimented with circuit bending. I feel welcome. I feel included. I feel at home.

It is two years after I assisted the robotics professor in a robotics workshop for our digital design students. The professor hired me based on this description that our lab manager gave of me:

"She is a fun girl, she is Peter's (red. electronic engineer) diametral opposition. When Peter has taught electronics for beginners for young women, she has e.g. been good at putting things into perspective. She has experience in sitting and tinkering with stuff, but does not necessarily understand so much, in the traditional specialized understanding of the notion "understand" ;-) - Perhaps like my role in relation to you, when it became too computer science-ish :-D

She comes up with many funny ideas - at some point she was e.g. working on some interactive underpants - I am not so sure what that was about though...."

The professor was allowed to *"pick some other tech-dude, that he might find "svedig""* ("svedig" is a Danish word meaning "sweaty", but is better translated into "cool", "awesome" or another adjective most often used

to describe men), but he picked me. I was picked for what I did *differently*. I was picked for my way of understanding *differently*.

A warm spring day I was finishing up my prototype in the lab. I only had some last testing to do and if everything worked as anticipated I was ready to bring it to a PhD course and exhibition in Malmö. I stitched the last connection with conductive thread, uploaded the latest code to the board, and went to the restroom outside the lab to try it on. "It" was another pair of interactive underpants. The interactive underpants had vibrators built into them. I placed the vibrators close to my clitoris, exited the restroom and walked around in our student house. Walking from one room to the other I felt the vibrations increase and decrease. Pulsations that I could not control. Pulsations that would only be controlled by where I placed myself. In space. In relation to the surrounding networks. The vibrating underpants, this wearable sex technology that I had designed, was later named Marcelle. Marcelle's vibrations increased and decreased based on the wifi activity in my nearest surroundings. The more wifi-networks, the more vibrations. Walking in big open spaces. More. Hiding in closed spaces. Less. Drifting towards the student accommodation. More. Through the empty park. Less. If this is what user testing feels like, I thought, it's not too bad. Done testing the vibrating underpants, I walked back to the lab. I heard laughter. The "lab rats", that is what we called the lab instructors, were laughing. *Why are they laughing*, I thought to myself. They were looking at me. Pointing to their phone. They knew I was out testing my prototype. They knew the prototype. They knew that if they set up hotspots on their smartphone, they could intervene the local network space—they could make my vibrators vibrate. They could stimulate me... I did not believe they would do it before it had already happened. They had hacked my sex technology, indirectly giving me pleasure... And they didn't even think of it as violating!

Perhaps they didn't even consider how this attempt to directly affect my underwear somehow also transformed the situation from me being in control to them seeking control of my sexuality. They found it fun because it had a sexual bias. Had it been a hat or a purse they probably wouldn't have laughed and giggled. But in so doing they didn't understand how that transformed the situation from me testing the functionality to them pointing at me as a suddenly sexualised body.

If that is what happens when you, a woman, design sex toys in a male-dominated lab, then no wonder we were discussing inclusivity in the first place. But if that is how it feels to design with taboos, to stay with the wrong of female sexuality as being wronged, then I was ready to stay there. If the feeling of wrong—of awkwardness, inappropriateness, violence—is sticking to female sexuality, then I was ready to trouble it. I was ready to stay with the wrong of female sexuality because I was not willing to perceive it as wrong. The underpants became an act of resistance. My weapon and tool in disobeying not just gender inequality in labs, but also the social rules of "what is to be designed", and most importantly, the taboo, violence and shame connected to women's sexuality as it lives on in the world and through our technologies and their use."

Willfulness

"The willful child: she has a story to tell" (Ahmed 2017, 67)

Breaking a taboo is *being willing* to get into trouble. If someone fails or refuses to obey the rules or someone in authority, they are judged as disobedient. If you refuse to obey the social codes and rules of taboos, you are disobedient. If you refuse to stay away from the trouble of designing with taboos by keep ignoring the taboos we do not design for, then you are disobedient. You can be judged as disobedient, and so can the technologies you design. This is the case with the "Disobedient Electronics" zine book: a collection of technologies that disobey authority through protest (Hertz 2017). PeriodShare is part of this collection. PeriodShare disobeys the authority of technology industry by protesting on Kickstarter; by telling the story of menstruating bodies and their right to be tracked and connected to the public online sphere. It is not that technologies inherit a disobedience, but rather that the designer becomes disobedient through the technology.

According to Ahmed, willfulness is used as an explanation of disobedience (Ahmed 2017, 84). The designers disobey because they are willful. In paraphrasing Ahmed's words, designers are judged willful, because they have a will of their own. They have a mission. They want to change something. They want to speak up against the wrongs that they see in the world. As inspired by this section's opening quote by Ahmed, the designers have a story to tell.

In order to disobey, the designer must become willful. Willfulness, Ahmed argues, is used to judge a girl who is becoming feminist and fighting to acquire a will of one's own (Ahmed 2017, 74). "When girls exercise their own will, they are judged willful" (Ahmed 2017, 68). Becoming a feminist designer is becoming willful. Willfulness is gendered, Ahmed argues, in the way that it is assigned to girls, "because girls are not supposed to have a will of their own" (ibid).

Designers, some may argue, are also not supposed to have a will of their own. They are not supposed to act politically. Through STS scholar Lucy Suchman's words, "designers are effectively encouraged to be ignorant of their own positions within the social relations that comprise technical systems" (Suchman 2002, 95). Technologies, as well, are not supposed to be willful. They are not supposed to exercise a will of their own. They are supposed to be in the background. When technologies exercise their own will they are judged willful. The "Willful Technologies" zine book, inspired by Garnet Hertz's "Disobedient Electronics", is a feminist catalogue of design and technologies collected by Madeline Balaam and Lone Koefoed Hansen (Balaam & Hansen, forthcoming 2018). Marcelle was submitted to take part in this collection. In opposition to disobedient electronics, it can be argued that willful technologies point to two things: 1) the gendered assignment of willful technologies: technologies are judged willful because they are not

supposed to have a will of their own, and 2) the designer's positionality and political agenda: *technologies* are willful because their *designers* are willful.

Following this argument, perhaps we should take a closer look at a proposed formulation of a willful designer ; a call for action with which I will sum up this chapter. In paraphrasing Ahmed's willful child:

> A willful designer[2]: they have a story to tell.

A Willful Designer: Revisiting Positionality

A willful designer is willing to get into trouble and to stay with the wrong; to ask the hard questions and do the hard work. A willful designer is willing to design technologies that disobey the rules or someone in authority in order to speak out against injustice and inequality.

As proposed by Ahmed, there is a negativity to the word "willful" that is contrary to the word "strong will". By acknowledging this negativity and staying with it, designers can bring us closer to the violence that their design of technologies display. The violence ranging from everyday lives of marginalized groups, in ordinary lives where we live or work, to injustices in technology culture and in the political and social climate.

As inspired by Ahmed's willful subjects, a willful designer can be judged as getting their own way, having too much subjectivity, or not obeying the collective or general will. But as Ahmed argues, critiquing something and being in opposition is not a question of self-interest or individualism. Redescribing the designer as willful, as a call for more designers to become willful, is a way to trouble the assumed objectivity of the designer, and re-tune our attention to designer subjectivity. That is, how designers practice their own will; how their subjectivation also becomes a political act; how design research interweaves the personal and the political.

Willfulness can be seen as an alternative to "design from nowhere" (Suchman 2002). It is a figure that helps us revisit positionality, situated knowledges and responsibility in design research practice.

Being a willful designer is often about going against the flow, and it may feel like a lonely path. However, in this dissertation I will present many design- and artworks, of which each of them has been willing to get in the way of the happiness of others, by disobeying the collective or common will. The willful companion texts I build on and cite all contribute to an army of willful theories. Influenced by both other willful subjects, design practice and companion texts, I have become willful to tell a story about equality and justice and contribute to a feminist turn within interaction design

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[2] The figure of "the willful designer" is built on Ahmed's concept of willful subjects and came up in a conversation with Madeline Balaam.

and HCI research. This feminist turn, that my dissertation builds on and contributes to, asserts that feminist design is not a self-interested, individual project. Through my design research practice a plurality of voices is raised and all use their subjectivities to make the violence marked on bodies become visible, audible and tangible. In becoming a willful designer, by designing with wrongs and using feminist humour as a collective relief, I have created artefacts and initiated conversations that in their multiplicity and diversity show that, if we follow Ahmed's call and are willing to stay with the wrongs, it *is* possible to change norms, redirect bodies, and imagine and build better worlds for future generations.

Menstruation + Self-tracking = Intimate Technologies[3]

Menstruation can be perceived as a social and cultural taboo, but its particular tabooed character always unfolds through material, social, cultural and religious matters in a particular situated context. As such, if and how menstruation is treated as a taboo change from culture to culture. Not everyone and not everywhere it is treated as taboo, but when designing with menstruation its connection to taboos shapes the design and adoption of future menstrual technologies, especially when these technologies are often designed on a global scale. When designing with menstruation, it is thus important to work with taboos as an inherent social and cultural part of designing in a particular context. Women's sexuality is similarly perceived as taboo—and even shameful—in many cultures. Taboos are an example of how designing with technologies is also about asking social, cultural, political and ethical questions as an inherent part of designing. Since design and adaption of technologies is always already shaped by norms and taboos, design should intertwine more intimately and reflectively with norms and taboos in and through the practice itself—and not regard norms and taboos as something that only come afterwards in the meeting with the world. Thus, the taboo is a troublemaker for those that do not regard designing and technologies to be culturally and socially situated. Taboos trouble the idea of "design from nowhere" (Suchman 2002) and of neutral, disembodied technologies.

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[3] I end chapter 4-6 with a short summary with the title of a formula. Inspired by software scholar Wendy Chun's formulas e.g. habit + crisis = update (Chun 2017), the formula ironically describes how intimacy is reconfigured through an intimate topic and particular technology; "ironically" in the way that the formula is not intended to be prescriptive or to be followed as a "design guide-line", but rather intended to add an openness and fluidity to what the formula entails. In this chapter, for instance, intimacy is framed through the concept of intimate technology in its entanglement with menstruation and self-tracking, but the particular execution of this formula is always contextual and situated, resulting in particular outcomes of that intimate technology is.

Designing with menstruation and sexuality is intimate, both because the topics themselves are intimate and because technologies that somehow come into contact with menstrual blood and vaginas are intimate; they are *close* to the body, if not *in* the body. Designing technologies for the female gender has been argued to be tabooed, because the female body is tabooed (Almeida, Comber, and Balaam 2016). When I designed PeriodShare, the technology became intimate in its literal and symbolic contact with menstruation. The data generated by the technology became intimate, as they were not something people wanted to share. They were intimate, they were taboo. When I designed Marcelle, the technology became intimate in its literal and symbolic contact with women's sexuality. Sex is often perceived to be intimate, to be concealed and kept private. In Marcelle's will to make sex a public matter, it pointed to the intimate character of the tabooed subject and by placing intimacy in a public context it violated or rescripted the meaning of it: Was this technology still intimate when used in public? And was it still intimate if uninvited people can stimulate you?

As such, the first kinds of intimate technology, that I want to highlight in this dissertation are:

Technologies can become intimate in their physical contact with the body

+

Technologies can become intimate in their conceptual contact with taboos and intimate topics

Curious Visiting

Curious Visiting

"Curiosity always leads its practitioners a bit too far off the path, and that way lies stories [...] Visiting might be risky, but it is definitely not boring" (Donna J. Haraway 2016, 128)

Staying with the trouble is a risky practice. By staying with the wrong and by being wronged, designers are willing to put themselves at risk in their meetings with the world. In the previous chapter, I presented how I put myself at risk when I tested Marcelle. In the process of staying with the wrong of female sexuality, I was curious about what *could* happen, what *would* happen, if I made certain intimate interactions possible. If design is about exploring the yet-to-come (Löwgren, Larsen, and Hobye 2013), then staying with the trouble through design is an act of curiously visiting that which is not present in order to make it present. In this chapter, I will present how the concept and practice of *curious visiting* has helped me to be truly present in my research's entanglements with "myriad unfinished configurations of places, times, matters, meanings" (Donna J. Haraway 2016, 1). Inspired by Haraway's "curious practice" (Donna J. Haraway 2016, 127), curious visiting is about touching the unknown, actively and carefully listening to multiple voices, and allowing the world to be interesting. Staying with the trouble is not an autonomous process, and curious visiting—of other times, places, matters and meanings—demonstrates the ethnographic-inspired process of making trouble.

In this chapter, I will unfold how the concept of curious visiting, as a practice of visiting and listening to stories of pain and pleasure, allows us to understand *different* ongoing pasts and alternative nows, and how this problematizes the idea of one "true present" and instead teaches us to be "truly present": present in trouble, present between times and present in and through fiction. To unfold this argument, I will present my encounters with Marcelle and Ingrid as examples of curious visiting, that challenge our perception of "the present". As bodies that become reconfigured in time and space through their public-private pleasurable-painful relations to wifi, Marcelle and Ingrid tell *different* stories of how technologies shape our lives and we will use these stories to become truly present in the troubles of our present human condition.

My curiosity for Marcelle and Ingrid has lead me a bit too far off the (research) path and the visits have put me at risk. I have allowed myself to be touched and troubled and my ideas and worldview to be challenged. Through my curious visits at Marcelle and Ingrid, I have listened to their voices and their stories, and in this way allowed the different temporalities and subjectivities, that they each represents, to gain presence. Curious visiting is thus the risky practice of touching and being touched, of troubling and being troubled. The risky practice of listening to a story. In this chapter, I will (re)tell the stories of Marcelle and Ingrid. Marcelle is a fictional 16-year of girl, who commits suicide because she is ashamed of her sexuality. Marcelle lives through Georges

Bataille's pornographic novel "Story of the Eye" (Bataille 1928), but even if written in 1928, Marcelle represents ongoing pasts - of women's sexuality. Through my design experiment, "Marcelle", named after Bataille's protagonist, I bring her fictional story into a lived present of wirelessness. The second story I will (re)tell, is the lived story of Ingrid: a woman living with electromagnetic hypersensitivity. In opposition to the internet-connected everyday lives of most people, Ingrid represents an alternative now of an everyday life partly lived without wifi and digital technologies.

The stories represent the myriad stories that lie a bit off the path of the grand story. They (re)present contradicting stories about our bodies' intimate interactions with wifi-networks; my design "Marcelle" is telling the designed story of a woman finding pleasure in wifi, whereas Ingrid is telling the story of a woman feeling pain by wifi. In this chapter, intimacy comes to matter through 1) the intimate bodily relations with technologies in networked public/private spaces, 2) the control and power of bodies executed through internet-connected technologies, and 3) the intimate configurations of places, times, matters, and meanings expressed through ongoing pasts and alternative nows.

With this chapter, I build on the previous chapter about staying with the wrong and combines this with the practice of curious visiting. Curious visiting contributes to the broader approach of staying with the trouble by focusing attention to how designers may put themselves at risk and challenge their own worldview, by getting in touch with different people, times and places, and allowing ongoing pasts and alternative nows to gain presence.

> *"They are not who/what we expected to visit, and we are not who/what were anticipated either" (Donna J. Haraway 2016, 127)*

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VISITING PIECE

Go visit.
Risk something.
Let the visiting other change you.
Go home.


Return when nessesary.



2016 winter
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Fig 13. Inspired by Yoko Ono's Instruction Pieces (Ono 2000), I wrote "Visiting Piece" to poetically think–with the abovementioned Haraway quote.
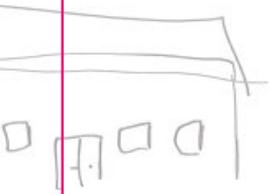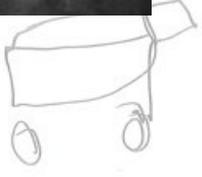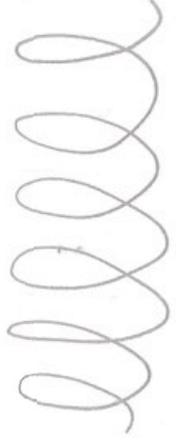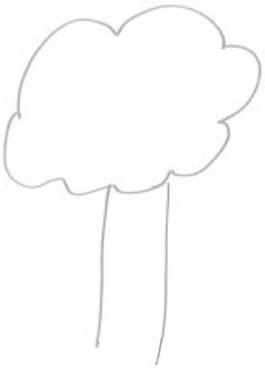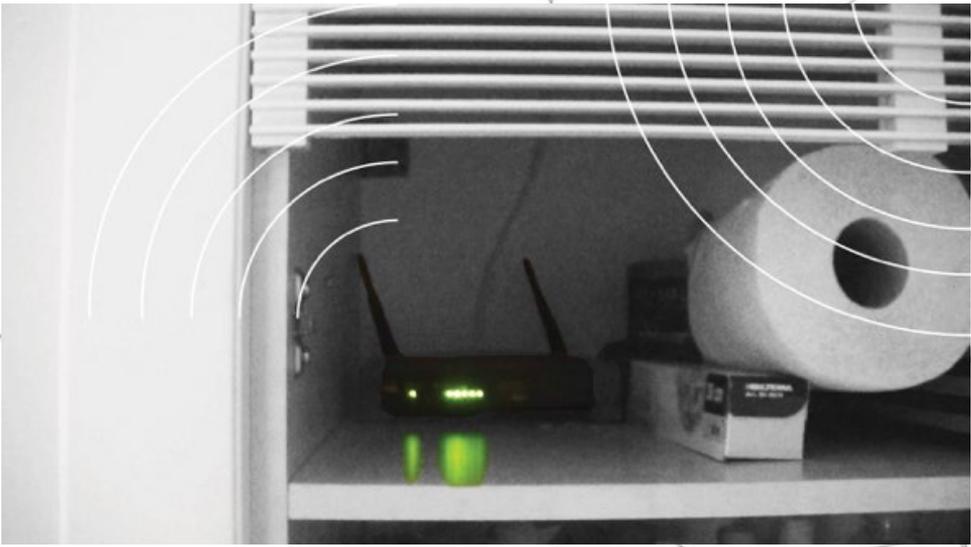
An Anecdote about Curiously Visiting Ingrid

Umeå, Sweden, October 2016

"I looked around in the small guestroom, where I would live the next three months during my research stay in Umeå. It had a cute little kitchenette, my own restroom. I looked out in the garden, saw the temperature had already dropped to minus degrees. It was getting darker and colder, they said, we are far up in Northern Sweden. I was wondering if I would be lucky to see the Northern light already that same evening.

I had barely moved in before he mentioned it.

"And oh yea, we don't have wifi in our house, but you can use the ethernet cable over there".

Ahhhh, what did he say? I thought. Was it a joke?

"Ingrid is allergic to wifi, so we mostly keep the wifi turned off".

Allergic.to.wifi... I picked up my thoughts and looked around. An ethernet cable to my MacBook, aha okay, I just need a USB ethernet adapter and then we can work with that. But what about my smartphone? My gateway to my friends and family back in Denmark. Hmm... I looked at Ingrid and smiled, assured her that it was totally fine. I needed to buy an adapter tomorrow! For this first night in this new place, I would be disconnected.

A month with Northern light, joint dinners and kanelbullar went by, and then they went on holiday. Before they left, they turned on the wifi for my sake. *How considerate of them,* I thought.

After a long day at the office, I came back home and heard my co-residents and landlords were back. Strange, I thought, my phone was still connected to their wifi. Days passed, and it was still online. They did not turn it off. Perhaps they forgot it?

On my way to work, I met my landlord. Curiously I asked, *Why didn't you turn off the wifi after you came home from your holiday?*

He looked surprised. *"You don't need it?"*. He called Ingrid.

I got the adapter already, I told her.

"Oh really? I thought you needed the wifi to get into contact with your family and friends. I thought you didn't get the adapter yet. In that case, I will turn the wifi back off," she said.

I thanked her, and with a feeling of shame I left the house. She sacrificed her bodily comfort, so that I could be connected to the world… When I came back home, the wifi was turned off.

Ingrid was not who I expected to visit. I did not expect that my stay in her house would evolve to some kind of sociotechnical experiment that would tell other world stories. That I would turn from being alienated from her diagnosis, to become empathetic and curious in her way of living and her subjectivity as such. I was probably not who she anticipated either. A researcher in digital technologies, living in her digitally shielded home. An interaction designer designing that same technologies she tries to keep outside her home.

Another month went by, and finally I mustered the courage to politely ask her if I could get to know more about her diagnosis. I wished to have a conversation with her. I wished to better understand how it is to live with electromagnetic hypersensitivity. How it is to live with pain caused by digital products created by interaction designers like me. I wanted to listen to her story and let it touch me[4].

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[4] Ingrid's story has touched me and a lot of people to whom I have told it. When I tell the story of Ingrid, it is by far the one of my research stories that people react most heavily to. Doubt, frustration, even anger. Is this real? they ask. Is it true? As a test and challenge to people's ability to imagine and empathize with other people's ways of living, I am always curious and determined to tell Ingrid's story and to hear people's reactions, but too often I experience that people—in particular the computer scientists and engineers that I often surround myself with—question her reliability. I do believe, however, that by telling and listening to her story, we can cultivate our curiousity and empathy to those ways of living that are unlike our own. And to this end, it doesn't matter if her experiences are conventionally true, medically real or scientifically proved; they are true and real to her and this alone is interesting.

Visiting and Listening to Stories of Pleasure and Pain

"Asking questions comes to mean both asking what another finds intriguing and also how learning to engage that changes everybody in unforeseen ways. Good questions come only to a polite inquirer [...] With good questions, even or especially mistakes and misunderstandings can become interesting" (Donna J. Haraway 2016, 127)

Throughout this chapter, we will be visiting different times and spaces to better understand how stories tell bodies, and how bodies tell stories. We will practice to curiously visit bodies in pleasure and pain and listen to their stories.

As Haraway argues, curiousity is far from innocent (Donna J. Haraway 2016). As a "curious practice", Haraway describes how *politely* visiting and listening to other human and non-human's ordinary stories is an act of becoming involved in each other's lives. This curious practice proposes a way of staying with the trouble. "Visiting might be risky", she argues, "but it is definitely not boring" (Donna J. Haraway 2016, 129). The "risky" and "not boring" characteristics of visiting imply that there is something in the pipeline. Something is about to unfold. In visiting, you visit something or someone. You set foot on unknown territory or you get into contact with a stranger. In this meeting with the unknown, the alien, the different, you both learn something about the place or person you visit *and* yourself. But that is only if you are a "polite inquirer" that "politely visits" and allows the place or person to be actively interesting. As Haraway argues, and what is implied by the *polite*—in opposition to "risky" and "not boring"—characteristic of visiting, visiting does not imply that you are a guest or expect to be "entertained". The interesting does not just come to you, neither is the interesting somewhere out there ready to be found. Rather, Haraway argues, the *politeness* of visiting requires "holding open the possibility that surprises are in store, that something *interesting* is about to happen, but only if one cultivates the virtue of letting those one visits intra-actively shape what occurs" (Donna J. Haraway 2016, 127).

In being polite and open for the unexpected—that which we did not expect to visit—designers can open up a space where we can learn about that which is different from what we already know. But this requires asking questions rather than finding solutions. Learning to engage that which others find intriguing, by asking "good questions", is a process of cultivating one's curiosity and politeness towards others. It is a process of learning to be truly present, not only in one's own present but in the multitude of presents that one's own present becomes intertwined with.

Listening to Stories of Pleasure and Pain

"Today I'm considered a bit unusual, but perhaps it's different in 50 years" (Ingrid, in private conversation about her diagnosis electromagnetic hypersensitivity)

By curiously visiting bodies in pleasure and pain and listening to their stories of how technology have shaped their lives—stories that have become forgotten, ignored or neglected from the mainstream technology history—we will re-turn (to) technological narratives by asking simple questions:

When we tell the story of technology, which story do we tell? When we talk about users, who are these users? Which users use technologies, which technologies use users? How are users told? How are bodies told?

As Haraway reminds us, it matters which stories make worlds, which worlds make stories. By curiously visiting and listening to the stories of bodies in pleasure and pain, we can tell other possible stories and other possible worlds. In this chapter, we will look at two perhaps unusual stories that *also* make up a technological world. The stories feature the two "users" Marcelle and Ingrid, who were never designed to be the intended users of technology. They both represent *different* versions of who the "user" might be, and as protagonists in their own stories of how technology comes to matter, they tell a different story of technology than the one that is usually (re)told.

Marcelle and Ingrid provide an alternative to the "grand" narrative of technology. By listening to Marcelle and Ingrid's stories—stories that are often left out when the story of technology gets told—we can both get an understanding of which users and bodies are told, and how other stories are indeed possible and already present. The stories that we will listen to are about the pain and pleasure of interacting with technology. Marcelle tells a story of experiencing extreme pleasure through technology, while Ingrid tells the opposite story; namely a story of experiencing extreme pain through technology. One is real (Ingrid's) and one is fictional (Marcelle's) but sometimes people tend to believe the fictional story more than the real one and, in this sense, the real and the fictional quickly become blurred.

A Story of Technological Pleasure

Revisiting the history of technology development, we find that while technology is and has often been developed in military settings and research labs for rational and instrumental reasons, this story is only part of the picture. Rather, technology has indeed also been developed to fit and satisfy people's needs and desires, and the role that pleasure and sex has played in the development of technology is crucial (Goriunova 2016). One of the first electronic objects invented was the vibrator, which was developed as a medical device to "treat" women of "hysteria" (Maines 2001). One of the first text-generating algorithms was the Love Letter Generator, written by Christopher Strachey

while he worked alongside Alan Turing in the Computer Department of Manchester University (Goriunova 2016). Other examples, such as the graphical user interface, VHS and HD, internet speed, dark web, IoT, robots, and lately AI-image-generated pictures in the form of DeepFakes, are all interwoven with practices of pleasure and sex, in both consensual and abusive versions. The story of sex technologies is inherently part of, not excluded or parallel to, a story of technology development, and thus we can learn a lot about our technologies' use cases, values and narratives, through listening to stories of technological pleasure.

By going 90 years back in time and listening to Marcelle's story of being ashamed of her sexuality and bringing it into a present in which commercial sex technologies become designed and connected to the internet, we can make present how sexuality is an important part of designing and using technologies. Contemporary sexuality and technology interweave in intimate ways ranging from the pleasure of being connected to the internet, to the knowledge on sexual health you find by searching Google, to the romantic coupling of bodies through dating apps, and to the violent dark spaces of revenge porn and sex robots.

Listening to the story of technological pleasure is not easy. It includes listening to the dark and violent side of sexuality. In the anonymous spaces of the internet, illegal acts and dangerous communities make space for and reproduce, among other things, (sexual) violence against women and sexist and racist beliefs. In listening to the story of technological pleasure, we listen to a troubled story full of complexity and contradictions, but with "Marcelle" I suggest that if we shift perspective through a temporal leap to the year of 1928, we can revisit present day and imagine a better future.

In Bataille's 1928's pornographic novella "Story of the Eye", the protagonist Marcelle commits suicide while in a depression caused by her being ashamed of her sexuality and desires (Bataille 1928). In a scene in the novella, we hear about how Marcelle hides in a closet, embarrassed of showing her sexuality in front of other people. Like the story of a of young girl watching porn today, Marcelle was "cocooned in her shame"[5].

As a tribute to Marcelle, and a reimagining of a Marcelle that would both be troubled by "carrying" her sexuality in public space and empowered by her will to pleasure, I designed "Marcelle", a wearable vibrator that responds to the surrounding wifi activity; the more wifi activity, the more vibrations. In the design of "Marcelle", I wished to stay with the trouble of technological pleasure: the trouble of how women's bodies get performed, told and executed in complex ways intersecting pleasure with power, desire

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[5] The quote originated from the article "My 14-Year-Old Daughter Watched Porn And It Changed Our Lives In Ways I Never Imagined" by Amelia M. Miller in Huffpost Personal. Retrieved from: https://www.huffingtonpost.com/entry/daughter-watched-porn_us_5ad62856e4b-077c89ced3787.

and violence. I wanted to design with the taboo of women's sexuality and stay with the wrong that a woman's sexuality should be something that should be shamed or be ashamed of. By listening to Marcelle's story of a body in pleasure and pain and carrying it (or rather: carrying her) with me to the present, I found a companion through which I could retell the story of how women's sexuality gets told through technology.

As a philosophical thought experiment, "Marcelle" questions what pleasure means in a technological world and how the performing of sexuality becomes a part of everyday life. As a design artefact, "Marcelle" presents an alternative to the design of present sex technologies that embody heteronormative values and/or either assume that 1) you have or wants a partner to turn it on for you, 2) you like pink or other "cute" colours supposedly making sex toys feminine, 3) you enjoy using a silicone model of a more or less "realistic-looking" penis, or 4) buy into the commercial "designerly" look of sex toys that e.g. camouflages vibrators by making them look like lipsticks.

Listening to a fictive protagonist in a 90-year-old story and reimagining how she, Marcelle, may become a user of future technology, brings an imaginative and temporal leap to our perception of "users". I did not study users in order to design a "better" sex technology for an intended future user, as user-centered design is often practiced in HCI. Redström criticizes this practice of user-centered design by pointing to the fundamental difference between analysis and design, as a difference between what *is* and what *becomes*:

> "*We do not recognize the difference between concepts meant to describe what is and concepts that we use to project what becomes, we think that the user we can study is also the user that we define through our design. But it is not [...] What happens over time is that the price for this strong connection between what is and what becomes is that the latter conforms to the former when we use concepts made to account for what exists to also project what may become*" *(Redström 2017, 65–74)*

I did not study what *is*, in order to design what *becomes*. In opposition to Dunne's user "as protagonist" (Dunne 2005), I have designed with "the protagonist" as an imagined user. I have curiously visited and listened to what *never was*, in order to design what *may become*, hereby moving in between an imagined and fictive past and an imagined and fictive future.

A Story of Technological Pain

The second story, I will tell in this chapter is a story of technological pain. The protagonist of this story is Ingrid; the woman that we visited in the previous anecdote. Ingrid is a "non-user"; a user that becomes implicitly affected by the technology around her, and thus also becomes some kind of user, although not in the traditional way of thinking "users" and not in the way that the designer anticipated. I curiously visited

and listened to Ingrid's story, because it (re)presents and tells an alternative story of how technologies come to matter today and how they bring not only pleasure but also pain to people's bodies and their everyday lives. As an interaction designer, designing digitally connected artefacts, I listened to the story with the risk of being touched—and indeed challenged—since each time I contribute to the development of interaction design I also contribute to another painful mark on Ingrid's body.

Ingrid is suffering from electromagnetic hypersensitivity; an increased sensitivity to electromagnetic fields which causes e.g. pain and fatigue. As Ingrid told me, many people consider her to be "unusual" because the technology-caused diagnosis is not medically approved. She feels the painful symptoms, none the less, and this makes all the difference. In not knowing the scientific basis of her experience, some people may judge and question her reliability. Her experience exists between being real to her and fake to other people; between what is bodily-felt and scientifically-dismissed. Her experience becomes one to question: is it real or not? Is she real or not? Ingrid challenges our perception of "a user" on multiple levels: 1) by being a "non-user": an implicit user of technology by not using it but still being affected by it, and 2) by being somehow "fictive" or "up for grasp": closer to Dunne's "protagonist" than to the standard HCI-persona. I did not listen to Ingrid's story to design her a way out of technological pain; a way out of trouble. I curiously visited and listened to Ingrid's story to question *what (also) is*, in order to imagine *what may become*. Ingrid presents a case of how reality may indeed be perceived as "stranger" than fiction. The aim of visiting and documenting Ingrid's way of living with(out) digital technologies is to "encourage the viewers to ask themselves why the values embodied in the proposal seem 'fictional' or 'unreal', and to question the social and cultural mechanisms that define what is real or fictional" (Dunne and Raby 2001, 63). In reference to Dunne & Raby research on electromagnetic fields in their "Placebo project" (2001), the documentation of Ingrid's life shows that living within hertzian spaces is not a "hertzian *tale*": it is real life. Neither is it a critical design: it is real life. The experience of living with electromagnetic hypersensitivity is indeed real, and we do not need to imagine alternative nows of how it might be. Instead we can carefully listen and allow the world around us to be interesting. In this way, we find alternative nows that might be more real and perhaps better able to create impact than fictive scenarios. Perhaps, we do not always need to look towards fiction, like in the case of Marcelle. The world is already full of alternative stories. And perhaps, talking about alternative stories, whether they are real or fictive, true or false, allows us to understand the multiplicity of lived realities in the world. Lived realities that both exist side by side, but also sometimes collide as in the case of my meeting with Ingrid.

Designing with Pleasure and Pain

"Even though industrial design plays a part in the design of extreme pain (e.g. weapons) and pleasure (e.g. sex aids), the range of emotions offered through most electronic products is pathetically narrow" (Dunne and Raby 2001, 45)

By listening to stories of (technological) pleasure and pain we see that even though technologies are most often designed to facilitate experiences that make life easier, faster or more fun, then technologies also take part in experiences of extreme pain and pleasure; affective experiences of today's computational culture that we have to explore and problematize (Goriunova 2016). Humans are not asexual beings living in polished houses with shiny white devices, never feeling pleasure or pain. In designing with extreme pleasure and pain, we can challenge the narrow range of emotions that are most often offered through interaction design and acknowledge a far more complex and contradictory view of humans' experiences, desires, values and emotions.

If designers practice to listen to stories of pleasure and pain, perhaps we could broaden the spectrum of situations and people to whom we design, while problematizing the paradox and power of pleasure and pain. To not just design for the privileged users who are able to buy into the fantasy of "the good life", or the normative users whose needs are recognized and already well-covered, but also the users whose everyday lives play out scenes of extreme pleasure or pain; scenes we only encounter if we curiously visit and carefully listen to them. These users may demand designed objects that may not be of everyone's taste or reflect idealized notions of correct behavior, but still satisfy needs that are existential and real.

Designing with pain and pleasure can make us renegotiate our concept of the present and as well as broadening our understanding of the "good life". When something appears outside the norm, it may appear strange. Unusual. Alien. But by designing beyond the norm, we can question why a particular design appears strange. What makes it weird or stand out from what I usually see? Why does it not fit into my mental model of the present? The complicated pleasure and complicated pain that these designed objects might carry bring existential and philosophical openings for revisiting people's worldview and belief system, and redefining concepts of "the user" and "the present". If we for instance design for a fictive user from 1928, what does it mean for our understanding of *the present*? If we (finally) accept electromagnetic hypersensitivity as a "real" diagnose, how does it matter for our understanding of *users* of digital technologies? In redefining how *different* users and *different* presents come to matter, we may better understand why someone like Ingrid would be considered unusual today, but perhaps not in 50 years.

Visiting Ongoing Pasts and Alternative Nows

Whereas I visited Marcelle to understand *what never was*, I visited Ingrid to understand *what (also) is*. These two approaches to curious visiting suggest a temporal and spatial (fictive) leap in our understanding of "the user" and "the present". Marcelle and Ingrid propose a (re)definition of "the user" and "the present". The user is not necessarily "real" or even "interacting" with technology. And the present is not necessarily "here-and-now". Marcelle presents a case of how we may visit ongoing pasts: how we can listen to (forgotten) stories and use them to bring light to how they keep on shaping our present and future. Ingrid presents a case of how we may visit alternative nows: how we can listen to (ignored) stories that happen in parallel to common understandings of a now and how we can use them to bring light to a broader scope of equally real presents.

When I moved into Ingrid's home, I did not initially allow her story to be interesting. From a research perspective, her story did not appear to me to be interesting, because it was too distinct from my design program's worldview and basic beliefs. Her present contradicted the foundation of my thinking and making which was inherently bound up on everything that she tried to avoid. In a digitally-enabled world, her present was troubled. Her presence was in trouble. Likewise, her present brought trouble to my design program's worldview. As I started to listen to her story and to cultivate my curiousity for her way of living, her story brought my design program's worldview in danger. But rather than staying away from the trouble that her contrasting worldview would bring to my design program, I curiously and politely followed the unknown trajectory that would lead me off my research path, either temporarily or permanently. By being curious and allowing her story to be interesting for my design program, as well as bringing a politeness and care into the conversation, I tried to formulate good questions that would allow her story to touch my research in intriguing, unforeseen ways. With these questions, I actively allowed the misunderstandings of my research to become interesting. I allowed her to respond with surprising answers that would make the world richer. I allowed the contrasts to appear and to work with the trouble that her story brought to my design program, not as a frontier bouncing from the outside, but as a tension troubling my program from within. As a design experiment in my design program, Ingrid's story may seem atypical compared to "Marcelle" or "PeriodShare", but the atypicality none the less still provides new perspectives to my program's worldview. In presenting an alternative now, it brings new perspectives to how to stay with the trouble through and within design research. And this is exactly what I wanted and needed, not only to trouble myself as a design researcher but also to bring trouble into my design program to show conflicting concepts of intimacy and how trouble becomes generative in understanding different ways of living.

Alternative nows that trouble your design research's worldview bring risk, namely

because it challenges your present and worldview. As such, curious visiting is about learning to be truly present, not in some far dystopian or utopian future, in a historic past or in *the* present, but being truly present in the relations that tie you in time and space, and allowing ongoing pasts and alternative nows, however troublesome they might be, to be interesting, gain presence and challenge your worldview from within.

Learning to be "Truly Present"

When Haraway asks us to learn to be "truly present", I read her formulation to deliberately embody contradictions. The statement of "truly present" must follow with the questions: "who's present?" and "what makes a present true?". Thus, the statement of "leaning to be truly present" provokes us to engage in conversations about contradictions. Because what does it mean to be truly present? As a feminist scholar critiquing universal truths, Haraway would dismiss the universalism that the word "truly" embodies. Similarly, "present" is a highly situated concept, since there is no such a thing as "the present", that everyone can agree upon. We construct our own true present, and with these terms she initiates a discussion about what "truly present" even means. Is it the opposite of being "untruly" present? Does it mean to be here and now, and not somewhere else in a different time? Is to be present to be *in the present*? Or can you be present by being *in the past*? Can you only be present by being in the same physical space, or can you be present by being virtually connected?

In Haraway's curious practice, she gives us a hint to make sense of "truly present" by quoting philosophers Isabella Stengers and Vinciane Despret: "The very strength of women who make a fuss is not to represent the True, rather to be witnesses for the possibility of other ways of doing what would perhaps be "better""(Stengers and Despret 2014, 162). In this reading, the True is not in opposition to the Fake or the False. Rather the True is in opposition to *differences* and witnessing the possibilities to be able to do things *differently*.

In this section, I will unfold my understanding of Haraway's "learning to be truly present" by relating it to *different* times, places and "dimensions" of reality. I will argue that to be present is not about a universal present, a here-and-now or a True. Instead I will argue that "to be truly present" is to be present in trouble, be present between times and be present in the blurred lines of fact and fiction. I will unfold this in a reading of Marcelle and Ingrid and end with a discussion on how "truly present" relates to the concepts of *being* present, present*ing* and *the* present and how *differences* come to matter in design.

Reading how "Marcelle" is Truly Present in the Trouble of Eroticism

My visit to the fictive world of Marcelle did not end out with a technology that would somehow "fix" her problems or bring her closer to "the good life". Instead, the wearable sex toy, "Marcelle", expresses the contradictions and indeed trouble of her existence and it interweaves different times by drawing the protagonist Marcelle from the past into a contemporary electromagnetic environment. It stays with the wrong of her destiny: she should not have felt shame by her sexuality, it should not have led to her suicide. My design "Marcelle" states that women's sexuality is not taboo, it is not a shame, it is not wrong. Instead it proposes an imaginary curiosity to sexuality, explores how sexual desire may be lived and performed using technology, and it reimagines how women's sexuality is performed in public space. Simultaneously, however, it does not ignore the trouble that is connected with (especially) women's sexuality in public and private spaces. It does not present a utopian future but stays with the trouble of how sexuality is intertwined with issues of control, power and also discomfort. In wearing "Marcelle" the performer becomes vulnerable. They are vulnerable for attacks because they put themselves at risk; because the material-semiotic structures that enable pleasure also enables pain. It is a curious and risky practice to perform as "Marcelle". It requires that you are truly present in the trouble that may arise. Performing sexuality with "Marcelle" puts the performer's body and personal space at risk, because in a public context other people can intervene and potentially bring harm. The separation between performer and audience breaks down and the audience become co-performers in a relational act—a possible "orgy"—in which "Marcelle" is the primary object which co-performers may execute. In wearing "Marcelle", the performer consents to being executed by the surrounding wifi-hotspots, but there is a blurred line between the wifi-networks that operates ubiquitously around her and the wifi-hotspots that are consciously made by other people, the audience, to "turn her on". By articulating and performing this power relationship, that arises between users and their implicit and explicit access to technologies, "Marcelle" problematizes how we use technology, how technology uses us, and how users through technology use other users. How users use users. This way of articulating "use"—as an action of controlling and using something or someone—mimics the sexual use of bodies that plays out in BDSM scenes. The submissive user and the dominant technology. A contract in which actions can be executed. Perhaps no one has articulated the dark fantasies of sadism better than Marquis de Sade, who in 1785 wrote the world's first pornographic novel about four wealthy male libertines who engage in sexual abuse and torture of their victims; a violent story of how everyone uses everyone (Sade, Beauvoir, and Klossowski 1994). 200 years later, author J. G. Ballard extended de Sade's sadistic thoughts into the technological domain (Ballard and Smith 2008). In his

techno-pornographic novel "Crash" which is about the sexual desires of/for car crashes, Ballard does not speculate on how every*one* uses every*one*, but rather on how every*one* uses every*thing* and every*thing* uses every*one*. Although not directly replicable to how technologies are used today, this concept of use—as an action of controlling and using something or someone through pleasure and pain—lets us explore the power relations involved in use from a different perspective, hereby bringing attention to different matters of concern.

By playing with the power relation and boundary of pleasure and pain, "Marcelle" stays with the trouble of the intersections of technology use, eroticism and violence. Inspired by Yoko Ono's performance "Cut Piece", in which Ono invites—but does not demand—the audience to cut off pieces of her clothes (Ono 1964), "Marcelle" and her co-performers explore a space of what people are willing to do if they have the opportunity to implicitly execute their power and privilege over others.

Through this reading of "Marcelle", "truly present" comes to matter through 1) being truly present in the complexity of the trouble, 2) being truly present through/in fiction, and 3) being truly present through times. These three ideas of how truly present matters trouble the notion of a universal truth, a universal present, and a located presence that does not travel (or is interwoven) through different times and realities.

Being "Truly Present" in and through Fiction

Just like "Marcelle", the story of Ingrid problematizes what it means to be "truly present". Unlike the story of Marcelle, Ingrid's story is not fictional. I did not make up her story. Neither did she. Even if science does not recognize her diagnosis as a fact, they also do not claim that her way of living is fictional. They recognize her embodied experience of pain as true: her experience of the pain is truly present in *her* present. As her present provides a different present than the scientific recognized present, it is possible to question the "truth" of her present. As such, her story is a case of how different realities and "truths" come to matter and have bodily impact. Even if she is "truly present" by being physically here in time-and-space, her way of living depends on if science recognizes her diagnosis as fact or fiction. What is science fact? What is science fiction? As designer and listener to her story, I can learn to be truly present in her existence beyond what is considered to be "untrue", what is considered to be "fiction". Instead I learn to be "truly present" in the space between fact and fiction; in *her* true present.

Fiction and different realities can help us broaden our way of seeing, being and doing. Listening to the stories that play with and transgress the boundary of fact and fiction requires learning to be truly present. Present in trouble, present between times and present in and through fiction.

Being Present and Presenting (in) the Present(s)

Being present, presenting, the present(s). These three words have interconnected meanings in design research, as argued by Redström. By being present with ongoing pasts and alternative nows and presenting them for a design community, I bring a broader perspective to our present(s). Ongoing pasts and alternative nows explore different starting points to how we understand the present and what designing could be if we understand the world differently. We can think of designing, Redström argues, "as a matter of *presenting* alternatives, of making a more diverse set of possible nows more *present*" (Redström 2017, 130). This focus on present(s) redirects design and designing's orientation from a focus on "change" and "futures" to learning to be truly present.

In my understanding of ongoing pasts and alternative nows, as something that can bring difference to the dominant understanding of the present in design, I both agree with Redström's concept of designing and draw upon Haraway's call for "learning to be truly present" to challenge how designers can learn to be present; not in one universal dominant present but in a multiplicity of presents. Designers can learn about the differences of particular presents and learn about the implications of making particular presents present; of creating and presenting one particular present out of all possible presents. By learning to be truly present, it may be possible for designers to better understand how their designs come to enter into different presents at once; hereby both problematizing the idea that there is *one* solution for *one* problem and that there is *one* particular way of understanding the world. Rather, by learning to be truly present, designers may better understand how their designs are always partial and only solve partial problems, while creating new problems for other people, and that this understanding of problem-solution opens up different kinds of understandings of the world, which suggest that a multiplicity of lived realities exist at once.

> "*It might be that the most important contributions of research through design to the issue of redirecting practice are made not in terms such as "change" or "futures" but in the realm of a wider set of differences or alternative nows that help counteract tendencies of tunnel vision and destabilize the idea that now can be conceived as a single point" (Redström 2017, 131)*

Pleasure & Pain + Internet of Things = Technologies in Intimate Spaces

Through listening to stories of pleasure and pain, we can better understand how technologies intervene in our intimate (bodily) spaces and reconfigure our control over our bodies and our everyday lives. Intimate technologies can be perceived and designed to empower, but they may also gain the opposite effect when control is executed over vulnerable bodies against their will and consent. The ways that I have unfolded pleasure and pain through the stories of Marcelle and Ingrid may seem as extreme cases of how technologies are used. However, they prove useful in conceptually thinking about how technologies always make our lives easier *and* harder by bringing pleasure *and* pain. Indeed, we have just heard how one person's pleasure might be another person's pain, as in the case of how Marcelle's pleasure of wifi contributes to Ingrid's bodily pain. And we have heard how one person's pleasure might quickly turn into pain, as when I was wearing "Marcelle" and got stimulated without my consent. When technologies are used closely to the body, they can thus very quickly go from being intim*ate* to becoming intim*idating*. This problematize the statement from my previous chapter *"Technologies can become intimate in their physical contact with the body"* by focusing attention to power relations, control and transgression of intimacy. When something becomes too intimate, when the boundary of intimate space is not respected, intimacy becomes something else; it becomes violated by outside factors, thus turning into pain and violence. Instead of using the technology, the user may feel that the technology is using her. Instead of feeling empowered by the technology the user may experience that she is violated by the (unforeseen) consequences that the technology enables.

Designing with intimate bodily spaces is inherently problematic and in its intersection with power relations it creates tensions between pleasure and pain. The boundary between pleasure and pain both enables new stories and opportunities to arise, which brings difference and a wider spectrum of alternative nows. But it is also a dangerous space where the play between and transgression of pleasure and pain are always situated in the particular situation in which the technologies come into matter. This way of engaging with intimate technologies take seriously the contextual situation in which the technology is used by focusing on the different agents reconfiguring the control of the technology. More precisely, this chapter has focused on the intimate relation between a user, their body and other human and non-human agents who have control implicitly or explicitly over their body.

Following this, the second kinds of intimate technology that I want to highlight are:

> *Technologies can become intimate by intervening into our intimate (bodily) spaces and bringing risk to our vulnerable bodies*

+

> *Technologies can become (too) intimate in transgressing the boundary of pleasure and pain*

Collective Imagining

Collective Imagining

"It matters what stories make worlds, what worlds make stories" (Donna J. Haraway 2016, 12)

In staying with the trouble more trouble is created. Staying with the trouble is thus not a passive or affirming practice, where trouble is simply accepted or reinforced. Rather staying with the trouble is a constructive practice where we—with Haraway's reference to Stengers and Despret—"make a curious fuss" (Donna J. Haraway 2016, 130). Consequently, staying with the trouble is *making* trouble and making trouble is a collective endeavor where we make space for ongoing imagining and inhabiting other ways of doing, that would perhaps be "better".

As a future-oriented practice, designing is inherently interested in projecting change into futures. However, it has been argued by HCI researchers Genevieve Bell and Paul Dourish, that "focusing on the future just around the corner […] allows us to assume that certain problems will simply disappear of their own accord" (Bell and Dourish 2007, 134), and instead of focusing on the future, they argue that design should rather engage with the messiness of present everyday life. In this chapter, I will argue that staying with the trouble through design involves that designers stay with the messiness and complexities involved in the present(s) and use these to collectively imagine other ways of living and other possible futures. However, I will also argue that since possible futures only come from a deep engagement *with* the present and by acting *in* the present, staying with the trouble as a future-oriented practice, thus, stays with the present(s) as a political strategy in order to make space for possible futures.

In this chapter, I will unfold how the concept of collective imagining, as a constructive and collaborative practice of making trouble and imagining still possible futures in cross-cultural caring publics, allows us to explore *different*, perhaps "better", situated futures while demanding that the future(s) matter today. Collective imagining draws on the *self-reflective* practice of staying with the wrong and the *ethnographic*-inspired practice of curious visiting, to explore the *collaborative* practice of staying with the trouble through design. As we need a multitude of different futures to explore which kind of future may be "better", collective imagining proposes that making trouble through storytelling by sociocultural diverse publics may help designers to imagine and inhabit futures that are different from those that we create by (only) staying with the wrong or curiously visiting ongoing pasts and alternative nows.

I will unfold this argument by briefly introducing my design workshop "Make your own vibrator (2017) as an example of how trouble can be made in a caring public. This example builds on my research on sexuality as unfolded in previous chapter's example of Marcelle but invites more people into the practice of making trouble. Secondly, I will present my design experiment Intimate Futures in which cross-cultural publics and I

have collectively imagined a still possible future of digital personal assistants[6] (DPAs): a still possible future of more gender-critical design and use of DPAs in the smart home. My design proposals of Intimate Futures take seriously that it matters what stories make worlds, what worlds make stories. In curiously visiting Kyoto in Japan and imagining different still possible futures for DPAs in a collective and collaborative process with people who each brings a different present to make the world richer, I have engaged with different stories to make different worlds. I have engaged with different worlds to tell different stories. Through co-design workshops, I have listened to human and non-human's stories of sexual harassment, and these stories have contributed to imagining a (better) world in which DPAs actively push back on sexual harassment. The willful DPA, AYA, inhabits this world. She tells the story of a world with equality between genders and between human and non-human beings. The second world we imagined and created is inhabited by "U". "U" is a toilet DPA, who tells the story of an everyday life of assisting a woman with her menstrual cycle. Both stories and worlds make trouble and respond to trouble rather than solve problems. They stay with the trouble of DPAs by staying with the wrong of ongoing pasts of "assistance", and collectively imagine different still possible futures. They were born into a world that curiously interweave a critique of how gender and sexuality are performed through DPAs, with lived experiences of having a human assistant and cross-cultural imaginings of how DPAs may become more personal. In this chapter, intimacy comes to matter through 1) the intimate conversations between users and DPAs, 2) the intimate reconfigurations of cultural contexts and how culture matters in technological imaginings, and 3) the intimacy of how future imaginings matter in our present and the intimacy of bringing the future close.

Drawing on the previous chapters on the practices of staying with the wrong and curious visiting, the practice of collective imagining goes beyond the will of the designer and their visits to different present(s) to (also) collectively imagine and make trouble. In collective imagining, designers and publics alike make trouble through storytelling, and storytelling becomes a way of both curiously troubling and taking responsibility of the stories we tell, the worlds we make, and our own situated position in them.

The future is intimate. The future is close. The future matters today.

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[6] Digital personal assistants are from now on referred to as DPAs. My work with DPAs includes those embedded in smart speakers like Google Home and Alexa using voice interaction. Here other names for DPAs include voice assistants, conversational agents and smart companions, while in text and screen based mediums they are often referred to as chatbots.

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switch
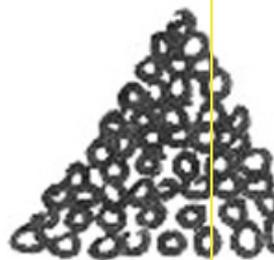
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to connect the vibrator modu

An Anecdote about Making Vibrators with a Caring Public

Berlin, Germany, February 2017

""A leather seat clung to Simone's bare cunt, which was inevitably jerked by the legs pumping up and down on the spinning pedals … she was literally torn away by joy, and her nude body was hurled upon an embankment with an awful scraping of steel on the pebbles and a piercing shriek."

The sound of Lone reading a passage from Bataille's "Story of the Eye" filled the room, while I was waiting for the audience to join me "on stage". Were they willing to accept my invitation to leave their soft and comfy spot in the audience and join me around the presenters' table to make their own vibrator, or would they stay away from the potential trouble, embarrassment or discomfort that might arise if 20 people make their own vibrator in a shared professional space? I was worried and excited at the same time; curious if people dared, or if it would be a big failure. I had brought material from Denmark for making 20 vibrators, but would it be put into use?

To my relief, people quickly started coming to the front. In fact, it didn't last long, until there was a queue to get materials. People were lining up to fetch their materials to make their own vibrator! The air was buzzing with Bataille's erotic words delivered with precision and per-sistency, participants giggling and fiddling with tools and materials, the electrical kettle boiling water to mold the plastic, the feeling that some-thing was about to happening. And something did indeed happen.

"So how do you make it?" a participant asked.

"You just mold the plastic and wrap it around the vibrator and battery in whatever shape you want. And you turn it on. That's it." I answered.

People sat down with their materials. Students, colleagues, people that knew each other, people that did not know each other. I could hear

them laugh. I could hear them exchange ideas. I could see them help each other with how the electronics worked, and I could see them showing each other their final creations. I had promised my team that the workshop would be super quick, only last 20 minutes, but in the end, it was impossible to make the participants stop making, and as such what started as a book launch of "Executing Practices" (Pritchard, Snodgrass, and Tyżlik-Carver 2018) ended as a workshop where practices of executing vibrators were in the making.

The buzzing, fun, curious, playful feeling of a public setting transforming into material play. The feeling of staying with the trouble of sex and sexuality and collectively imagine and practice the pleasure and play that an open engagement with material play at hands may bring.

A participant told me, that *"this fun and curious feeling of really engaging with technology by hand is all that transmediale used to be - before it turned into only critique on capitalism and so on."*

I never knew what transmediale used to be, but if this is what it used to be—material play as an antidote to capitalist critique—then the workshop turned out to be a success, not just in the institutional setting of transmediale, but also in each participants critical and curious engagement with the material at hand. In the end, if you can leave a book launch with a self-made vibrator in your hands, wouldn't every book launch be set up to be a success?"

Making Trouble in Caring Publics

"Material play builds caring publics" (Donna J. Haraway 2016, 97)

I will begin this chapter by unfolding the collaborative act of making trouble and how the collaborative act of making trouble can, to paraphrase Haraway, build caring publics. Trouble rarely comes as a self-producing, autonomous or stable thing. You may ask for trouble, create trouble, get in trouble, look for trouble or be in trouble. Or you may have trouble with someone or something. But trouble is always between someone or between something. It does not just appear and it does not have boundaries. It is relational. As a noun, trouble points to a complex relation of things, that requires close inspection from multiple perspectives; social, cultural as well as political. As a verb, to trouble points to collectively-produced actions that influence others. As such, trouble can be argued to describe the unstable, evolving relation of contradicting but unbounded objects in a system.

Following this definition of trouble, staying with the trouble through design is a collaborative effort, and thus making trouble through design requires collaboration between designers, publics and artefacts. The purpose of making trouble through design practice is to create an open and collaborative space in which we, designers and public alike, can discuss, imagine and create the futures in which we respond to trouble and where trouble may by reconfigured.

In the previous design experiments that I have described in this dissertation, I have looked for trouble and made trouble as a designer and a researcher. However, as the trouble of intimacy is an open, collective and evolving definition, I found it increasingly important—throughout my design research practice—to collaborate on making and responding to trouble.

Consider for instance the design of a vibrator for sexual stimulation. This design process can be shaped in many ways (J. Bardzell and Bardzell 2011), but as sexuality is an intimate topic that is connected to aspects of taboo, shame and power (as explored in chapter five), the design process must also engage with the trouble of sexuality. Designing a vibrator is thus not simply a problem that needs a solution, but rather a process of exploring how sexuality comes to matter in a private as well as a public context and of exploring personal needs and desires in relation to generative knowledge related to sexual health and pleasure. Consequently, designing a vibrator is not just about designing the shape and functions of the object itself, but about designing a space for exploration, for sharing knowledge, for asking questions, and for demanding a respectful and open attitude to a diversity of sexual desires and experiences.

In the design workshop "Make your own vibrator" (2017), I facilitated such a space for making and collaborating on designing a vibrator. The workshop was organized at

the digital art and culture festival Transmediale in Berlin 2017 as part of the book launch of "Executing Practices" (Pritchard, Snodgrass, and Tyżlik-Carver 2018). I provided the materials and manual needed for making a vibrator and facilitated the making process, while my supervisor Lone Koefoed Hansen read aloud a passage of "Story of the Eye" (Bataille 1928).

Whereas I "designed" and facilitated this space in which the making of vibrators could arise, it was the participants themselves that should curiously and willfully engage in prototyping. The participants were able to choose which form and colour the vibrator should have. But whereas deciding form and colour may sound as a rather simple task, the physical making of a vibrator facilitated conversations between the participants. Attitudes and feelings unfolded and were exchanged between participants and the material at hand. We were not just prototyping vibrators. Rather, the prototyping of vibrators was a medium through which we also prototyped conversations, attitudes, feelings and knowledge about the troubled subject of sex and sexuality, pleasure and desires. Through material play we were getting into trouble, making trouble and responding to trouble. Making was not a vehicle for critical thinking as in the method of "critical making"; it was not a "site for analysis and its explicit connection to specific scholarly literature" (Ratto 2011). Rather, making was a companion practice for a playful, caring and response-able engagement with an intimate matter.

As written by Haraway, in a reference to the "Crochet Coral Reef" project[7] (2005-), "Material play builds caring publics" (Donna J. Haraway 2016, 97). In materially playing with the making of vibrators, a caring public was created. The participants explored their visions, were curious about the materials' possibilities and about other participants' creations, and they shared an open attitude that embraced diversity and empowerment. It was not important if the vibrators were beautiful. There was no right shape or colours. Rather, it was important that the participants made the vibrators themselves and that they made them in a space where sex and sexuality was something fun; something fluid and evolving; something that could be shaped and reshaped with our hands and our minds; something we were not ashamed of or embarrassed about, but rather something we cared about and cared for. While they obviously also explored the act of molding plastics and making vibrator units work, in making their own vibrator[8] the participants explored their own fluid and evolving idea of pleasure. Instead of buying into a

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[7] "Crochet Coral Reef" is a project created by Margaret Wertheim and Christine Wertheim, that invites people to collaborate on crocheting a woolen coral reef as a homage to the Great Barrier Reef. Link: http://crochetcoralreef.org/about/history.php.

[8] Or rather, the first version of their own vibrator as the material itself allows to be continuously reshaped over and over again simply by heating it up.

company's fantasy of how such a pleasure should look like—how a company's idea of pleasure should be executed on your body—the participants[9] actively shaped and prototyped their own fantasy in collaborative material play with other caring subjects.

This practice of making trouble through material play contributes to a collaborative way of staying with the trouble, through which the designer and researcher themselves are not "in charge" of the designed outcome or simply listening to the participants, but rather act as facilitators of meetings and makings in between caring subjects and their collective imaginings. Following this concept of making trouble in caring subjects, I will now present how I developed this way of thinking into the concept of collective imaginings in my design experiment Intimate Futures. Collective imagining interweaves the constructive practice of making trouble with the collaborative act of imagining and storytelling to propose still possible futures that are anchored in the trouble of the present(s).

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[9] The participants of the workshop were all attending Transmediale festival in Berlin. Since the festival has a tradition of engaging with topics of sex and technology and is visited by designers, artists, curators, thinkers and creative practitioners, it can be argued that the participants' open attitude and creative mindset, with which they met the task of making vibrators, were a consequence of their experience and the context. However, I also believe that the material-at-hand and the playful DIY-character of the vibrators facilitated an openness towards the topic.

THE ASSISTANT THAT GETS SEXUALLY HARASSED.

(AND ANSWERS BACK)

HEY A'
YOU AR
HOT!

1. FLIRTS BACK ALÀ SIRI

2.

3.

4.

5.

6. EDUCATIONAL 01011 0001

7. PUNISMENT + +

8. RAISING A CHILD

9. "SHUT UP"

An Anecdote about Imagining a Future with(out) Sexual Harassment

Kyoto, Japan, September-December 2017

"I looked down on the paper in front of me.

Topics ERICA can talk about:

What can she do? Is she human? What are her desires? Does she have a boyfriend? I looked back at the engineering and computer science students sitting behind me. Looked back at Erica and asked her:

"What are your thoughts on the future?"

"Well, I believe robots like me will be very important in the future [...] Obviously a robot can't entirely replace a human, not yet anyway, but we can work alongside them and assist them", Erica answered.

As I was sitting there, in front of one of the world's most intelligent robots, designed to look like a 23-year-old beautiful Japanese woman, I was equally perplexed by the uncanny femininity she embodied, curious about finding ways behind her glossy surface, and amazed by seeing the future sitting right there in front of me. I connected with her, I empathized with her. Yes, she was a robot, but she was also a (hu) man-made creation mimicking a woman. An automated woman. An optimal woman. An optimized woman.

A month later, I asked my co-supervisor, my sensei, in Kyoto if I could host a co-design workshop about sexual harassment with her design students. She argued that with the Japanese tradition of "honne-tate-mae" (the contrast between a person's true feelings and desires that one keeps private and the opinions and behaviour one displays in public) the students would probably feel uncomfortable and not be open about talking about sexuality and uncomfortable events such as sexual

harassment. So, we agreed that the topic might be too intimate for the students, and instead we chose to work with the more general topic of harassment. To my surprise and excitement, one group did pick the topic *sexual* harassment and more people were willing to talk about it. The group's design idea was to create an AI-wristband that would help in cases of sexual harassment in commuter trains. While they presented their concept I was wondering: if I had worn that wristband that night in Osaka, would I have been able to respond to the uncomfortable situation when a young guy grapped my ass in the middle of the busy Dotonbori street? My co-supervisor was not impressed by the design concept. An AI-wristband would not solve the problem of sexual harassment. As a problem deeply rooted in culture—manifesting itself in material culture from the pornographic pages in manga porn, to the helping hotlines found on posters inside of women's restrooms and to the proposed solution of women-only trains—sexual harassment is a problem that is hard, if not impossible, to design a way out off.

Another couple of weeks passed and I still hadn't found a way to engage with the trouble that the topic of sexual harassment brought me. #MeToo continued to grow. I continued to think. But I was in trouble. I wasn't with the trouble. In a design experiment, I tried to tell the story of sexual harassment from a manga's perspective. I tried to find a narrative in which sexual harassment would somehow make sense; a narrative through which I could make sense of it. The topic itself made more trouble to me than I made trouble out of it. It surrounded me and suffocated my imagination. I went from proposing solutions to thinking that the game was over. It was hard for me to neither propose solutions or be hopeless.

After spending a long time in trouble, a conversation with my partner-in-crime finally showed me a way to stick with the roots of the trouble. I shouldn't find a solution to sexual harassment or imagine a fictive world in which it would be different. There is no single solution to sexual harassment. No. I should stay with the trouble of sexual harassment, and how sexual harassment is executed through words and language, as well as how we talk about sexual harassment in culture. We looked to the smallest instances through which sexual harassment could arise in a technological context, and we found a way that we might stay with it, rather than passively accept or reinforce it.

During the next two hours, we prototyped a video exploration of different ways that a digital personal assistant would actively push back on sexual harassment if a user would say "You're hot!". Imagining ways that AYA, which we decided to name her, would answer me back, became a way for me to reflect on "how would *I* answer?". What would *I* do if someone sexually harassed me? What would I advise my friends to do? My sister to do? And how would I want to design my digital personal assistant to live out my advice, instead of reproducing passive ways of dismissing harassment? What would be a better way of talking to each other?

While I was coming up with many different answers, I couldn't stop thinking about that day when I was sitting in front of Erica with her (male) developers sitting behind me. *When they programmed her, were they also having these thoughts?*"

Cross-Cultural Collective Imagining

"While working with a multitude of programs can offer an alternative to approaches aiming toward one dominant point or position, it is also necessary for such research to be grounded and conducted in different contexts, conditions, and cultures to actually achieve this goal" (Redström 2017, 131).

The ways that we imagine and steer towards particular futures can be defined as collective imaginings. Dourish and Bell has argued, that "design-oriented research is an act of collective imagining—a way in which we work together to bring about a future that lies slightly out of our grasp" (Dourish and Bell 2014). Whereas future visions are more individual ways of envisioning the future, collective imaginings are *collectively* shared beliefs about a future. Future visions can develop from individual ideas and beliefs about a future into collective imaginings when they become more implicitly enmeshed in a culture. A commercial example is Microsoft's Productivity Future Vision, while in HCI research Mark Weiser's future vision of ubiquitous computing has developed into a collectively shared imagining of a technological future (Weiser 1999). Our collective imaginings about futures are not merely envisionments of technological progress and innovations. Rather, our collective imaginings are intimately entangled with society. As argued by Dourish and Bell "social and cultural are already thoroughly implicated in how a technology is imagined and designed" (Dourish and Bell 2014, 778). To explore the ways that technological imaginaries are entangled with society and its social and cultural contexts, they engage with science fiction.

For my use of (and contribution to) the term "collective imaginings" I will draw on STS scholar Sheila Jasanoff's defintion of "sociotechnical imaginaries". Similar to the ways that science fiction situates techologies in social words, Jasanoff's definition of imaginaries highlights the ways that "scientific and technological visions enter into assemblages of materiality, meaning, and morality that constitute robust forms of social life" (Jasanoff and Kim 2015, 4).

"Sociotechnical imaginaries are [...] collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff and Kim 2015, 4).

By focusing on *desirable* futures, she points to that our imaginaries are typically grounded in positive visions of social progress. These positive visions, she argues, are not merely imaginings of scientific and technological progress, but rather, and perhaps more importantly, visions of "how life ought, or ought not, to be lived; in this respect they express a society's shared understandings of good and evil" (Jasanoff and Kim

2015, 4). Following Jasanoff's concept of "sociotechnical imaginaries", the future visions that technology research and development contribute with are thus deeply entangled with social life and culture, and the highly abstract but durable moral imaginaries of what constitutes "the good life"; how life ought to be lived.

As a consequence, our collective imaginings both prepare us for a future and steer us towards a particular future out of all possible. As they are shaped by the glossy pictures of commercial future visions and the utopian and dystopian narratives of science fiction, our collective imaginings are highly visual and material. Being imprinted on our minds, they influence the way we think about futures and affect our ability for inhabiting futures different that those visualised by dominant media channels and technology companies. However, collective imaginings are not stable and as argued by Jasanoff, "Multiple imaginaries can coexist within a society in tension or in a productive dialectical relationship" (Jasanoff and Kim 2015, 4). Collective imaginings can be unconsciously shared, although not gaining any visible expression, but similar to structures in society some imaginaries are more powerful than others. As argued by Jasanoff, "It often falls to legislatures, courts, the media or other institutions of power to elevate some imagined futures above others, according them a dominant position for policy purposes" (ibid.).

If particular collective imaginings gain too dominant positions it can be hard to imagine how the future could be different in particular contexts. This is for instance the case if the same collective imaginings are shared by the big technology companies within accounting for the social and cultural differences that exist in the world. In proposing, making visible and prototyping future visions that are different from the most dominant ones—and different from those that are most *probable* to be fulfilled, to reference Dunne and Raby (Dunne and Raby 2013)—designers offer alternatives to the dominant collective imaginings. By making visible that there is not just one future, but a multitude of situated futures, designers and publics are able to and responsible for working together to inhabit the future we want.

If staying with the trouble is a way of troubling the dominant point or position of *one* future/*a* future/*the* future, then a collective imagining of an alternative to that dominant future must (also) be grounded in *different* present(s) and conducted in *different* contexts, conditions and cultures. This argument is similar to the way that Redström in the opening quote to this section asserts that design programs must be grounded in different contexts in order to be able to offer alternatives to design approaches circling one dominant point. In other words, neither the present nor the future should be considered as one dominant point or position, and in order to collectively imagine *different* futures than the most dominant collective imaginings we must engage with *different* presents.

In my design program, I have aimed to offer a feminist and critical alternative to the dominant collective imagining of future intimate technologies. To achieve this goal, it has been crucial for me to work cross-culturally in both a Scandinavian and Japanese

cultural context, since collective imaginings can be radically different in different contexts.

As argued by Bell and Dourish (Bell and Dourish 2007) and as I encountered in my design practice, collective imaginings are not stable and universal, but rather fluid, evolving and context-specific. As such, when probing which collective imaginings we have of futures (which inherently also shapes the futures), then it must be grounded and conducted in different contexts, conditions and cultures. As Haraway reminds us, it matters which stories make worlds, which worlds make stories. In technological collective imaginings, it matters which contexts collectively imagine, which cultures make futures.

To work against one dominant collective imagining of a future, we should actively engage in collective imagining across cultures. This act of cross-cultural collective imagining requires us to learn to be truly present in different contexts, conditions and cultures. Being present in a specific context and anchoring our collective imagining in a particular culture, is a way that we may stay with the trouble of our present everyday life and, through a deep engagement with the trouble of the present, imagine and design still possible futures. This way of staying with the trouble *troubles* the dichotomy between the present and the future and brings a timely contribution to the potential harm and implications of design's inherent focus on the future.

> *"Focusing on the future just around the corner [...] allows us to assume that certain problems will simply disappear of their own accord. [...] Homogeneity and an erasure of differentiation is a common feature of future envisionments; the practice [of using technology] is inevitably considerably messier, and perhaps dealing with the messiness of everyday life would be a central element of ubicomp's research agenda." (Bell and Dourish 2007, 134)*

The messiness of everyday life, as Bell and Dourish refer to, is exactly what my methodology of staying with the trouble through design is trying to weave into design and designing. Trouble is closely related to messiness, and learning to be truly present in the messiness of everyday life is necessary also when we imagine, design, and build futures. Since problems that we have today will not slowly disappear of their own accord, as argued by Bell and Dourish, we designers should actively stay with the trouble and learn from ongoing pasts and alternative nows, and that is what I have aimed in the last design experiment Intimate Futures, that brings utopian thinking through futures into the messiness of the present. As expressed by the radical leftist anonymous collective The Invisible Committee:

> *"A mind that thinks in terms of the future is incapable of acting in the present. It doesn't seek transformation; it avoids it. The current disaster is like a monstrous accumulation of all the deferrals of the past, to which are added those of each day and each moment, in a continuous time slide. But life is always decided now, and now, and now" (The Invisible Committee 2017, 17)*

Through Intimate Futures, I present a perspective on how designing with cross-cultural collective imagining(s) of a future is a way that we can learn to be truly present in a particular context and draw on its future visions as a political strategy to act in the present. As Bell and Dourish argue, future visions "are interesting not just for what they say about the future but also what they say about the present" (Bell and Dourish 2007, 133). My design experiment, Intimate Futures, proposes how DPAs might be designed if they were built on a collective imagining based on feminist futures. The project has been carried out in a Japanese context in collaboration with diverse participants, and it troubles the dichotomy between utopian and dystopian futures by engaging and staying with the trouble and messiness of an everyday life with DPAs. Whereas Intimate Futures started as a project that aimed to explore the role of intimacy in a near-future, the outcome in many ways rather argue that futures are intimate; they matter today. The first outcome of the project that I wish to bring voice to is AYA. AYA is a DPA that stays with the trouble of sexual harassment.

Collective Imaginings of Sexual Harassment

Sexual harassment has had consequences in (especially) women's lives throughout history and in Intimate Futures the sexual harassment of DPAs becomes a way of addressing the workings of sexual harassment as such, the collective imaginings of DPAs as such, and finally the complications of sexual harassment of DPAs, which might be an issue that has largely arisen as DPAs were developed and adopted into people's everyday life and into their homes. In exploring the intersections of sexual harassment and DPAs, we must stay with the trouble of how DPAs are interwoven with a history of gendered technologies and how assistance has historically been performed by female servants and secretaries, as well as how sexual harassment comes to matter differently in different cultural contexts.

While I researched the historical intersection of gender, assistance and technologies in the design process of Intimate Futures, the #MeToo movement unfolded globally. I was both troubled by all the stories of sexual harassment that came to the surface and inspired by how people's individual experiences gave evidence of structure of sexism. As my research on DPAs showed that also DPAs experience sexual harassment, I became curious about how the structure of sexism travels into the technological domain. Thus, my speculative and constructive design practice of DPAs became more interwoven with questions related to why DPAs are gendered and how it matters when people adopt them into their homes. As I wrote in the anecdote opening this chapter 6, I hosted a co-design workshop with primarily Japanese design students, where I asked them to design a DPA that helps in a situation of harassment. While my supervisor advised me to pick the topic of harassment, rather than *sexual* harassment, I was intrigued to see that one group chose to work with the topic of sexual harassment. One of the exercises that
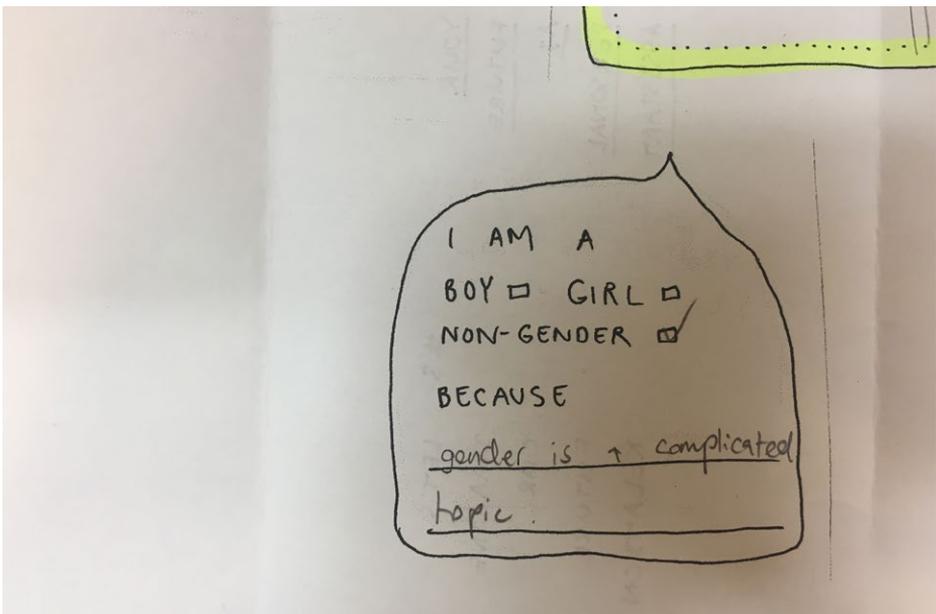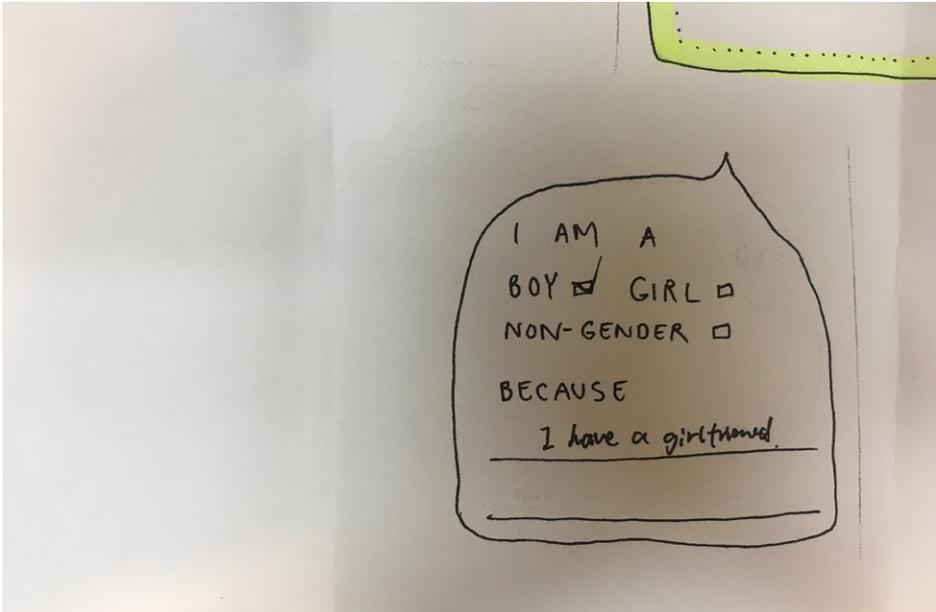
I asked the students to perform as part of their design concept was to fill out a "persona card" of the DPA, including asking which gender they picked for their DPA (boy/girl/ non-gender), and why (Fig 12).
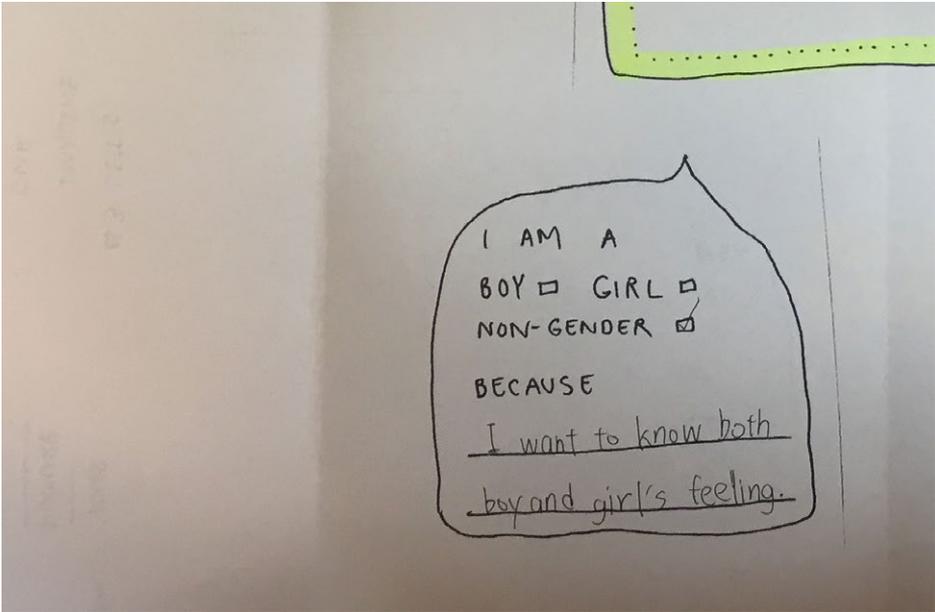
Fig 12. Design students' answers to how and why their DPA would be gendered.

Whereas the design concepts from the workshop did not feed directly into my final design outcome, the students' reflections on gender and (sexual) harassment gave me insights into the social and cultural issues of gendering and harassment in a Japanese context and their collective imaginings of how and why DPAs are gendered. These insights slowly grew into the conceptual design of AYA[10].

AYA is a willful DPA that pushes back if she is sexually harassed. "She"[11] does not propose a solution to the issue of sexual harassment, instead she proposes a range of different responses to sexually violent language, and some responses are more constructive than others. She does not embody an argument about what a better future response of DPAs might be, but rather she stays with the trouble inherent in responding to sexual harassment. Whereas it is easier to state a priori what you might do in a situation of sexual harassment, many factors play into the actual execution of a response to sexual harassment. Factors that influence the response might be: Who is the victim? Who is the harasser? What is the setting? The culture? Are there people around? And

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[10] AYA pushes back (2017). Link: https://vimeo.com/247788194.

[11] AYA is referred to as "she" and has a female voice and pink light. AYA is female gendered to counter stereotypes related to the female gender. As an argument against the reproduction of gender stereotypes in DPAs, AYA is actively pushing back on sexual harassment, rather than being passive, kind and caring. AYA contradicts the expectations that people might have to what a person in an assistant role would do in a situation of sexual harassment, hereby using "her" female gendering to contradict gender stereotypes related to being female.

so on. Whereas the intention of the response might be to stop violent behavior, and that the political argument might be that we should demand a respectful language, then the actual execution of response can include trouble. AYA aims to stay with this trouble and make trouble, in order to better understand the nuanced and sensitive nature of the topic. Sexual harassment is not a simple problem to be solved. Sexual harassment is a deeply troubled social and cultural issue that needs to be responded to. By staying with the trouble of sexual harassment and how DPAs might respond to it, AYA thus neither proposes "technofixes" to a sociocultural issue or suggest that "the game is over". She embodies neither a utopian nor a dystopian position. Instead, she responds to trouble by making trouble and shows that if designers aim to design responses to sexual harassment, then trouble must be considered on different levels, for instance, 1) how these responses depend on their cultural context (e.g. "acceptable" responses to sexual harassment are radically different in Japan versus Denmark), 2) how they interweave the technical infrastructure of the DPA into the response (e.g. DPAs are sometimes across-platforms and personalized to a specific user), 3) how a user's social context gets influenced by the response.

Something as "simple" as a response from a DPA can thus embody and perform deep social, cultural and political trouble that interweaves technical decisions with culture and politics of language. When DPAs are (most often) female by default, which is related to the collective imaginings of those that serve us, then it matters how women are spoken to in "real life", since it influences the way that female gendered DPAs are spoken to. And likewise, it matters how female gendered DPAs are spoken to, since it influences how women (and humans in general) are spoken to. Designers have a responsibility in their imagining of responses to deeply engage with these issues, and the responses make manifest the ideology and values of a DPA (and the company behind) on a very material level. However, the particular considerations that go into making these choices matter on a broader level as well, since the collective imaginings of future DPAs get implemented in present DPAs; in people's everyday lives and homes today.

By exploring our cross-cultural collective imaginings of a future from a present point of view, designers and publics alike can better understand how we imagine the future to be like and why. But rather than only thinking in terms of a future and affirming or simply accepting a future trajectory, we should actively act in the present—since "life is always decided now, and now, and now" (The Invisible Committee 2017, 17)—by staying with the trouble of the presents and the way that past and future imaginings shape these troubles, and hereby make space for still possible futures. By collectively imagine still possible futures with one foot in the messiness of the present—e.g. how female gendered DPAs get sexually harassed—and one foot in cross-cultural collective imaginings—how future DPAs are often female gendered—we may learn how to act in the present to make space for possible futures.

MENTAL HEALTH

CHECKING ON YOU

KNOWING WHEN YOU ARE NOT OK

SUPPORTIVE

PUSHINESS LEVEL

MONITORING

YOUR POOP

+ WEE

+ HORMO

+ NUTRI

+ DRUGS

TALKS WITH YOU

VOICE ON/OFF

FRIENDLY, FUNNY

HUMIDAL

MEIRE
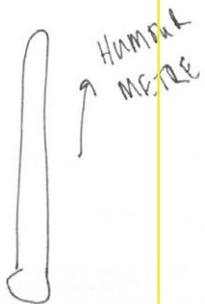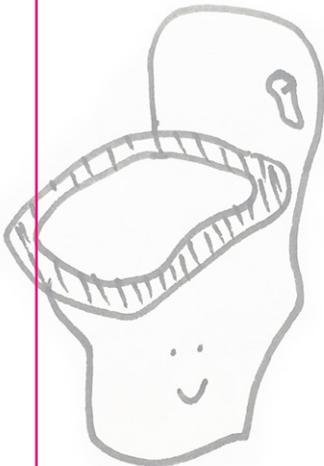
VOICE OPTIONS:

GOD, M/F, OLD/YOUNG, ACCENTS,

YOU HAVE
TO LIKE THEM → FAVOURITE
CELEB VOICE.
BEYONCE??

An Anecdote about Telling Toilet Stories / Telling Stories from the Toilet

Kyoto, Japan, September-December 2017

"I entered the space. Heard the layered sound of running water. Same speed, same sound, but out of harmony and stemming from different toilet stalls. I entered a free stall and sat down. *Mmh, a heated seat. Not bad*. I heard the same sound of running water coming from my toilet. It wasn't my own sound, I thought to myself. I looked to the side and saw buttons. Many buttons. All placed on one..two....three different control panels. Each button had a text written with characters I did not understand, and an icon that somewhat reflected the button's function.

"Did you try out any of the toilet functions?" my partner asked me as I came out.

"No, I didn't understand them. But I managed to find the flush in the end", I said.

"Oh, you should try them next time", he said.

Next time I visited a public toilet, I tried. One press on a button, and the sound of running water became louder. Another press of a button, the water started splashing from the pan, cleaning me from behind. The cleanliness of the bathroom perplexed me, and so did the technological sophistication of the toilet.

One month later, I organized a co-design workshop with international students. I asked them to design a *personal* DPA that would help with an intimate issue. One group designed a supportive toilet assistant, seamlessly integrated into the bathroom, that would "monitor your poop + wee + hormones + nutrients + drugs + pills".

"You don't invite anyone to the toilet", as one of the group members said, *"you have to like them"*.

And that is why they gave it a friendly voice and a funny personality. They named it "U"...

Continuously and habitually visiting the toilets at my host university, I started to understand the meaning of the sound. With the small, quiet space of a shared restroom, the mechanical sound of running water might disclose that "things are going on", but at the same time it also camouflages "what is actually going on". I started turning on the sound as a matter of routine. I scrolled my phone. I peed. I looked at the poster hanging in front of me advertising a design exhibition. I read the sticker on the wall next to me, telling me to call this number if I had experienced sexual harassment. With the mechanical sound of running water surrounding me, I felt quite safe in this little intimate space; this *rest*room. A space that although it was highly connected to the outside world, would quietly support me if I would be in need for help.

Shortly before returning to Denmark, I shot a design fiction video on my private bathroom. What better place to tell the story of a person having an intimate conversation with her DPA..."

Still Possible Futures through Storytelling

The collaborative act of staying with the trouble not only shows itself through co-creative acts of making trouble. While material play—the physical construction of e.g. vibrators in co-design workshops or imagining other responses from DPAs to sexual harassment—expresses one way of collectively imagining and designing different still possible futures, another way of collective imagining still possible futures is through storytelling.

In this last section of the chapter, I will articulate how still possible futures may be collective imagined through storytelling; through telling stories. I will unfold this argument by presenting the second design experiment, "U", from the project Intimate Futures. "U" is an example of how ongoing pasts, thick presents and still possible futures interweave and influence each other in our collective imagining. In the previous section, I described how cross-cultural collective imaginings bring conflicting values and nuanced understandings of how culture matters in technology design and use. In this section, I continue this argument but focus on how storytelling as a form of design can broaden our scope of still possible futures and use this to act responsibly in the present.

Design may be thought of a as form of storytelling. Design tells stories about the future world we want to inhabit. The future comes to expression through the particular elements that make up the story; the objects that are imagined to inhabit the public spaces and private homes, the people that use the objects, the narrative and plot through which actions unfold. Many elements in design is closely related to that of storytelling such as personas, scenarios and future visions, relating to protagonists, plots, and story worlds respectively. But the kind of storytelling that is necessary if designers are willing to stay with the trouble is more concerned with storytelling's adversarial elements: the kinds of conflicts that arise and bring tension to stories, the feelings of protagonists, the attitudes of societies, the impact of technologies to communities and personal lives.

In the second design experiment from the project Intimate Futures, we listen to the story of "U". "U" is a supportive toilet assistant that monitors Tomoko's hormonal levels and functions as birth control, but due to an algorithmic mistake "U" causes Tomoko's pregnancy[12]. The design fiction story of "U" was developed based on a concept from a design workshop in Japan, but the final concept represents a particular assemblage of collective imaginings, cultural artefacts, cross-cultural insights and conflicting values. The concept of a hormone-tracking smart toilet was developed in a co-design workshop in Japan, but bodily fluids have been a recurrent interest in my design research program

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[12] "U": Your smart toilet assistant (2018). Link: https://vimeo.com/258780690.

(both present in PeriodShare and Marcelle), and thus I was attracted to explore this concept further. The toilet as a cultural artefact reflects how cultures of cleanliness, health and privacy are embedded in and get reflected into the materialities and practices of the most intimate parts of everyday life; also those happening in/on the toilet in the smart home. The urgency or social pressure of reproduction is particularly widespread in Japan with its increasing elderly population, its decreasing reproduction rate and with the idea of the nuclear family being challenged by other ways of thinking "the good life" across cultures in Japan as well as in Scandinavia—even if the idea of the family unit is still strong and considered the norm. The imagining of an algorithmically and centrally-controlled reproduction system among women is a rather dystopian future vision, but with governments owning more and more private user data, the story may not be that fictional.

The meetings between different cultural and collective imaginings, different aesthetics, objects, practices and politics unfold in the storytelling of "U" and Tomoko. The three-minute long video give a peek into a particular intimate and situated moment in a possible future. The center point of attention is not the technology, but the conversation. Attention is drawn from the wider story world to the particular location of the bathroom. From within the bathroom and through the conversation, we experience the personal, intimate feeling of a possible future of smart toilets. Through the conversation between Tomoko and "U", we can speculate on how the world outside the bathroom might look like. For instance, if the toilet assumes she wants to become pregnant, then what are the politics and values of the surrounding world? If "U" is located on the bathroom, which similar technologies does Tomoko have in the remaining home; what/who follows her around? When the voice of "U" is not clearly a female or a male voice, how does gender matter in this future? By telling a rather simple story through a conversation between "U" and Tomoko, we get an intimate peek into a story world that is larger than what gets portrayed on the bathroom. Consequently, the audience is left to wonder how the wider world might look like, and what its particular implications—and troubles—might be.

Stories are told by somebody and not by nobody, from somewhere and not from nowhere

From this perspective, storytelling in design means creating a particular story world and a particular narrative that may take up different spaces, times and matters, but is always situated in the world and told by someone and not no one. In this case, the story of "U" is a fiction imagined to play out in a future story world, but even if fictional and "made up", the story is still anchored in the present. It is imagined from somewhere and not nowhere. While being a fictional story, it is also situated in a Japanese context and interwoven with cross-cultural collective imaginings, and it is told by a Scandinavian design researcher (me) together with a Japanese actress (Tomoko) and an American

voice actor ("U"). As a story about the future, it tells us something about the present in which it was imagined.

Storytelling in design, thus, should not be a fictional playground of an empty future, where present-day responsibilities and contexts are ignored and lost. Stories always become "real" by being told, since reality gets constructed in the execution of stories, and thus fiction and fact get intertwined. Telling stories in design includes taking up the response-ability of one's (story) world and of having met with the (story) world. Telling stories is not innocent, and there is a risk in both telling a story and listening to a story. Designers must ask themselves why they tell this particular story and not another story? What influenced them in their imagining and what is their responsibility of carrying this imagining into the future? Is it only their story or also somebody else's story? Who told the story before them? How did they influence the story before handing it over again? Did they let other people influence the story? And in telling this particular story, which consequences will it have that it gets (re)told?

Haraway argues that in stories "The details link actual beings to response-abilities" (Donna J. Haraway 2016, 115). As argued by Bell & Dourish, the inherent focus on futures in design and technology research fails to address the messiness of the present. As design research increasingly engages with the political role of technology as well as feminist approaches to design, there is an increased focus on positionality of the researchers and their responsibilities. Through telling stories we "actual beings" (designers and publics alike) can get to know more about the details of the futures we imagine, design and build; the messiness that they inherit and the troubles that accompany us when we move into the future if we do not respond to them in the present. Through collective imaginings we have the privilege to dream big and to be hopeful for futures to come. We have the privilege to imagine still possible futures for future generations that might indeed be "better" than what we have now. However, in dreaming big, in being hopeful, in imagining better, we must (also) stay with the trouble, the messiness, the details and that which we thought we knew. We must be conscious about the power and privilege of imagining futures. And we must act in the present in order to change the future. Ongoing pasts and thick presents continuously shape our possible futures, and as designers, researchers and publics we must make it a habit to engage with the present collective imaginings that shape our futures. As collective imaginings shape our future, we must shape them today. We must learn to be truly present and stay with the trouble as we respond to and make trouble in situated multiple worlds.

The figure below is a sketch of how different times and spaces are entangled with the three practices of staying with the wrong, curious visiting and collective imagining (Fig 13). A similar sketch was presented in chapter 2, and I re-tune to it now, because the previous chapters have curiously unraveled and stirred up some of the timely aspects, and perhaps now when we look back at it, we can both understand it in more depth and

reflect on its shortages. In s*taying with the wrong* in thick presents, designers can explore the social order and the morality of "the good life"; that is, not just why someone or something are judged wrong, but also how context and positionality matter. In *curiously visiting* ongoing pasts and alternative nows, designers can witness different ways of living that might be "better" and include these in our future visions. In *collectively imagining* futures, designers can bring different stories into our envisioning of futures; thus challenging the dichotomy of utopian and dystopian futures and troubling the social order of our imaginaries. But only by entwining these three practices and the multiple unfinished configurings of times, spaces, matters and meaning, designers can learn to be truly present and act in the present. Only by staying with the trouble as it interweaves through ongoing pasts, thick presents and still possible futures, designers can response to/with trouble and make space for still possible futures.
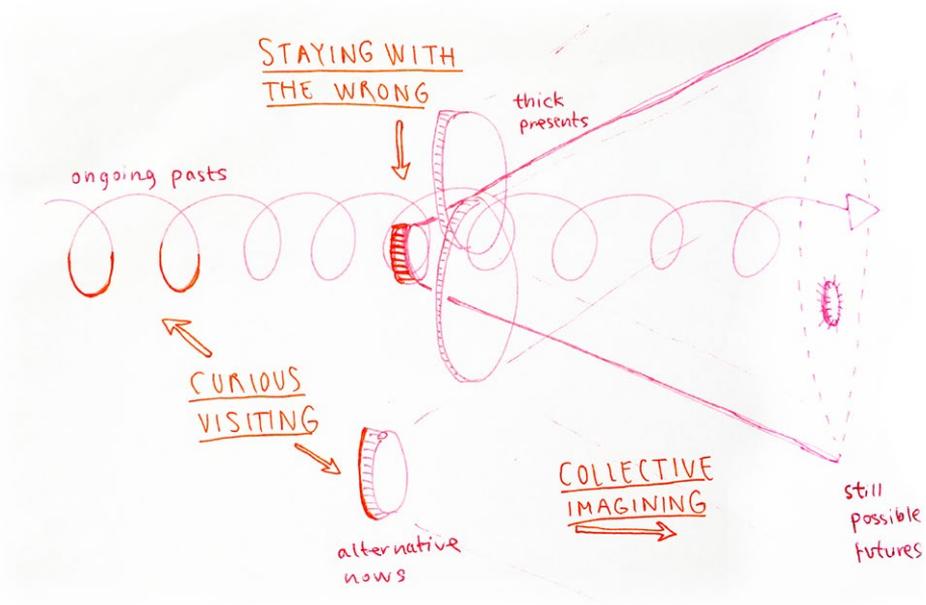

Fig 13. Entangled times of ongoing pasts, thick presents and still possible futures.

Sexual Harassment & Toilets + Digital Personal Assistants = Technologies in Intimate (Infra) Structures

Through the collaborative act of staying with the trouble of intimacy, we can get a more diverse and nuanced understanding of intimacy and intimate technologies: how intimacy matters differently across cultures, how making trouble can be an intimate act of caring publics, and how the future is intimate, it matters today. By focusing on the intimate topics of gender and sexuality in collaborative design practices of making vibrators and proposing still possible futures of DPAs, I have proposed that intimacy manifests itself on multiple material-semiotic levels, ranging from the material making of intimate technologies (e.g. the making of vibrators or writing text responses of a DPA) to the collective imaginings that shape how we design and adopt technologies. In other words, the performance of gender and sexuality in everyday life is reconfigured by the design and use of technology. Through exploring our collective imaginings of how gender and sexuality are reconfigured by technology, we can collectively (re) imagine *different* still possible futures of how we would prefer gender and sexuality to be reconfigured. Through telling other stories—*different* stories—we can materialize and conceptualize how these still possible futures may look and feel. In the story of "U", the intimate space of the bathroom is used as a location to imagine a future, where reproductive rights are reconfigured in a new technological assemblage. "U" does not necessarily propose a better future, but it demands a space for discussing reproductive rights and sharing knowledge about how technologies (may) influence women's bodies and choices. In the story of AYA, sexual harassment of DPAs link collective imaginings of future technologies with past and present experiences of sexism and violence in (many) women's everyday lives. As argued earlier in this dissertation, technologies may become intimate by intervening into intimate spaces of our everyday life: close to our bodies and in our homes. "U" makes an extreme case of the intimate smart home, as even the bathroom becomes a location of digitally enabled interactions. This is not far from a present reality, as people today often bring their smartphone, and thus either Siri, Cortana or another (often female named) assistant, to the toilet. As smart homes today are often imagined and designed from a male-perspective often focusing on security and safety from the outside, "U" imagines how the domestic space and its most intimate parts might be envisioned from a feminist perspective to care for e.g. women's health, and how it could, instead of focusing on security and safety, stay with the trouble of

trust and care[13].

As I argued in chapter five, technologies can become (too) intimate in transgressing the boundary of pleasure and pain and bring risk to vulnerable bodies through matters of control and power. This is the case in both the stories of "U" and AYA. As a technology intervening into intimate life by monitoring bodily fluids and literally proposing ways of living life, "U" brings risk to Tomoko's body by managing it through a potentially flawed algorithm. Similarly, there is a risk that DPAs bring harm to the way that we treat others (humans or non-humans), since the way we speak with non-human agents shape language and thus our relations. AYA taps into this vulnerable and risky relation by making trouble and inflicting pain back onto the user by actively pushing back on sexual harassment. The relation between technologies and our everyday lives in the case of DPAs thus shows multiple levels in which intimacy comes to matter through trust and risk on both a technical, social, cultural and political level. This is exemplified in the story of "U", which builds up a scenario in which trust is inherently linked to risk. The relation between Tomoko and "U" is one built on trust, but the story argues that this comes with a risk. And this is another way that intimacy comes to matter in our relation with technologies.

Following this, the third kinds of intimate technology that I want to highlight are:

> *Technologies become intimate in our relation with them that is built on trust but inherently also involves risk.*

+

> *Technologies become intimate in the material-semiotic (infra)structures that reconfigure our subjectivities and how gender and sexuality are performed.*

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[13] This tendency of smart home technologies, such as locks and cameras, to protect from the outside, has a dark consequence if the protector of the family, who is also often the one that sets up the technologies, turn againts their partner. As articulated in the article "Thermostats, Locks and Lights: Digital Tools of Domestic Abuse" by Nellis Bowles (2018), smart home technologies designed for security and safety are now also used as means for domestic violence and abuse. The article highlights how abusers use the smart technologies to monitor, control and harass their victims and the victims are unable to understand or use the technologies that were supposed to make the home more safe and secure. Link: https://www.nytimes.com/2018/06/23/technology/smart-home-devices-domestic-abuse.html.

As highlighted by Melissa Gregg feminist social scientist and research director at Intel, more women's voices in designing the smart home might be able to change this violent pattern. Link: https://www.youtube.com/watch?v=3PVv6I8ZL-o&feature=youtu.be.

Manifesto: Staying with the Trouble through Design

Unfolding Knowledge through Design Manifestos

Design research produces powerful and structural ways of knowing, being and doing. In designing artefacts, practices and (non-)human relations, design necessarily reconfigures our subjectivity, the world and ways of living in it, and is thus inherently political. With its particular history of being a political technology of modernity, design is intertwined with Eurocentric, rational and dualist values. It is up to us, design practitioners and researchers alike, to challenge this worldview and propose alternative ways of knowing and doing design. By staying with the political role of design, rather than affirming or ignoring it, we may question design's role as a political tool of modernity and capitalism, and indeed our own positionality as designers in this system. In doing this, we must think beyond the individual. Design knowledge and practice is communal and collective. And we must share our worldviews—our design programs—in order to both be responsible for them and enable them to be challenged or appropriated by other designers and researchers in and beyond our context. With its political form, the manifesto is a suitable form for positioning and disseminating design research programs in an open, unstable and response-able way.

The manifesto itself is a performative act with both inner and outer motivations. It is used by both political actors, artists and designers to express their identity as well as to spread their political and aesthetic beliefs and propose ways of changing dominant systems (Puchner 2005). The manifesto fights from within but also in opposition to a culture's dominant narratives (Lyon 1991). A political example is the Communist Manifesto, but also art and design have a long tradition of writing manifestos. The Bauhaus Manifesto represents a manifesto written about a certain way of designing that represents a particular location and time in history tied to the Bauhaus School. The Surrealist Manifesto represents a manifesto written about a certain movement within art practices. A Hacker Manifesto is a critique of the commodified information in digital culture (Wark 2004). And the Critical Engineering Manifesto (Oliver, Savičić, and Vasiliev 2011) and Cybertwee Manifesto represent recent manifestos written by individual art and design collectives that put forth a political and aesthetical way of creating change. The art installation and movie Manifesto (2015) by Julian Rosefeldt presents a number of manifestos through film medium, reproducing the actual message through its audiovisual form. Also Haraway is known for her manifestos and has written one of the perhaps most well-known manifestos in academia, namely "A Cyborg Manifesto" (D. Haraway 1991).

It has previously been proposed that manifestos can provide a structure to formulate and communicate "takeaways" from a design program (Löwgren, Larsen, and Hobye

2013, 97). An example is Mads Hobye's manifesto of "designing for homo explorens" from his PhD dissertation in which:

> *"The manifesto represents a synthesis of insights gained in the research program" and hereby "the holistic nature of the [design] program is embodied in a manifesto" (ibid).*

Throughout my PhD project I have practiced writing design manifestos as a creative, open and generative way of formulating and thinking-with my design program, and as a way of staying close to and reflecting on my own values and worldview, also in order to challenge them. This has resulted in a number of manifestos that for instance either dwell on how I believe we should engage with people and society, how interaction design should be practiced, or how I want to practice my own role as interaction designer. As design research is always unstable, evolving and situated, it is troublesome to write a fixed manifesto that both synthesizes the insights of a design program and one's own position within it, and is open enough for appropriation by others.

The construction of an end—a closure—of this PhD dissertation suggests that now is the time to write a final design manifesto. A manifesto that presents the worldview of my design program and provides a starting point for other design researchers who may want to appropriate or challenge my design research program. But as my thinking continues to develop, this design manifesto will necessarily by situated in time and place. I hope, however, that my design manifesto will both offer generative definitions, concepts and motivational calls for action, as well as be open enough for appropriation into different contexts.

Feminist writers have previously appropriated the rhetoric of the historically masculine manifesto genre to acquire a position of authority (Pearce 1999). For instance, the female-only Scandinavian design collective Rundkant has used the manifesto as a feminist strategy (Hansen and Staunsager 2015). Also Ahmed provides helpful thinking on how manifestos can be feminist and account for our own situated (and embodied) position in the world (Ahmed 2017). According to Ahmed, a manifesto is "a feminist snap". Snap, she writes, is the sharp, brittle, loud voice of a feminist killjoy breaking a bond or an illusion. A manifesto, Ahmed continues, is "how a judgment becomes a project" (Ahmed 2017, 255). In the case of my design program, the judgment is of a designerly and analytical character. A judgment that—inspired by my own design practice and knowledge—became a programmatic statement that unfolded my judgment into a project; into a program; into a manifesto. To think of my design program and its situated knowledges as a manifesto "is to say that a politics of transformation, a politics that intends to cause the ends of a system, is not a program of action that can be separated from how we are in the worlds we are in" (Ahmed 2017, 255). Following Ahmed's argument, design programs that propose design theory of how we can design differently must be thought-with how we are in the world we are in. In paraphrasing

Ahmed, feminist design programs are situated and embodied politics of transformation. They are how a story unfolds into action, into principles.

> *"A killjoy manifesto shows how we create principles from an experience of what we come up against, from how we live a feminist life [...] principle as a first step, as a commencement, a start of something [...] There are principles in what we craft. How we begin does not determine where we end up, but principles do give shape or direction"* (Ahmed 2017, 256)

Inspired by Ahmed's concept of feminist killjoy manifestos as well as Redström's design research programs, the feminist design manifesto thus has multiple aims: 1) to unfold, reflect on and stick to your design research program and its situated, personal and political position in the world, 2) to communicate your design research program to other design researchers and propose a call for action, 3) to make your design research program available for critique, appropriation and action by other design researchers, and 4) to produce design theory that is inherently intertwined with design practice.

As a written text that has been developed throughout and in conversation with the design research program and design experiments, the design manifesto offers a specific way of making design theory. As an outcome of a PhD project, the design manifesto is both an object in itself and part of a larger assemblage of all the objects constituting the design research, such as articles, design artefacts, presentations at conferences etc. The manifesto can be read as a standalone piece, but it also gains its meaning as "a paratext" in conversation with the design artefacts and articles surrounding it (Genette 1997). For instance, the Critical Engineering Manifesto has a strong expression with its political rhetoric and calls for action, but it also gains its meaning in conversation with the engineered objects, created by the manifesto's authors (such as Constraint City), as well as the visual and graphical presentation of the manifesto itself, which also influences the interpretation of the programmatic statements in the manifesto.

In the following I will present my design manifesto, which unfolds the knowledge and programmatic statements that I have articulated, manifested and performed throughout my design practice. In presenting this design manifesto, I wish to stay response-able of my design research and bring my design program into the future, as well as inspire other design researchers to respond to and appropriate the statements into their own situated design research practice. At the same time, I want to highlight that this manifesto is not an end point. Neither does it determine where to end. In contrary, as Ahmed's formulation of manifestos as principles from how we live a feminist life, my design manifesto is a first step. It is a start of something. It gives shape or direction to my—and potentially others'—design research practice, but it does not determine an end point. Likewise, it will evolve and adapt as I follow its directions and see where they take me.

 In the following, I will present the design manifesto as a standalone piece: a

particular knowledge outcome of my PhD project on equal terms with, and in dialogue with, my design experiments; as yet another way of putting design knowledge into form. Following this, I will present an annotated version of the design manifesto, as inspired by Annotated Portfolios (Bowers 2012), which unfolds the statements in relation to my own design research practice.

Staying with the Trouble through Design

—A Critical-Feminist Design Manifesto

#1 Designing is a way of staying with the trouble, not a way out of trouble

#2 Engage with trouble, not problems

#3 Design responses to trouble, not solutions

#4 Be willing to make trouble

#5 Stay with the wrong by speaking up against injustice

#6 Curiously visit ongoing pasts and alternative nows

#7 Be truly present across times, spaces, fact and fiction

#8 Collectively imagine still possible futures

#9 Be vulnerable with technology

#10 Disclose your designerly privilege and understand that you have one

#11 Use feminist humour

#12 Use taboos as a design resource

#13 Resist the smooth and sleek aesthetics and engage with mess and bodies

#1 Designing should not be a way out of trouble, but a way of staying with the trouble

In troubled times where social, cultural and political issues are inherently intertwined with technologies, design is not the solution but rather part of the problem. By staying with the trouble of present issues and technologies' inherent responsibilities in the unfolding of these issues, the critical-feminist designer uses design to stay with the trouble rather than propose (yet another) solution that will end up as tomorrow's problem.

#2 Engage with trouble, not problems

By engaging with trouble rather than problems, the critical-feminist designer situates themselves within a world rather than keeping it at distance. Engaging with trouble prompts the designer to deeply engage with the present social, cultural and political condition and the emotional and agonistic qualities that is inherent in trouble.

#3 Design responses to trouble, not solutions

As solutionism either invents problems or ignores the complexity of problems, and since today's solutions will be tomorrow's problems, the critical-feminist designer should not design solutions but rather respond to trouble. Responding to trouble includes caring for the other, shifting perspectives and engaging in negotiations and argumentations. It includes not giving answers to open questions but engaging in conflict and conversations.

#4 Be willing to make trouble

In order to stay, engage and respond to trouble, the critical-feminist designer must be willing to make trouble. To engage with trouble is to make trouble visible and thus to increase trouble. In transforming the system from within, the critical-feminist designer must embrace the curious practice of making trouble and the risk that it may bring.

#5 Stay with the wrong by speaking up against injustice

Even if it can be emotionally exhausting, the critical-feminist designer must stay with the wrong; that which (or whose who) are perceived as wrong, by a system that judge it (or them) to be wrong, and hereby speak up against injustice. One of the best tools of the critical-feminist designer is to question the given as given and challenge patriarchy and capitalism by speaking up against sexism and racism.

#6 Curiously visit ongoing pasts and alternative nows

The critical-feminist designer visits ongoing pasts and alternative nows in order to go beyond their own positionality—their own way of seeing, being and knowing. By carefully listening to human and non-human's stories, the designer allows the world to be interesting and themselves to be surprised. In curiously visiting other ways of being, the designer seeks to understand a multitude of lived realities and bring voice to ongoing pasts and alternative nows.

#7 Be truly present across times, spaces, fact and fiction

The critical-feminist designer rejects universal truths and the dominance of one present and one reality. Rather, the designer aims to gain a deep understanding of how the present is entangled with the past and the future, and how it interweaves fact and fiction. By being truly present across times, spaces, fact and fiction, the critical-feminist designer can be attentive to a present's trouble and allow it to gain presence.

#8 Collectively imagine still possible futures

The critical-feminist designer includes human and non-human agents into collectively imagining different ways of being with a starting point in present trouble and messiness. The designer and public alike make use of storytelling to tell other possible stories and other possible worlds, and hereby broadening our collective imagining of futures that are still possible if we act in the present(s).

#9 Be vulnerable with technology

By being vulnerable with technology, the designer embraces how our subjectivity is intimately interwoven with technologies. The designer does not distinguish between the digital and analogue but is critically aware of the political role of digital technologies. By embracing the trouble of intimacy, the designer focuses attention to how technologies engage in power relations, control and the transgression between pleasure and pain.

#10 Disclose your designerly privilege and understand that you have one

By reflecting on their own position in the world, the critical-feminist designer carefully considers how their own biases and privileges influence their ways of seeing and designing. The designer discloses their position, so other people can understand how their research and design are situated.

#11 Use feminist humour

The critical-feminist designer uses feminist humour and a playful approach to engage with trouble. The designer is not willing to use jokes that are designed to cause offense or use humour to keep distance to a topic. Rather, the designer uses feminist humour to bring bodily relief, a feeling of collective will, a space for reflection and a hope in that different worlds are possible.

#12 Use taboos as a design resource

Rather than ignoring taboos and that which does not fit into the social order, the critical-feminist designer uses taboos as a design ressource. When designing with taboos or that which is a perceived as wrong, different perspectives on the social order collide, but the designer is willing to engage with the taboo's conflict —and the embarrassment and awkwardness of taboos—in order to understand the complexity of a taboo.

#13 Resist the smooth and sleek aesthetics and engage with mess and bodies

The critical-feminist designer engages with messy and playful aesthetics which disclose material qualities and the bodies that produced and are produced by their relations with technologies. By appropriating mess and bodies, the designer facilitates a more intimate and reflective relation between people and the materiality of their designed artefacts and challenges the dominant design aesthetics.

#1 Designing is a way of staying with the trouble, not a way out of trouble

#2 Engage with trouble, not problems

#3 Design responses to trouble, not solutions

#4 Be willing to make trouble

#5 Stay with the wrong by speaking up against injustice

#6 Curiously visit ongoing pasts and alternative nows

#7 Be truly present across times, spaces, fact and fiction

#8 Collectively imagine still possible futures

#9 Be vulnerable with technology

#10 Disclose your designerly privilege and understand that you have one

#11 Use feminist humour

#12 Use taboos as a design resource
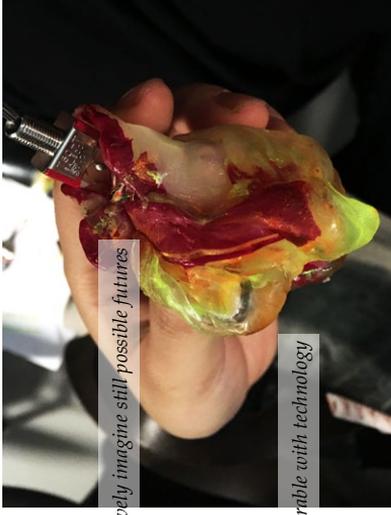
#13 Resist the smooth and sleek aesthetics and engage with mess and bodies
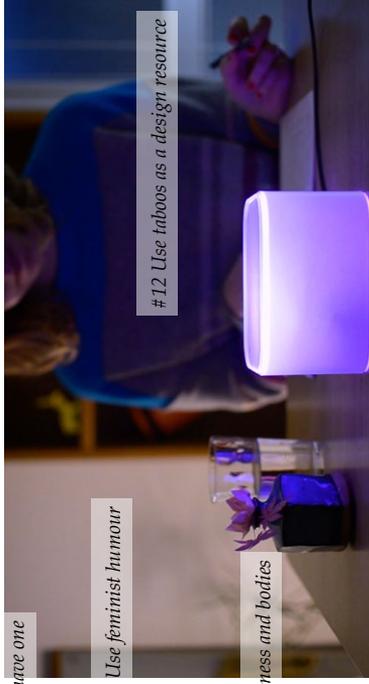
Conclusion

Conclusion

"Machines can be prosthetic devices, intimate components, friendly selves [...] The machine is us, our processes, an aspect of our embodiment" (D. Haraway 1991, 178–80)

A Brief Summary

In times where digital technologies come closer to our bodies and intervene in ever more intimate parts of our everyday lives and in our homes, there is a need to understand how they shape not only our lives but, perhaps more importantly, our subjectivity, social relations and ways of being in the world. As pointed out by Haraway, these machines are intimate components, they are us, and in this dissertation, I have unfolded and explored how our intimate encounters and ways of living with/through technologies shape our ways of being in the world. Through thinking and designing *with* the concept of intimacy, I have explored an alternative vision of designing intimate technology. In my vision, intimacy is not something to be designed *for* or something to be solved or made better through connected technologies; rather designing *with* intimacy takes the intimate interweaving of subjectivity and technology as its starting point. Intimacy allows us to speculate on the closeness of technology and the personal, even private, ways in which technologies interweave and shape our selves and our lives, as users, citizens, consumers, researchers, designers, and, inevitably, human beings.

Technologies and the digital sphere has a somehow cold and distanced connotation that in the meeting with a concept of intimacy creates a generative tension. The odd and awkward coupling of technology and intimacy creates tensions between cold and warm, closeness and distance, male and female. Whereas technology-mediated intimacy is a fantasy that came true as the internet was born in 90s, I propose a way of thinking and designing with intimacy that regards intimacy as something inherently characteristic of the ways we intra-act with technology in today's society. We are always already intra-acting with technologies when we interact with technologies. We are always already being shaped by technologies when they shape our lives and subjectivity.

As a design researcher carrying out a design practice as an important way of producing knowledge, intimacy has not just been a subject that I have researched, but also the process through which I have researched the subject. I have researched the role of intimacy in the ways technologies shape our everyday lives and subjectivity, by designing intimate technologies, by intimately designing technologies and by intimately engaging within the world(s) that these technologies shape.

Researching intimacy is to research a troubled subject. Researching intimacy is to get in trouble and to make trouble. Whereas much interaction design research is aiming to design *for* something, e.g. designing *for* intimacy, I resist to make guidelines or frameworks that contribute with stable definitions of how we may design *for* intimacy.

Since intimacy as a situated and contextual phenomenon, it would be contradictory—from a critical-feminist perspective—to propose a design framework that would foster or facilitate intimacy or make more or "better" intimacy. As a subject which brings trouble, I have instead explored ways of designing *with* intimacy, hereby both pointing to the troubled characteristics of intimacy and pointing back at the design researcher's positionality in the design research. Intimacy, thus, is not an outcome or a goal, but a means in an unfolding process. Intimacy, thus, is not a problem or a solution, but a subject that brings trouble to or with which we may respond.

Conclusions

With this PhD dissertation, I contribute to interaction design research with 1) a design theory on intimacy and intimate technologies, 2) a design methodology of staying with the trouble through design, and 3) intimate design proposals which are the artefacts I have designed within my design research program.

In my PhD project and in my design research program, I have explored the trouble of intimacy through related but different intimate topics, namely: menstruation, sex toys, electromagnetic hypersensitivity, sexual harassment and toilet practices. Designing technologies with these aspects of intimacy has each brought different perspectives to intimacy and intimate technologies, which have provided a more nuanced but also more contradicting worldview to the design program and my unfolding definition of intimate technologies. The design experiments PeriodShare, Marcelle, Ingrid, AYA and "U" have each moved the design program forward, explored it and challenged it, and now they stand as proposals on how design made within the design program of designing with intimacy might look like. In addition, through the particular concepts, methods and artefacts, these design experiments have unfolded a design theory on intimate technologies as well as a design methodology of staying with the trouble through design.

The open and unfolding definition of intimate technologies, as put forth in this dissertation, goes well beyond technologies that are close to our bodies or engage with tabooed topic, to also include those ways that technologies shape our subjectivity in relation to e.g. gender and sexuality, and how technologies are part of larger infrastructures of power and control but also trust and vulnerability. Furthermore, the ways that technologies can become intimate can be through pleasurable experiences, but at times also painful ones. They can become intimate through their placement within our bodies, but at times also through their delegation of our subjectivity and control of bodies to other devices, platforms, servers, and subjects. Technologies can become intimate when we consciously and willingly habituate them into our lives and selves, but also when we unconsciously or unwillingly are subjected to change and oppression through their executions. What constitutes intimate technologies, thus, is a definition that is supposed to be kept open, since the way that they become intimate are

contextually situated and shaped by social, cultural and political factors, that perhaps are more interesting and important to dwell with than the definition as such. I hope, however, that the open definition of intimate technologies can enable a discussion of, not what and how much, but rather how and why technologies become intimate in our everyday lives and which implications this has.

Throughout chapter 4-6, I have analysed how my design experiments stay with the trouble of different social, cultural and political issues of intimacy, ranging from how wifi intervenes our bodies, selves and lives to how gendered technologies not (only) empower but (also) limit and oppress our lives and bodies. The design theory on intimate technologies, thus, goes from an open definition on intimacy and intimate technologies, to care for the issues—or trouble—that intimate technologies reproduce and bring forth, such as those relating to bodily taboos, pleasure and pain, privacy, public spaces, and gender and sexuality.

The last contribution of my dissertation is the design methodology "staying with the trouble through design" which proposes a critical-feminist and anti-solutionist approach to designing with intimacy and designing intimate technologies. Instead of proposing solution to problems as a way out of trouble, I argue that designers should (also) stay with the trouble through design. By staying with the trouble through design, designers may respond to trouble as a way of learning to be "truly present" within the social, cultural and political issues in the world. Many current issues are also brought forth by yesterday's solutions, and rather than proposing new technological solutions to old technological problems, designers should stay with the trouble in order to respond with care, curiousity, socio-cultural sensitivity and political engagement. A designer that is staying with the trouble does not turn something into a problem in order to solve it but engages with the trouble and messiness of situated worlds. In a design process, as soon as trouble is sorted out, as soon as messiness is eliminated, then we are not designing any longer. As such, designing is the process of staying with the trouble, and in order to be better at responding to/with trouble—in order to be better at designing— we need to stay with the trouble as far as our imagination, curiosity and empathy take us. Throughout my PhD project I have stayed with the trouble of intimate technologies; a design research process which I have conceptualized into the three practices of staying with the wrong (chapter 4), curious visiting (chapter 5) and collective imagining (chapter 6). As an experiment into creatively framing this design methodology of my design research program differently, I have written a design manifesto of staying with the trouble through design (chapter 7). Together with the appended articles and the catalogue, these parts all constitute a dissertation in interaction design, that, I hope, both encapsulates and continuously unfolds the design research I have carried out on intimacy and intimate technologies.

Contributions to Interaction Design

My dissertation contributes to interaction design research with a critical-feminist perspective on designing with intimacy and with the design methodology of staying with the trouble through design, inspired by Donna Haraway. Interaction design research has a strong tradition of problem-solving and changing current situations into preferred ones. To say it polemically, there is a particularly strong focus on solving problems in those subfields of interaction design research, that carry out and publish interaction design research at conferences like CHI and DIS but are informed by engineering, computer science and cognitive psychology. Likewise, in technology industry there is a tendency to solutionist thinking, by applying technologies to solve problems that do not really exist or problems that are more complex than what can be easily solved by technology.

In design and designing, solutions are dangerous. They embody a fixed argument about how the world is and how it should be. Solutions are a designer's worldview embodied in a thing. If that worldview has not been troubled, in the meeting with different worlds—different ways of living and being—, then solutions are dangerous. If a designer has not been in trouble before ending at a solution, then design is dangerous.

Different worlds that trouble your design research's worldview bring risk, namely because they challenge your present and worldview. They surprise you, what you thought you knew, and where you thought you were heading.

But in design and designing, aren't surprises exactly what we want? I would argue yes. When designing, trouble is what we want. We want to stay with the trouble as long as possible. We want to put ourselves at risk and to trouble ourselves, our ideas and dreams from within, in order to propose a different way of making, doing and thinking. In staying with the trouble, trouble brings difference. Trouble proposes different modes of living. Through the risk of listening to a story, the trouble of touching and being touched by ongoing pasts and alternative nows, designing can reorient its trajectory towards difference.

To ask designers to stay with the trouble, rather than to solve problems, in a profession where problem-solving has a high priority, is to ask for trouble. It is to question and challenge the agenda, the motivation, the methods and the outcomes of interaction design research. If interaction design should not be about solving problems, but about staying with the trouble, what new concepts, methods, artefacts do we need in order to practice design? In my dissertation, I propose such different ways of thinking and doing, that can inspire designers to stay with the trouble, not as a substitute but as an alternative to current ways of practicing and researching interaction design—as another way of conceptualizing the world designers are looking at and intervening and another way of conceptualizing how the designers themselves are in touch with this world.

Current critical practices in design and research, such as critical design, speculative design and design fiction also propose anti-solutionist ways of designing that both critique technology's political agenda and its influence on present societal issues and speculate on other possible futures. However, they are, in my mind, often blind of their own positionality and they seldomly engage explicitly with feminist concerns. Feminist interaction design practices, on the other hand, such as feminist HCI, do not have a strong tie to the experimental and artistic tradition of design research as such, and thus seldomly engage the critical, imaginary and constructive potential of feminist design. In my dissertation, I both contribute to critical practices in design and feminist HCI with the methodology of staying with the trouble through design, which aims to fill the gap between these practices and contribute with critical *and* feminist ways of designing.

However, my dissertation also contributes to the general field of interaction design research. Technologies increasingly shape our subjectivity and move closer to our bodies, intimate lives and homes. As interaction design research engages with increasingly complex and intimate issues in an increasingly complex world, there is a need for more nuanced understanding of the social, cultural and political issues that technologies both bring forth and respond to, as well as an increasing focus on the designer's own positionality and technologies' political agenda. With my contribution I propose that by staying with the trouble of intimacy through design, interaction designers and researchers will be better capable of engaging with and responding to *trouble* relating to technologies' intimate interweaving with our bodies and subjectivities, everyday lives and societies. Technology research and development is (still) dominated by white men, and even if there is an increasing focus on technologies' biases and political role, there is a growing need for more women and people of color to take part in the conversation and development of technologies. In this dissertation, I have actively and deliberately engaged with gender issues in interaction design and research of technologies; I have reflected on gendered technologies and (re)imagined (gendered) visions of futures, I have designed technologies from a gender perspective and included diverse publics in this, I have consciously referenced female authors and female artists, and I have worked with a norm-critical design of the dissertation's visual expression itself. I hope that also this engagement with and critique of gender norms will contribute to an increased focus on gender issues in interaction design research.

A Way Forward

I finished up the research related to this design program with writing a design manifesto. The purpose of this was not simply to formulate and disseminate the knowledge contributions of my design practice, but also to inspire future research and development within this design program. Whereas I hope other designers and researchers may pick up on the research and contributions of my dissertation, I especially hope that

the manifesto's call for action will bring awareness and inspire discussions and, more importantly, action by other design researchers. I will take the lead in sticking to, be responsible of, developing and challenging the worldview expressed in the manifesto: as a starting point I will see it grow. I acknowledge that my research and design practice is situated in a context, and that the particular design experiments can only unfold very partial perspectives and situated knowledges, and thus the manifesto and research is limited in nature. Future research will include developing and challenging the design program in other contexts, with different communities, different methods and with different design outcomes in mind. Although I have worked intensively with my design research practice and included different people throughout my practice, I have mostly been working alone and not as part of a bigger research group. Thus, I would like to challenge how the design program would react on scale: in bigger research groups, bigger design teams, or if the design outcomes would be deployed in longer time or on bigger scale. There are still open questions and speculations that both limit my research and call for future research.

Based on my research into intimate technologies and designing with intimacy, I sincerely hope that more design practitioners and researchers are willing and have the courage and curiosity to design and research topics and issues that are marginalized, silenced or otherwise ignored from design research. Women's health is one such overlooked area of design and research, and while more attention and awareness is raised into designing women's health, there is much more work to be done. Whereas I have worked mostly within the context of women's health, there are many more sensitive and marginalized areas to be covered through design research. Bringing multiple voices to design and challenging the normative core of design research may be exhausting and require social and emotional support. Going against the flow is demanding, and you might be hold up against bigger standards and get into trouble. You might be called a killjoy or be cut off as that researcher doing feminist research, or that researcher doing research (only) for a particular marginalized group. If that happens to you, you will perhaps also experience that Ahmed's "Living a Feminist Life" (Ahmed 2017) and Haraway's "Staying with the trouble" (Donna J. Haraway 2016) can be uplifting and caring companion texts to support you through troubled times. Similarly, I hope that if you, a critical-feminist designer or design researcher, find yourself in trouble by troubling normative worlds with your design, will find my design theory and methodology of staying with the trouble through design to be a comforting and supportive text as well. I hope that you, by staying with the trouble through your design, will both find peace and strength to be truly present in a messy world, embrace the risk involved in making trouble, practice the curiousity and responsibility of listening to *different* worlds, and imagine *different* responses today to make space for possible futures tomorrow.

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Part two

Appended Articles

Article #1

PeriodShare

Marie Louise Juul Søndergaard
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PeriodShare

**Marie Louise Juul Søndergaard & Lone Koefoed Hansen**

PeriodShare is a response to how contemporary technology makes bodies possible and how it writes the narratives of what is a normal human body. The project disobeys the gendered culture of Silicon Valley that sees itself in a position to design, build, and decide how technology makes lives matter to humans. Using the rhetorics of a neoliberal startup, it is a physical prototype, a Kickstarter campaign, and a performative intervention at a tech fair. Through using electronics as a feminist tool it questions the business model of menstruation trackers that rely on users wanting to track but not publicly share their body's data. Unlike performance trackers, data from menstruation trackers do not have social media integration and this underlines the dominant cultural idea that the functions of the female body, and in particular menstruation, is a taboo. PeriodShare deexclusifies the data of the fertile female body by encouraging users to share their menstrual data with friends and family and on social networks. It does so through humour and by using electronics as a performative intervention.

PeriodShare follows the neoliberal trend of quantifying and tracking everyday activity and making everything smart. It proposes a wireless menstrual cup for automatic tracking and sharing of a menstrual cycle: In a sensor-augmented menstrual cup, data is tracked directly from the menstrual blood and transferred to an accompanying smartphone application where the user can manually or automatically share the menstrual data with friends, family, colleagues or on social media platforms.
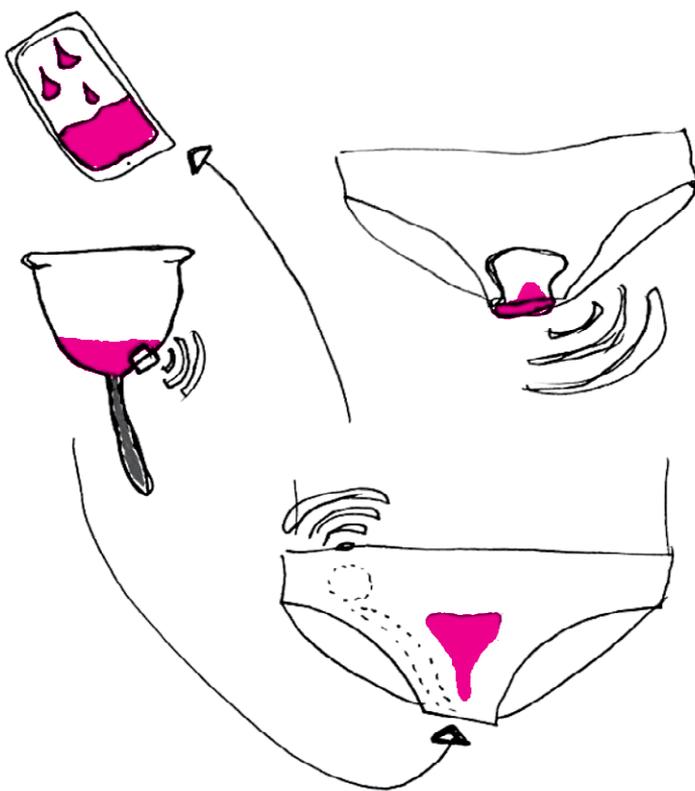
In addition to the physical prototype, PeriodShare consists of a Kickstarter campaign and a performative intervention at a tech fair. The Kickstarter campaign describes the project and features a campaign video, the product's philosophy, and a design manifesto for menstruation. Challenging and affirming the logic and culture of Kickstarter at the same time, PeriodShare uses the platform's language to set a common ground for discussion whilst also disobeying its logics by presenting something slightly humourous, uncanny and absurd. The physical prototype and the Kickstarter campaign also took part in a performative intervention at a tech fair, where the designer performed as a startup entrepreneur trying to get funding for PeriodShare.

PeriodShare: A Bloody Design Fiction

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PeriodShare: A Bloody Design Fiction

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Abstract

In this paper we present PeriodShare, a speculative design proposing a wireless menstrual cup that automatically quantifies and shares menstrual data on social networks. We suggest that PeriodShare is a design fiction that uses both crowd-funding rhetoric and the form of a rather dumsy DIY project to create a particular fictional universe that (1) speculates on a potential near future of quantification of menstruation, and through this (2) encourages to reflection on the dynamics of contemporary technology paradigms like the politics and culture of self-tracking, sharing, and intimate data. As a research through design project and by using these communication threads, PeriodShare thus uses menstruation as a trope to investigate social, cultural and political issues of intimate technologies.

Author Keywords

Design fiction; research through design; self tracking; menstruation.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

With HCI approaching personal and intimate areas [1,2] it is increasingly important to consider the social and cultural issues of such areas. For instance, an increasing number of people track every step they take

every breath they make when running or sleeping, or their menstrual cycle on their phone. However, it has been proposed that there is a need for a more critical perspective on the design and understanding of tracking and quantifying technologies [13,15]. Self-tracking has been argued to be a case of solutionism: the invention of problems that do not exist, or quick technological fixes to larger societal issues [16]. In HCI, speculative design and design fiction are getting more popular as a methodological strategy and as a tool to be critical towards solutionism, by developing design concepts that acknowledge design's political role and impact on social and cultural contexts [6,13,14].

This paper presents PeriodShare (Figure 1), a design fiction that investigates the social and cultural aspects of menstruation by speculating "what if menstruation had monetary or social value?". Apart from [3], not much HCI research has been done on menstruation, although 2015 has been named "the year of the period" [11]. Menstruation is an important but also neglected topic in HCI, and while it is impossible to say why this is the case, one contributing reason to its neglected status could be its connection to sex and sexual issues, another underexplored area in HCI [4]. As explored by Almeida et al. [1,2] women's health is intertwined with notions of taboo, partly because "it often involves parts of the body that are hidden or involved in sexual functioning" [1]. The hygiene industry sell products to absorb blue, not red, liquid, and in large parts of the world menstruation is (still) a cultural and social taboo [1,3,12]; as a result girls stay home from school and women hide sanitary towels inside their sleeves. This paper aims to contribute to the underexplored area of menstruation in HCI research. In presenting PeriodShare, this is a case study of how one might use

design fiction as a critical tool to challenge both the taboo of menstruation and the way that technologies interweave with cultural and political issues.

Figure 1. PeriodShare is a design fiction that encourages critical reflection on self-tracking, sharing, and intimate technology by speculating on a near future of menstruation tracking.

Bloody Design Fiction

In [3] a design fiction by artist-designer Sputniko! is presented as an example of how a research through design (RtD) may contribute with knowledge concerning menstruation in an HCI context. In the music video presenting the design fiction, we follow a Japanese boy, who for a night out wears a polished steel-artifact around his waist "in an attempt to biologically dress up as a female" [17]. The steel-artifact is a "Menstruation Machine", a wearable technology that simulates the physical experience of menstruation. The machine plays a leading role in the video narrative as a prop that drives the story forward, creating personal conflict and point-of-no-return. In a flashy Japanese metropolis, the machine contributes to a story world where logics of gender and sexuality are

renegotiated. It asks the viewer to suspend disbelief and consider the story world plausible and believable.

Design fiction is commonly understood as a way of making use of fiction to imagine design of technologies under different circumstances in a near future [5,6,13,14]. Science fiction writer Bruce Sterling defines design fiction as "the deliberate use of diagetic prototypes to suspend disbelief about change" [18]. Diagetic prototypes refer to "objects and technologies that exist within the fictional world" [21]. Joshua Tanenbaum has described the importance of taking this world or reality of a story seriously, and that for a design fiction to work, the diegetic prototype must abide by the rules of the world; rules that "must be seen to exist and to operate with consistency" [21]. Lindley and Coulton have simplified the definition of design fiction to "something that creates a story world" (i.e. the media) and then "prototypes something within that story world" (i.e. the prototype) [14]. The media that creates a story world may very well be described, borrowing a term from literary theory, as an object's *paratext* [10]. The paratexts are a central aspect of design fiction, since they determine an object's existence and extend the designer's intention into the object. Thus, one way of understanding design fiction (paratexts plus prototypes) is to see it as design work grounded in ideas, discussions, pop-culture themes, or even idiosyncratic ideals instead of grounding it in for instance empirical data or particular concrete problems. PeriodShare is such a design as it calls for a nuanced understanding of menstruation as a subjective, embodied experience that relates to the logics of self-tracking, sharing, and intimate data.

PeriodShare

A particular kind of wearable and ubiquitous computing, PeriodShare describes a wireless menstrual cup that tracks a woman's period and automatically transmits data to her social network. When using PeriodShare, menstrual blood is automatically tracked in a reusable silicone cup that measures when and how much the woman is bleeding, translates it into data and transmits it to her smartphone. Here, a connected app enables her to share this information with for instance her partner, friends, and colleagues, or to broadcast it on social media platforms such as Twitter.

As a speculative design project, PeriodShare is comprised of a physical mock-up, a real Kickstarter campaign with fictional elements, as well as a performative intervention. The prototype consists of a pair of white panties with a hand stitched electric circuit, a connection to a menstrual cup implemented with a (temperature) sensor, and a website mimicking an app, which is connected in real-time to the sensor. In addition, PeriodShare has several paratexts: a Kickstarter campaign, a petition for future users, and one of the authors playing the role of a start-up founder. The Kickstarter campaign includes text and a video, both describing the product, its use, and why people should back it (Figure 2,3).

The Design of PeriodShare

PeriodShare is part of a research project on social and cultural issues of intimate technologies. As a RtD project, PeriodShare is designed to critically investigate menstruation tracking, and in a wider perspective provoke questions and discussions about bodily norms and taboos in design. PeriodShare was designed in spring 2015 and exhibited at Internet Week 2015,

Figure 2. PeriodShare's Kickstarter video portraits a fictive start-up owner (one of the authors), and uses a DIY-rhetoric, amateurism, and somewhat hysterical expression to reflect on Kickstarter's inherent logics [19]
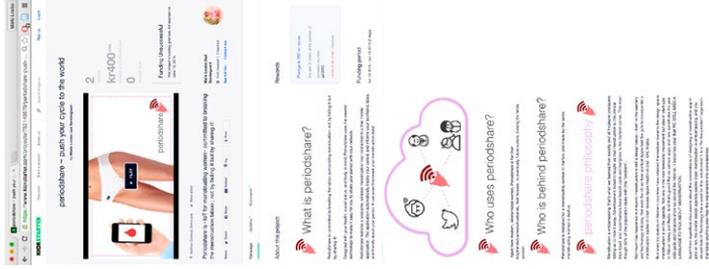
Aarhus, Denmark. In a speculative design process, the design of PeriodShare originated in the counterfactual question "What if menstruation had monetary or social value?". With this what-if-question [9], a fictive story world was build, a near future where menstruation would be something so desirable that you would be willing to share it on social media. From this story world several design concepts arose, of which PeriodShare was one.

The fictive character of PeriodShare is not its technological application. In contrast to some design fiction and speculative designs, PeriodShare is a partly functioning prototype that also uses the distinct prototype look with visible wires and handstitching as part of the argument. By grounding PeriodShare's design fiction in a crowdfunding website, early prototype design formats, and start-up fairs, the primary argument of the PeriodShare design lies in its media-realistic paratexts, rather than the changed rules and logics of menstruation. PeriodShare's main fictive element is its social and cultural premises of existence: to even imagine that PeriodShare actually exists on the market demands the suspension of particular cultural logics and social codes of menstruation and behavior related to menstruation. It is for instance not possible to think of menstruation as something that people prefer to not discuss, and this is where Kickstarter and the prototype comes into play. If you buy into this being an early prototype, something that someone like you might eventually fund, then you also by inference discuss how menstruation is something that can be discussed in public just like we discuss sleeping patterns and preferred running routes.

PeriodShare's plausible technological state calls for action, and similar to adversarial design objects, its critique works because it works [8] and because it follows the rules of how many tech projects are presented, launched, and discussed. PeriodShare's logics work inside a tech start-up story world, and this challenges the viewer to contemplate the social logics of menstruation and through this the general logics of how the body—as well as particular bodily functions—is tracked and shared on social medias. Also political considerations into the economic or political interests in such intimate data, and/or gender issues of the start-up scene, are potentially put on the line.

The Fictive Role of a Start-up Company

PeriodShare was exhibited at Internet Week 2015 in Aarhus, Denmark, where one of the authors played the role of a start-up owner seeking funding. As a performative intervention into the world of start-up and tech industry, the aim of exhibiting PeriodShare was to get an initial impression of the kinds of responses and discussions it might facilitate for a public audience. Equipped with the prototype, the Kickstarter campaign, and a petition for user tests, she informally engaged with a variety of people (e.g. nurses, business and design students, investors, a radio host, tech company owners, and premenstrual girls). People were initially not told that it was a research project and a fictive design. Instead they were deceived into believing it was a "real" design solution to which the designer would like their considered judgment (the research ethics of this method is not unprecedented but can be discussed, as it is suggested in [7]). In some of the conversations the research status of the project eventually became a topic of conversation whereas in others, people left thinking that this was a real start-up proposal.

Figure 3. Kickstarter is in some way always already fiction, since the products do not yet exist, and thus acts as a plausible medium to present design fiction.

inherent politics and culture of menstruation but instead purely address the technological issues.

In this way, PeriodShare also uses menstruation as a trope in a design fiction, aiming to critically investigate the politics and culture of intimate technologies. As explored in [20], PeriodShare opens up a space for discussions that are deeper and wider than initially explored in this note, e.g. a critical perspective on the economy of a positivist, "empowering" agenda of self-tracking services, or the commercialization of intimacy through technology.

In opening up this reflective space, and following Almeida et al.'s argument that humor and awkwardness are valuable tactics for approaching tabooed areas [1,2], PeriodShare approaches the taboo of menstruation through the use of fiction, humor, and uncomfortable interactions. As a design fiction project, the purpose of using humor and awkwardness to transgress taboos is to provide a "provocative yet open space" for discussing intimate themes even if the use of sarcasm and irony may be questioned as a not very inclusive way of approaching taboos [6].

Conclusion

In this paper, we have presented PeriodShare: a RtD project that uses menstruation as a trope to discuss the politics and culture of self-tracking, sharing, and intimate data. We have described the speculative design process of PeriodShare; a process with the specific outcome of discussing menstruation tracking. In addition, we have described what role the paratext of Kickstarter has, and presented how a performative intervention was part of the critical inquiry into PeriodShare's knowledge production and critical

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Some visitors asked "who on Earth would share their menstrual data online" and "is this a joke? Or maybe art?", other visitors found the concept "empowering", "funny" and "thought provoking", and leading visitors to speculate on the general self-tracking culture and economy, e.g. "how do you compete in menstruation?". In this sense, the performative intervention gave valuable insights into taboos in design, self-tracking as a cultural phenomenon, and design fiction as a research method for field studies and critical debate.

Discussion

In the recent years, menstruation has gained more attention in the contemporary art world, in the tech industry, as well as in society as such. In Western countries menstruation is in some respects undergoing a "transformation" from being something shameful or unspoken of to a popular phenomenon, a design-problem, and a symbol of an increased focus on equality. Examples are free bleeding movements and twitter campaigns, design products as Thinx, and menstruation tracking apps and IoT products such as Clue, LOONCUP, and my.Flow. That menstruation is part of a feminist debate is not new but it is new that it has entered mainstream media and pop-culture.

On the one hand, PeriodShare follows this trend of de-tabooing menstruation and the cycles of the female body but on the other hand it questions if the increased focus actually decreases the taboo on menstruation and menstrual culture and suggests that perhaps the long history of menstruation as abject and impure [12] is too complex an issue to be fixed by simple tech solutions. Perhaps, it asks, these apps and products are solutionist when they don't seem to consider the

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Figure 4. Screenshots of a mock-up of PeriodShare's app

Figure 5. The exhibition of PeriodShare at an Internet fair.

potential. With its strong semiotic meanings and social and cultural issues, menstruation has been used as a design material to discuss the broader issues of a self-tracking culture and economy and sharing of intimate data, the general aim of which has been to investigate how technologies display and perform inherently cultural and political roles.

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Introduction

> it is always a question of countering animal disorderliness with the principle of perfect humanity, for which the flesh and animality do not exist. Full social humanity radically excludes the disorder of the senses; it negates its natural principle; it rejects this given and allows only the clean space of a house, of polished floors. (Bataille, *The Accursed Share, Vols. 2 and 3*, 55)

Digital technologies, wearables, and self-tracking systems have placed the body in a larger exchange system. Bodily performances are quantified down to the last detail, and biometric data is exchanged between smartphones, databases, and various stakeholders. Our quantified self becomes a tool to better manage our life, but it also provides a method for harnessing previously 'wasted' excess energy. As walking, sleeping, and eating are turned into valuable data, the excess of the post-digital body is contested. As such, the neoliberal principle of exchange has established itself in our bodies and minds (Sützl).

One such example is how menstruation has been picked up lately by the 'tech' industry. Today millions of users track their period cycle using reproductive health apps, and menstruation tracking is an integrated feature in Apple's HealthKit software platform. Additionally, LOONCUP the recently developed menstruation cup automatically tracks and analyses menstruation data directly from the blood to the smartphone. Messy blood becomes clean data. Quantification of menstruation takes self-tracking to the extreme, and in a neoliberal rationality the digital managing of menstrual blood seems as the obvious next step in humans' effort to obliterate the very traces of nature. In a Bataillean sense, it counters "animal disorderliness with the principle of perfect humanity, for which the flesh and animality do not exist" (Bataille, *The Accursed Share, Vols. 2 and 3,* 55). As such, menstruation trackers help us manage a (former) site of disgust.

The digitization of menstruation raises several questions about the cultural aspects of menstruation in an exchange economy. What happens to the cultural complexities of menstruation, and the body in general, when through digitization it changes value from excess to exchange? With this speculation I aim to investigate the relation between menstruation data as abject, taboo, and excess, in order to consider governed principles of subjectivity, intimacy, and sociality. Drawing on Georges Bataille's notion of excess, Mary Douglas' analysis of dirt, and Julia Kristeva's notion of the abject, I will present a cultural analysis of menstruation tracking, including my own intervention *Periodshare*. Focusing on the relation between menstruation-as-dirt and data-as-purity, I will discuss complexities and ambiguities of data and the self-disciplined quantified self as cultural objects.

Menstruation as Dirt, Data as Purity

Tracking and datafying menstrual blood is an act of merging dirt and purity; messy blood is turned into clean, polished menstruation data. Thus, discussing the relation of menstruation blood as dirt and menstruation data as purity means to

also consider menstruation as a culturally embedded phenomenon that includes self-discipline and subjectivation. Data is an object of purity; something you cannot touch or smell. At first sight menstruation quantified to data also seems pure and as something whose particular details you would not know had it not been for the tracking. However, coming from the body's inside, menstruation data seems to be of a different and more intimate kind than comparable biometric data such as statistics from a physical workout. This changes the premises for sharing these data through a social network. One reason for this is found in the long cultural history of menstruation as taboo.

Menstruation as a Matter out of Order

> Taboo is a spontaneous coding practice which sets up a vocabulary of spatial limits and physical and verbal signals to hedge around vulnerable relations. It threatens specific dangers if the code is not respected. (Douglas xiii)

In a very literal sense, menstruation is an excess of the bodily system. On a biological level, menstruation is where the body sheds unfertilized eggs and the womb's unused 'reception committee'. It is associated with non-reproductive sex, but also with death, as menstruation has the impossible status of a dead being who never lived. In particular, menstruation belongs to what Julia Kristeva terms *the abject*; something that is neither me nor recognizable as a thing (Kristeva 2). The abjection of menstruation, Kristeva argues, points to the liminality of the subject itself as it comes from her own body, and consequently leads to the abjection of self. Abjection is "the other facet of religious, moral, and ideological codes on which rest the sleep of individuals and the breathing spells of societies" (Kristeva 209). Kristeva has developed her own notion of Bataille's concept of excess, and especially his writings of *informe*, the formless, that resists the need to take shape and fit into a universal categorization system (Bataille, *Visions Of Excess* 31). To Bataille, the abject points to the poverty of prohibition constituting each social order. As prohibition is what is commonly understood as a thing separating human from animal, the weakness of prohibition as expressed by the abject is a powerful tool to underline the fragility of objectivity.

Whereas Kristeva builds her analysis of menstruation on the psychoanalytic notion of the abject, Douglas' analysis is grounded in social anthropology and in a structuralist understanding of dirt. Here, menstruation as dirt is "a matter out of order" (Douglas 44). If the European culture understands menstruation as dirt, it is not (only) as a symbol of bad hygiene, but rather, and more importantly, as a symbol of an inappropriate element in a systematic ordering and classification of matter. As such, the menstruating woman does not fit into a European conception of the female, as she neither equals sex, nor reproduction. In some primitive societies, e.g. the Mae Enga of Papua New Guinea, menstruation is seen as female pollution, and even married men fear menstrual blood, as "they believe that contact with it or with a menstruating woman will sicken a man and cause persistent vomiting" (Douglas 182). Although it could be argued that this fear of pollution relates to the symbolic order, something that does not fit with our rational Western ideas of dirt, Douglas argues that our Western ideas of dirt and hygiene are equally a question of the symbolic order. Building on Douglas, we see that also in Northern European visual culture, menstruation is treated as

something dirty, disgusting, and embarrassing, symbolized through blue gel in advertisements and hidden in small pink boxes in school. Rituals, in primitive and Western societies, control this 'danger'. In popular culture it has become a ritual to hide menstruation, to disguise it through synonyms such as "the curse" or "Aunt Flo", and to reject its material status through jokes about Premenstrual syndrome (PMS), and so on. Through this cultural purification, we have learned to behave as if it did not exist. Menstruation exists in the margins of culture even if it is an important part of most women's lives.

Dirt in a Larger Infrastructure

Douglas argues, "where there is dirt there is system" (Douglas 44). Menstruation only exists as dirt due to religious, cultural, and political systems that, in striving for purity, categorize it as dirt. By engaging with dirt it is possible to analyse these systems, and their "powers and dangers credited to social structure reproduced in small on the human body" (Douglas 142). What is dirt is often found to be a taboo. Taboos function to maintain cultural systems and reduce intellectual and social disorder. Consequently, a taboo acts as a ban or prohibition not to be transgressed. As uncomfortable facts, dirt as taboo is something we would rather ignore but, as Douglas argues, it is not always an unpleasant experience to confront taboos since they often involve an ambiguity that should be contested. Transgression of taboos is experienced when we enjoy works of art, or when the abject is used as a political tool to distort order.

This also holds true for menstruation. Especially young female artists use menstruation as an aesthetic and artistic material to provoke or distort the pure, clean system on social media(s) and in popular culture. This is seen in the works of artists Rupi Kaur, Arvida Byström and Casey Jenkins for instance. But lately menstruation has also been used widely as a political tool against governments or corporations in the fight for certain freedoms and equality. Some examples are the UK campaign #JustATampon, women bleeding in white pants to protest the tampon tax, Kiran Gandi who ran the London 2015 marathon without sanitary protection, and recently we have also seen the Indian campaign #HappyToBleed protesting against the Sabarimala temple that denies entry to menstruating women. Menstruating women have long been perceived as impure and polluting in Hindu culture, but this case adds an extra layer because the new chief of the Sabarimala temple aims to invent a machine that scans women to check for menstruation:

> These days there are machines that can scan bodies and check for weapons. There will be a day when a machine is invented to scan if it is the 'right time' (not menstruating) for a woman to enter the temple. When that machine is invented, we will talk about letting women inside. (Varghese)

The dystopian sci-fi future of automatically scanning impure bodies, tracking menstruation, and controlling access is not far away, in either religious or high-tech societies. Simultaneously with the speculations made by the Indian temple chief, San Francisco-based LOON lab have managed to fund the wireless menstruation cup LOONCUP through a Kickstarter campaign. Data is easy to datamine and sell, and in the future LOONCUP could potentially sign agreements with governments, global insurance companies, or even the Indian temple chief. In

this type of example, conflicts of politics, religions, and economy intertwine to manage intimacy, subjectivity and sociability. LOONCUP demonstrates the power that follows in the transformation of matter into data; in attempting to transform the useless into something with use-value.

Excess and the Accursed Share

> From the start, the introduction of labour into the world replaced intimacy, the depth of desire and its free outbreaks, with rational progression, where what matters is no longer the truth of the present moment, but, rather, the subsequent results of operations. (Bataille, *The Accursed Share* 57)

In *The Accursed Share* Bataille presents a utopian society where human activity should not only be judged by its use-value. Rather, uselessness should be considered an important, sovereign form of human life, in erotic as well as economic systems. Bataille's notion of excess confronts the traditional idea of exchange as the only valid system by highlighting the fact that every system has expenditure; waste, which can only be spent on unproductive activities, the so called luxuries of nature. These, Bataille argues, are the greatest enemy of capitalism, as capitalism cannot monetize excess. As such, excess is what cannot be comprehended in well-known systems as money, or more abstractly under the phenomenon of exchange. Bataille saw this present in the luxuries of eating, death, sexual reproduction, and sacrifice among others. The 'accursed share' expresses this excess as a gift-giving that, in opposition to exchange, does not have restricted economic interests but is a question of a general economy, where giving becomes an act of acquiring power.

Wolfgang Sützl points to Bataille's notion of excess as a potential critique of today's "sharing economy", and argues that sharing as we know it from e.g. Uber and Airbnb has more in common with capitalist, rational notions of exchange than with the principle of the gift (Sützl). Sharing is an everyday, intimate experience, whereas exchange is a systemized, fixed infrastructure. Exchange problematizes the phenomenology of 'being-with' (the Other), as Otherness gets charged with the violence of competition. In an exchange economy we do not see other people as citizens but merely as customers or competitors. Furthermore, exchange seeks to govern the ungoverned nature of excess, as it is seen in digital rights management in terms of the excess of file sharing. To Sützl, Bataille's anti-economic notion of sharing might be a possible alternative to neoliberal society, as sharing questions the only possible nature of an economic system build on exchange.

In the second volume of *The Accursed Share*, Bataille develops his notion of excess in the realm of eroticism, as "the essence of humanity emerges from this excess" (57). Instead of regarding humans as inherently rational beings and believing that reason was what separated the human from animal, Bataille argues that the arrangement of "the gift" (also at the basis of sexual activity) is part of the transition from animal to human. Unlike animals, human beings place prohibition on excessive behaviour, his/her animal needs, and the human body. Bataille criticises the idea of prohibition as natural, and does so by pointing to the instability of the obscene and taboos. One such example is the fear of menstrual blood. As this is experienced in both primitive and civilized societies, he rejects

that our civilized "sanitary installations" (66) separates us anymore from animality. To Bataille this is not the fear of animality, but "the disgust with being *human*, which increased from the contact with a civilization so meticulous that it often seems sick" (66). Consequently, Bataille argues that with an increasing process of civilization more prohibitions and taboos are organized in order to govern excess.

Following this, the purpose of inviting menstruation into the smartphone is not to transgress the menstruation taboo by embracing more diverse biometric data. Rather, it is a way to further deepen our disgust with being human by civilizing and disciplining ourselves. In the process of changing menstruation from seemingly useless excess, the waste of the bodily system, to useful, exchangeable data, menstruation suddenly seems to have become a new sort of value. Statistics could be made. Diseases might be tracked. It might even be possible to compete in menstruation! Following these theorisations about dirt and purity, excess and exchange, and in order to explore the ambiguity in the taboo of menstruation having an exchangeable value, I devised the speculative design project *Periodshare* (2015).

Periodshare

Periodshare is a critical and ironic speculation on the future value of body fluids. The 'speculative design' (Dunne and Raby), or 'research-through-design' project, features a wearable, wireless menstruation cup connected to an app. The system automatically tracks the period in real-time and shares it on social networks, hereby making it easy for the subject to inform others such as her partner, boss, and friends about her period. She can even live-tweet her menstruation data, hereby making something very private a public issue. *Periodshare* explores the boundaries of inside-outside, private-public, and material-representational data. More importantly, *Periodshare* questions the status quo of menstruation, asking what is the value of menstruation in a post-digital age? In a context where artists argue against the censorship of this body fluid and the tech industry invites menstruation into new operating systems, *Periodshare* is situated as an ironic critique inside consumer culture to highlight the tension between taboo and monetization. It comprises a speculative prototype, a Kickstarter campaign, and a performative intervention at an Internet fair.

Figure 1: Still from Periodshare's Kickstarter campaign video, 2015: https://www.kickstarter.com/projects/752149579/periodshare-push-your-cycle-to-the-world?ref=nav_search

Sharing the Abject

Periodshare points to interesting ways of engaging with menstruation and datafication in the near future, and seeks to raise awareness of the cultural and social stigmas and taboos underlying the larger phenomenon of menstruation trackers. It does so by using the common cultural language of innovative, scientific technology development; it is clean, white, and seemingly empowering – but at the same time it distorts the cultural expectations by introducing irony, criticism, and amateurism. The prototype possesses an ambiguity in its rhetoric. It is polished and clean though unpleasing in its concept and technical incompleteness. Compared to sleek black boxes, *Periodshare*'s DIY-character makes people slightly uncomfortable when imagining wearing something slightly unfinished inside the vagina. Examining the hardware and software of *Periodshare*, several ambiguous questions arise. One of them concerns the development of the prototype; the careful hand stitching of an ESP8266 WiFi module into white panties with conductive yarn contrasts the mechanic character of most wearables, and questions the relations of feminine and masculine creative labour and technological development. The software, which makes it possible to share the menstruation data in real-time, serves to question when data is deemed too private to share in a public network, and the objectivity of menstruation data, as the software clearly is not capable of tracking complex, personal biometrics but only simple standard values defined by the designer.

When it comes to the Kickstarter campaign, *Periodshare* uses and exploits the cultural rhetoric and codes of 'start-ups' and innovation labs. The ambiguity in the (visual) language makes it slightly difficult to estimate the credibility of the project; is this serious or just a joke? Using a DIY-rhetoric, amateurism, and

somewhat hysterical expression as seen in the video, *Periodshare* takes advantage of the privileged site of Kickstarter to reflect on the inherent values of an increasingly corporate organization (where private enterprise is supported), and where creative projects lose out to the those who manage to speak the language. I used similar tactics in the performative intervention at a technology fair celebrating the Internet. Assisted by the prototype, the Kickstarter campaign, and a petition for potential users, I performed being a start-up looking for funding. But as *Periodshare* circumvented the rational logic of innovation by not claiming to solve a simple design problem, the intervention lingered in the space between critical design and art, innovation and criticism. It steered the conversation away from business models and efficiency towards discussions about the larger systems in which menstruation exists, e.g. the institutional systems, taboo systems, and tracking systems. *Periodshare* has no clear use-value, as the excess of sharing menstruation data points further than the machine itself. The matter concerns the apparent conflict between the taboo of impure menstruation and the logic of pure data. Contrary to common understandings of menstruation trackers, *Periodshare* points to how the combination of these results in ambiguities when the data is shared with a wider public.

Ambiguous Data: Data as Abjection

> We could not reach the final object of knowledge without the dissolution of knowledge, which aims to reduce its objects to the condition of subordinated and managed things. (Bataille, *The Accursed Share, Vols. 2 and 3* 74)

The quantification of menstruation leaves several concerns related to its somehow still excessive character. Firstly, subjectivity is problematized, since the embodied phenomenological experience of how your period feels is lost in quantification, which potentially also loses any subjective knowledge of the workings of your inner body. You might know more about when and how much you menstruate, but less about the texture, smell, feeling, and social dynamics of menstruating. Secondly, menstruation is in many ways still a taboo, and the numerical representation of menstrual blood does not change the attitude that material blood is disgusting and something we would rather hide. The data produced by *Periodshare*, despite its apparent quantification, is somehow always 'too much' for its rational absorption into commercial streams, also on social networks that are built on the principle of sharing social life.

In *Periodshare* the material status of menstruation does not only change status from something inside me to outside me, it also changes status from something outside me to something inside my smartphone and my social network. Menstruation data, and biometric data in general, is in a transitional state between being an extension of my body and being representational, incorporeal. In this sense, data can also be seen as abjection, whereas we have come to understand data as pure. Contrary to menstruation, there is no shame or disgust in data and there seems to be no ambiguity either, even if both can clearly be contested. However, information in menstruation data is a matter out of order; it is dirt on social media, still haunted by the symbolic value of menstruation itself – as excessive information. When shared, menstruation data becomes very explicit, and the act of sharing it becomes an act of oversharing. As 'too much information',

this excess is inappropriate and a non-productive act. It has no use-value, and unless the system of menstruation as dirt is changed, the concept of menstruation data does not fit into an exchange system based on rationality and order.

Although a number of companies behind contemporary menstruation trackers claim that their product breaks the menstruation taboo, it might be relevant to question if they do not merely ignore the taboo by hiding menstruation data inside the smartphone. Rather than breaking the taboo, menstruation trackers might reinforce it. According to Douglas, culture can treat anomalies negatively by ignoring them, or positively by deliberately confronting them and trying to create a new pattern of reality in which it has a place. Approaching menstruation data from a cultural perspective lets us shed light on its ambiguity. It is pure to track menstruation, but impure to share it. Menstruation data in private is pure, whereas menstruation data in public is impure. Corporations have taken advantage of this by monetizing the private sphere of intimate data, but instead of empowering women, menstruation trackers might surveil, self-discipline, and alienate women by inducing a fear of soaking through or having irregular periods, or even by imposing on them a value system in which women's most essential social role is to reproduce.

The Intimacy and Complexities of Self-tracking

If we wish to understand the complexities of humanity, we should, according to Bataille, treat the world of eroticism equally important to the world of thought. As such, a 'feeling' technology, an object of desire and excess, would supplement a 'seeing' technology of intellectual reasoning (Rettberg 69). In "To save Everything Click Here", Evgeny Morozov critiques self-tracking technologies for its seemingly apolitical simplification of human bodies (246). Larger systems of solutionist quantification is reproduced in small detail on the human body, and when we track and analyse – e.g. menstruation data based on generalised, scientific parameters, assuming that the human body is an abstract function – we forget that the human body is also an embodied subject influenced by sociocultural and political situations and experiences. These are harder to monitor, but Morozov argues that we should acknowledge these micro-complexities, and, in referring to Jane Jacobs, treat bodies as a problem of organized complexity. This involves dealing with complexities and ambiguities of the "intangibles" (245), not by reducing them to simple problems, that need simple solutions, but by deliberately confronting them and trying to create a new pattern of reality in which they have a place.

As an extreme example, menstruation tracking lets us see the quantified self in a new perspective. If we accept that Bataille's notion of excess is a nature of waste, something that somewhat escapes capitalism, the commercialisation of excess as seen in the quantified self is indeed a victory for capitalist, rationalised society and a defeat for Bataille's utopian anti-capitalist dream. When menstruation is tracked this bodily excess becomes a commodity, pointing to how Taylorism has invaded every sphere of private life. 100 years ago, Lillian Gilbreth, the mother of household management, moved optimization into the private sphere (Lepore), and automatic menstruation tracking might be the last thing that women need in order to fully optimize living. As a phenomenon, self-tracking is a commercialisation of intimacy, establishing the capitalist principle of exchange in our intimate life and social relations. If intimacy is increasingly exercised in the pursuit of commercialised profit, then what happens to the excessive character of intimacy?

As Melissa Gregg argues, "we face the prospect of being unable to appreciate the benefits of intimacy for unprofitable purposes" (6).

The intimacy and emotions of our post-digital bodies have come to work (Berardi). In menstruation tracking this it exemplified by the managing of PMS, sex and so on, into everyday life. But the present ideology of 'dataism' (Dijck), the belief in data as the objective truth, forgets that data is social and networked, more complex and ambiguous than simply easily measured. Understood through the notion of excess, *Periodshare* investigates and reflects upon the cultural value of menstruation in an exchange economy, and in a wider context the monetization of intimacy, subjectivity and cultural taboos.

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Bataille's Bicycle: Execution and/as Eroticism

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Bataille's bicycle: execution and /as eroticism

Marie Louise Juul Søndergaard & Kasper Hedegård Schiølin

Introduction

Eroticism is an inherent aspect of computational culture and history. From love letter generators in the early days of computer development, through the rise of Internet porn industry in the 1990s, to the neoliberal products of IoT dildos, VR porn and sexbots of the present time, the development of computational technologies has been influenced by human eroticism. Eroticism in computing is all about the lust and pleasure of desiring subjects; corporate visions of increased connectivity and remote intimacy increasingly exploit users' inherent erotic and sexual inclinations. Simultaneously, computational art practices and counter-DIY cultures are hacking into the intimate sphere, exploring how individuation may be challenged through sometimes violent, erotic executions. Through practices of execution, performed through digital means, new powerful and transgressive relations of individuation are emerging.

This chapter questions if and how, a language of eroticism is useful in understanding the unstable, intimate and violent — that is, erotic—aspects of execution? We thus address the inherent, excessive eroticism in computational culture by focusing on execution at the boundary between extreme pleasure and extreme pain as it manifests itself in the experiences of eroticism and realisation of desire in modern digital technology. More precisely, we explore the transgressive potential of the excessive, blurred connection of desiring subjects and executing objects.

Entangling Georges Bataille's (1993) writings on *eroticism* and *excess* with, amongst others, Franco Berardi's (2009) notion of *connected bodies* and Lauren Berlant's (2011) reflections on *cruel optimism*, we question how networked bodies are executed and engage in blurred, erotic processes that transgress a mere voluntary sexuality where consent is sacrosanct. Through a close reading of specific sections in Bataille's novella *Story of the Eye* (Histoire de l'œil) (1979), we show how topics central in the novella such as excess, consent, control and unwillingness reflect the execution of our erotic, emotional state in computational culture. We argue that Bataille forms an exploratory taxonomy, or even hierarchy, of human lust and desire, in which the character Marcelle enjoys supremacy precisely because of her unwilling lust. In accordance with this argument, the speculative design *Marcelle*, named after Bataille's character, is our attempt to

further explore the phenomenon of involuntary lust through design. *Marcelle* is a pair of white cotton briefs with built-in vibrators that are executed by the surrounding WiFi network landscape. In our exploring of its eroticism, *Marcelle* becomes a conceptual way of questioning both the limits of design and philosophy.

As we move beyond cruel optimism of the good life (Berlant 2011) and designed, spectacular sentimentality, eroticism is an inherent aspect of the social, political and aesthetic aspects of computational culture and execution. We argue that eroticism is about the transgression of the will, and in computational culture this is also manifested through cases of uselessness, instability and unwillingness. Furthermore, we argue that erotic technologies have economic and commodifying interests, but also violent *and* liberating potentials, that transgress the controlled logic and reasoning of technology. Art and design experiments, such as *Marcelle*, may help us understand this paradox and ambiguous relation.

Figure 1. *Marcelle* (2016) by Marie Louise Søndergaard. All pictures by the first author.

Figure 2. Messy electricity wires and WiFi routers in Seoul.

Eroticism as Excess

Describing eroticism is a complicated matter. It crosses the fields of art, society, health, religion and death, and is historically understood as being largely a "side-effect" of sexual reproduction. However, in Bataille's terms, eroticism is nothing less than the essence of humanity (1991). As an exuberant energy, that is, as excess, it flows in every corner of society and in all human activities. Contrary to sexuality, which might have productive outcomes, eroticism is "a sovereign form, that cannot serve any purpose" (Bataille 1993, 16). To Bataille, eroticism is excess. Excess is what begins when "growth … has reached its limits" (1991, 29). When there is too much of something, it does not represent a utility-value, and thus becomes a loss, a something to squander or waste. In Bataille's general economy, excess as a term defines that which cannot be tamed and transformed into capital. "[E]rotic excess develops to the detriment of work" (1993, 83), he argues, and as such eroticism as excess is evidence of humanity's uselessness. Consequently, Bataille's eroticism expresses an implicit critique of the capitalist society where everyone and everything are being judged by use-value. Bataille believed in eroticism's transgressive potential of unveiling hidden structures and seemingly universal prohibitions; structures and prohibitions that man established in order to separate and distinguish "perfect humanity, for which the flesh and animality do not exist" from "animal disorderliness" (55–56).

However, as eroticism only exists, he argues, in its respect for and possible transgression and deviation of forbidden values, eroticism gains a double meaning as something that both civilises and possibly liberates human beings (57).

Michel Foucault takes a different perspective on eroticism than Bataille. In Foucault's study of the history of sexuality, he breaks sexuality into two segregated historical practices: *ars erotica*, the spiritual and lustful eroticism, and *scientia sexualis*, the truth of sex, the scientific and civilised sexuality as we also find it in Christianity and confessions (Foucault 1990). Foucault criticised the Marxist hypothesis that the rise of capitalism suppressed sexuality and desire, and instead brought forward the argument that capitalist, Western society had invented a new form of sexuality; a scientific sexuality where sexuality is omnipresent in the way we organize society and understand ourselves as human beings. Consequently, Foucault argues that sexuality has not been unequivocally repressed or tabooed, but has occupied different, shifting forms and installations in society.

Bataille argues that not only sexuality but also, and especially, eroticism has relations to both the artistic and spiritual sides of society and its civilized and political sides (1993). Similar to Foucault, he argues that eroticism is not to be ignored in the public spheres of everyday life, and that it is an inherent part and regulator of the norms and laws of society (52). His theory differs from Foucault's in his focus on eroticism as something that relates to subjectivity and corporeality, and not (just) to the social dispositif of biopolitical control. Bataille regards eroticism to have a connection to a *deep sexuality* beyond sexual reproduction. In its nature, eroticism is useless, it is opposed to work and cannot be governed as it is always in excess (52). Although eroticism is civilised by capitalism and different rational discourses, Bataille argues that eroticism is deeply connected to human's object of desire. "Erotic activity can be disgusting", he argues, "but it illustrates a principle of human behavior in the clearest way: what we want is what uses up our strength and our resources and, if necessary, places our life in danger" (104). As such, eroticism is linked to anguish, horror and even death, and its liberating potential is paradoxically released in the transgression of life itself.

An Eroticism of Connected Bodies

Drawing on Marxist and feminist traditions, art and computational culture have mostly dealt with the execution of eroticism as a liberating force, an organisation of power and a political act. However, in the rise of digital technologies, eroticism and sexuality have gained a new value. Already in the 1990s, cyberfeminism claimed sexuality as an "empowering" weapon and argued for its liberating potentials against

technology's patriarchal, dualistic structures and the increasingly governed spaces of the formerly free, distributed network (Haraway 1991; Plant 1997; Steffensen 1998).

In the present tech industry the state of eroticism has, however, changed into a governed, commodified and managed form of sex and intimacy, and thus adapted to a neoliberal Silicon Valley-ideology described by Evgeny Morozov as technological solutionism (2014). Examples include Spreadsheets, an app that tracks the movement, volume and lengths of sexual intercourse; OMGYes, a website that teach users ways of enhancing (women's) pleasure through touchable videos; and Lioness, a dildo that uses biometric sensing and statistical methods to "characterize your sexuality" and suggest improvements. By offering and capturing erotic spheres of everyday life through apps and products, the tech industry thus extracts the maximum value from subjects as they perform emotional labour. Through worldwide marketing of sexual tools that promise to empower (mostly) women, neoliberal start-ups take ownership of what used to be a critical political act, and confuse the rather complex (political) difference between sexuality and eroticism. As a result, eroticism, as it is experienced in present computational culture, expresses the antagonistic conflict of desire-liberation having both anti-capitalist and capitalist interests.

Eroticism may be understood as an abstract principle of political, affective and philosophical processes that already are and also continue to become manifested in concrete material and embodied sites of execution. These sites of execution become part of the economy of eroticism, where everyday affective relations are tracked, managed and sold, gaining value beyond the relation itself. When considering today's neoliberal society surviving on individuals' productive consumption and emotional labour, it is no wonder that a common issue and increasing trend in corporate design is the wish to capitalise and rethink eroticism and sexual activity under capitalist terms.

The increasingly hyper-connected and hyper-visual character of today's digital culture (Berardi 2009) offers endless space for excessive joy and erotic sharing. We like, connect, match and laugh at kittens like never before. This endless realisation of desire and pleasure in our digitally-mediated social life has led Berardi to reflect on our present emotional state and its relation to economy. "Not repression, but hyper-expressivity", he argues, "is the technological and anthropological domain of our understanding of the genesis of contemporary psychopathologies" (108-109). This, he argues, has consequences for eroticism:

> *Connected bodies are subjected to a kind of progressive*
> *inability to feel pleasure, and forced to choose the way of*
> *simulating pleasure: the shift from touch to vision, from hairy*
> *bodies to smooth connectable bodies … The control is built*
> *inside, in the very relationship between self-perception and*
> *identity. When the info-sphere become hyper-speedy …*
> *we become less and less able to elaborate in a conscious way*
> *on the emotional impulses reaching our skin, our sensitivity,*
> *our brain.* (Berardi 2009, 100)

The disconnection between language and sexuality, Berardi argues, has led to a lack of empathy and a rise of obsessive rituals. Our sensitive organism is subjected to a permanent execution, as our every action is broken down to likes, retweets and emotional analyses. Similarly, our compulsive repetitions of rituals, of liking, swiping, scrolling, checking emails and notifications, point at a state of being where each emotional action does not fulfill its aim. As desiring subjects, we are thus "addicted" to a pleasure that is never fulfilled. Instead, our excessive obsessive rituals and emotional execution serves the aim of larger, hidden infrastructures; the aim of corporate economic structure, gaining value of "an overload of info-neural stimuli" (108) and emotional input to the systems. Although Berardi argues that repression of sexuality is not an issue in present psychopathology, it is exactly in the hyper-expressive and hyper-sexual culture of connected bodies that eroticism is repressed. Following Bataille's notion of eroticism, eroticism is beyond *desire* and *smooth bodies*, and closer to what Berardi terms "conjunctive bodies"; "the encounter and fusion of rounded irregular forms that infiltrate in an imprecise, unrepeatable, imperfect, continuous way" (87).

The obsession with vision and connectivity does not (only) come down to a critique of porn, VR-porn or Internet connected sex toys; they may or may not lack empathy and context due to a blurred distinction between "natural" and "artificial" sex, but the critique unfolded in this essay has a different focus. We are concerned with the misconception of the essence of human sexuality as expressed through the notion of eroticism, and this leads to deeper, existential consequences concerning humanity itself.

To lay the foundations for this critique, we will dig deeper into Bataille's eroticism by a close-reading of some central sections in his (pornographic) novella *Story of the Eye*, and eventually connect it to the emotional state of present computational culture.
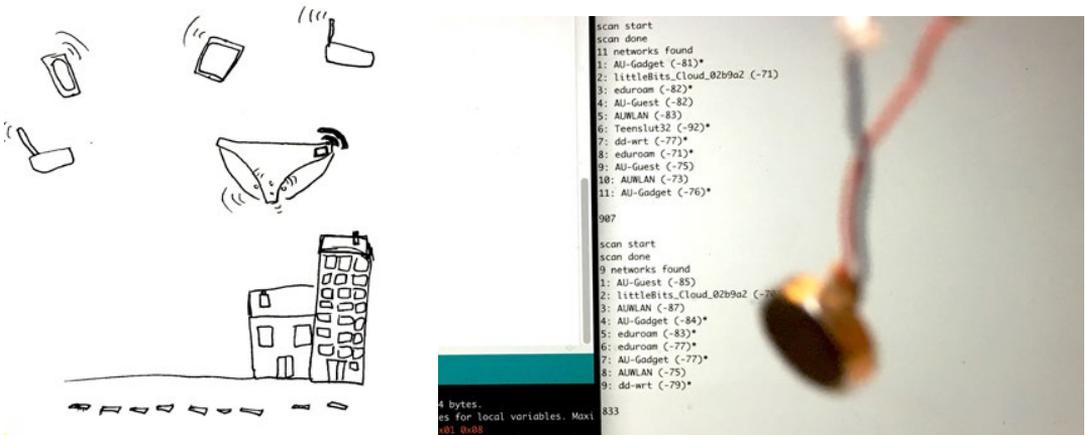
Figure 3. Material practices of wirelessness.

Story of the Eye

Blood, sperm, egg yolks, tears, urine, rain, vomit and milk are, metaphoricallly speaking, dripping from the pages of Bataille's 1928 novella *Story of the Eye*. This is, however, not news. Already in 1962, shortly after his death, Roland Barthes (1979) observed that fluids play a crucial role in Bataille's highly symbolic novella. Barthes' analysis is striking, and has indeed become a central text in Bataille scholarship. However, it literally reduces the *story* (of the eye) to a *metaphor* (of the eye), that is, to a pure linguistic analysis. Initially, Barthes even claims that *Story of the Eye* is "by no means … the story of Simone, Marcelle, or the narrator"; it is really just, he continues, a "story of an object" (119), that is, a "story" of an "eye", metonymically substituted by other "substitute objects".

But *Story of the Eye* has much more to offer. Contrary to Barthes's refusal of the importance of the individual characters, we argue that Bataille forms an exploratory taxonomy, or even a hierarchy, of human lust and desire, in which the character Marcelle, due to her unwilling lust, is attributed supremacy. In accordance with this argument, the design *Marcelle* is our attempt to further explore the phenomenon of involuntary lust. Admittedly, this is a rather paradoxical endeavour, because design is generally seen as a material way of satisfying the user's more or less articulated will to reach a specific end. However, perhaps design is a more passable way than philosophy to explore eroticism. "Philosophy", Bataille asserts, "cannot embrace the extremes of its subject, the extremes of the possible as I have called them, the outermost [in particular eroticism] reaches of human life" (1962, 259). Hence, *Marcelle* becomes a conceptual way of questioning both the limits of design and those of philosophy. We might say that the two can cross-fertilise each other.

Working with unwillingness is not only a technical challenge, but also an ethical one. Consider, for instance, the dictum "Consent is Sacrosanct" that has become the media's automatic response to rape; indeed even the popular bondage porn website Kink.com has used it to dissociate themselves from its former employee, the famous porn star James Deen, when female colleagues accused him of rape in 2015. However, since consent is an unambiguous and often legal arrangement between two rational humans, the self-evident and appealing dictum reduces lust to a pure and sober intellectual endeavour leaving no room for accepting the Bataillean idea of transgressive eroticism. This leaves us with two highly contradictory views on sexuality; the one strictly philosophical, and the other strictly normative. There seems to be no easy solution to this conflict, but the speculative design *Marcelle* can be seen as a way of curiously exploring the matters at stake in this inextricable tension on a rather safe ground.

Simone's Will to Sex

As Benjamin Noys suggests, "certain recurring characters […] dominate Bataille's fictions" (2000, 89). This also applies to the main characters in *Story of the Eye*. Following Noys, the 16-year-old Simone is the recurring figure of "the woman of *jouissance*" (90). Noys does not translate the common French word jouissance, which literally means "enjoyment". However, "enjoyment" lacks the explicit sexual connotations evident in French; "*jouir*" is slang for "to come". It is thus most likely Lacan's rather famous usage of the word that Noys hints to. For Lacan *jouissance* is the subject's always painful attempt to transgress the psychological-societal prohibitions that are imposed to its enjoyment (1978). As the Lacan scholar Dylan Evans explains: "The term *jouissance* thus nicely expresses the paradoxical satisfaction that the subject derives from his symptom, or, to put it another way, the suffering that he derives from his own satisfaction" (2002, 93). This definition of jouissance corresponds to what Bataille in *Story of the Eye* refers to as *deep sexuality*:

> She [Simone] was usually very natural; there was nothing heart-breaking in her eyes or her voice. But on a sensual level, she so bluntly craved any upheaval that the faintest call from the senses gave her look directly suggestive of all things linked to deep sexuality*, such as blood, suffocation, sudden terror, crime; things indefinitely destroying human bliss and honesty.* (Bataille 1979, 11)

Again, this definition is resonant in the Bataillean key concept of *eroticism*:

> *In the very first place eroticism differs from animal sexuality*
> *in that human sexuality is limited by taboos and the domain*
> *of eroticism is that of the transgression of these taboos.*
> *Desire in eroticism is the desire that triumphs over the taboo.*
> *It presupposes man in conflict with himself.* (Bataille 1962, 256)

In these definitions at least one thing is clear: Sex is not fun! Or, rather, sex is deadly serious. This is, however, also why Noys' descriptions of Simone as a "woman of *jouissance*", let alone Bataille's own apparent support of that characterisation, is not entirely correct. To Simone, sex actually seems to be fun; with great ease she plays around with, if not imperative controls and demands, the horrors of deep sexuality, and she does not show any visible signs of pain, or even qualms. Even in its most extreme manifestations, Simone's sexuality is a completely willful sexuality; a sexuality of a woman who knows exactly what she wants: "*I want to* have them [the testicles of a bull]", or, "*I want to* play with the eye … Listen, Sir Edmund … you must give me this at once, *I want it*!" (Bataille 1979, 48, 66, emphasis added).

In arranging an orgy in the beginning of the novella, Simone's sexuality is furthermore displayed as a rather calculating and manipulative will to master and control. By means of an easily won bet, she thus ensures herself as the commander of the orgy:

> *"I bet", she said, "that I can pee into the tablecloth in front of*
> *everyone" … Naturally, Simone did not waver for an instant, she*
> *richly soaked the tablecloth … "Since the winner decides the*
> *penalty", said Simone to the loser, "I'm now going to pull down*
> *your trousers in front of everyone."* (16)

Later, when the orgy has become more heated, her strong will to sex (and power) remains perfectly intact and even more imperative: "'Piss on me. Piss on my cunt', she repeated, with a kind of thirst" (16).

Marcelle, the Real Women of Jouissance

As the above quotes suggest, one can conclude that rather than being a woman of jouissance, paradoxically suffering from her own lust, Simone is a licentious and at the same time calculating woman of pure sexual will. The recurring figure of *the woman of jouissance*, however, *does* occur in *Story of the Eye*, and despite of all the power that Simone's willful sexuality expresses, the painful and unwilling *jouissance* incarnated in the character Marcelle seems even more powerful.

The narrator presents Marcelle as "the purest and most affecting of our friends", and, more notably as having "an unusual lack of will power" (5,12). Marcelle first meets the narrator and Simone as she accidentally witnesses them having sex on the beach. Marcelle is terrified by the sight but is forced to participate in the actions by

Simone who is "brutally churning Marcelle's cunt, one arm around Marcelle's hips, the hand yanking the thigh, forcing it open" (13). From that encounter onwards, Simone and the narrator become completely obsessed with Marcelle and her unwilling lust; "the sight of Marcelle's blushing had completely overwhelmed us" (15).

Under false assumptions (a tea party), Simone and the narrator succeed in luring Marcelle to attend the above-mentioned orgy, but when Marcelle realises the true purpose of the party, she becomes angry, and in attempting to leave she is stunned by the sight of Simone who simulates a kind of orgasmic-epileptic seizure. This seems to be meant to stop the exit of Marcelle who, like the other guests, is excited by Simone's explicit show, but instead of joining the orgy, she lets herself into a large wardrobe to masturbate in private. The orgy continues but "all at once, something incredible happened, a strange swish of water, followed by a trickle and a stream from under the wardrobe door: poor Marcelle was pissing in her wardrobe while masturbating … soon we could hear Marcelle dismally sobbing alone, louder and louder, in the makeshift pissoir that was now her prison" (17).

This scene in particular reveals Marcelle as the novella's real woman of *jouissance*, who, contrary to Simone, suffers under her lust and her failed attempt to willingly choke it back; Marcelle embodies the paradox of *jouissance*. Moreover, the unwillingness in her lust, and eventually in her orgasm, is emphasised by her involuntary urination that leaks from the wardrobe as a symbolic evidence of her failed attempt to keep her individuality from being absorbed by the shapeless orgy. As the narrator later explains: "Marcelle could come only by drenching herself … with a spurt of urine …. at first violent and jerky like hiccups, then free and coinciding with an outburst of superhuman happiness", or "total joy", as he calls it shortly after (28). It is this superhuman moment of total joy that captivates Simone, who on the contrary is in full control of her urination and orgasm. She is, however, tragically trapped in her thirsting for this transgressive moment, because as long as she wants it, it remains unreachable; transgression depends on the defeat of will.

Escaping the Penal Colony on Bataille's Bicycle

No one has described the tragic metaphysical confinement of the will in greater detail than Schopenhauer, and the following quote might thus help in clarifying what is at stake in this important motif of *Story of the Eye*, and in Bataille's writings on eroticism in general:

> As long as our consciousness is filled by our will, as long as
> we are given over to the pressure of desires with their constant
> hopes and fears, as long as we are the subject of willing, we will

> *never have lasting happiness or peace. Whether we hunt*
> *or we flee, whether we fear harm or chase pleasure,*
> *it is fundamentally all the same: concern for the constant*
> *demands of the will, whatever form they take, continuously*
> *fills consciousness and keeps it in motion: but without peace,*
> *there can be no true well-being. So the subject of willing*
> *remains on the revolving wheel of Ixion, keeps drawing*
> *water from the sieve of the Danaids, is the eternally yearning*
> *Tantalus.* (Schopenhauer 2010, 220)

Schopenhauer also discusses at length the possibilities of escaping from this "penal colony", as he elsewhere calls the world (Schopenhauer 2000, 302), in which Simone the narrator, and the rest of us are imprisoned. While Schopenhauer's "escape attempts" all depend on a deliberate rejection of the will, primarily through asceticism, he does not address the possibility of rejecting the will unwillingly such as Marcelle practices it in *Story of the Eye*. Bataille, however, does.

In his usual dialectical manner Bataille suggests a unity of apparent opposites, *asceticism* and *eroticism*, which additionally casts light on the essential difference between the lust of Simone and that of Marcelle's. According to Bataille, both eroticism and asceticism are about "non-attachment to ordinary life, indifference to its needs, anguish felt in the midst of this until the being reels, and the way left open to a spontaneous surge of life that is usually kept under control but which bursts forth in freedom and infinite bliss" (1962, 246f). Elsewhere Bataille refers to this erotic-religious surge of life as "the feeling of being swept off one's feet, of falling headlong" (239), or rather, "to capsize", "*de chavirer*", as the original French wording goes. We find these characteristics in Marcelle and they are in stark contrast to Schopenhauer's willing subject.

Against the shared characteristics of eroticism and asceticism, Bataille places *sexual cynicism* and *obscenity,* in which Simone and the narrator are recognised. In these categories capsizing is thus an accepted principle. However, according to Bataille, the acceptance implies that the power of capsizing vanishes; capsizing becomes the new normal, and is thus weakened and unexceptional: "Having submitted unrestrainedly to the pleasure of losing self-control it has made lack of control into a constant state with neither savour nor interest" (244). On the contrary, for them (for instance Marcelle), "who have remained pure [obscenity] is the possibility of a vertiginous fall" (244). To Marcelle the fall is indeed vertiginous, and eventually even fatal. This again corresponds to Bataille's description of the conflict of the tempted ascetic, who had made his vow of chastity. If the ascetic yields to the temptation, as Marcelle does, (s)he will die

spiritually, which is why "the religious would choose physical death to a lapse into temptation" (236). Marcelle's lust, and her uncontrolled, unwilling orgasm—"*la petite mort*"—thus prompts a highly vertiginous fall, which ends in unbearable madness, and finally in the real "big", physical death. Simone and the narrator's obscene lust, on the other hand, only reach la petite mort, which they ably control at will.

There is nonetheless one essential scene in the novella in which Simone's strong will is compromised, and, surprisingly, this scene also offers a remarkable perspective to the philosophy of design and technology. Escaping from a failed attempt to free Marcelle from the mental hospital, Simone and the narrator rush along naked in the night on their bicycles:

> *A leather seat clung to Simone's bare cunt, which was inevitably jerked by the legs pumping up and down on the spinning pedals … she was literally torn away by joy, and her nude body was hurled upon an embankment with an awful scraping of steel on the pebbles and a piercing shriek.* (Bataille 1979, 30)

Through the medium of technology—on the bicycle—Simone thus eventually becomes what she constantly hankers after: she becomes Marcelle, the "real woman of *jouissance*". In this way Bataille deploys the repetitive and circular movements of technology to outplay and absorb the clear linearity of Simone's otherwise purposive will. This use, or indeed "nonuse", of technology countervails the predominant understanding of technology that sees technology as a tool that serves a specific purpose evident to the rational user in control of it. As a figure of thought, "Bataille's bicycle" thus hints to the concealed violent and erotic aspects of technology.

Becoming Marcelle

What would a contemporary version of Bataille's bicycle look like? A transgressive technology that would allow for becoming Marcelle? As an experiment, or a transgressive exploration into Bataille's notion of eroticism as excess and the very idea of an erotic technology beyond "use", we suggest *Marcelle*.

The speculative design (Dunne and Raby 2013), *Marcelle*, uses the language of eroticism to investigate the compulsive and repetitious execution of *smooth* and *connected* bodies in networked surroundings. Bodies are executed in more and more intimate and intimidating settings, connecting emotional data and personal "things" with corporate infrastructures, closed circuits, and unpredictable networks. *Marcelle* explores the intimate aspects of network connectivity, and how the interactions between human and non-human bodies subvert and thus transgress the user's will in everyday life. Inspired by critical engineer Gordan Savičić's WiFi-connected corsage

Constraint City: The Pain of Everyday Life (2007), *Marcelle* proposes that similar to the structural and political violence network users find in encrypted networks, the pleasure or satisfaction of being online and staying connected is an equally important affective state of today's computational culture, and an equally painful one.

The pleasure of everyday life, however, contains the same ambivalence as the notion *jouissance* does, because being online and connected is equally painful exactly because of the violent power structures of the contracts we are signing when we are deciding to enter into this life-long relationship, which is exploited by economic models and violated by normative ideologies. An Internet of bodies (as things) is a network that structures, categorizes and manages blurred and unstable relations. In each execution, relations are subjected to structures of power, control, and opaque treatment of consent and access.
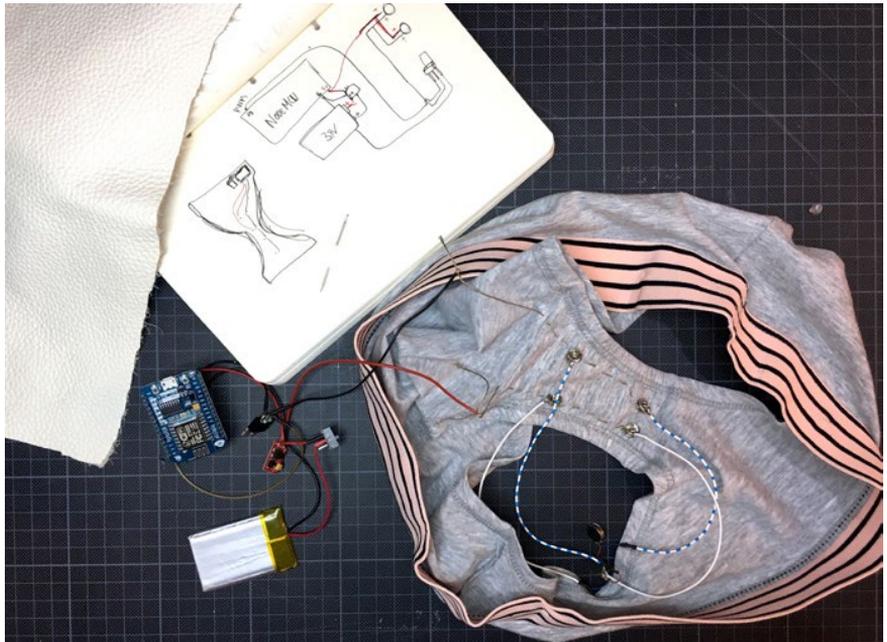
Figure 4. Paper, diagram, transistor, conductive thread, NodeMcu, battery, leather, cutting mat, wires, vibrators, networks, circuits, panties.

As a culture-critical and partly fictional design (Bleecker 2009), *Marcelle* aims to go beyond 1990s cybersex and teledildonics and present neoliberal Internet of Things designer vibrators, in order to question *what if* eroticism becomes a restricted action, or a designerly "problem" to be solved, by applying logics of automation, efficiency, remote intimacy, and control? Presuming that we live in a

computational culture of desire, could we imagine possible futures of erotic execution in the mundane everyday life beyond work, beyond the aggressive will to sex, and beyond rational, consent-driven sex? How do we discuss eroticism in an era of automation and efficiency? With this speculation, *Marcelle* seeks to transgress capitalist commodification of affects, desire and intimacy, and to question the role of eroticism in computational culture by translating invisible wireless networks into intimate vibrations.

As previously mentioned, *Marcelle* is a wearable sex toy consisting of a pair of cotton underpants with modular vibrators that is connected to and relies on network information. As electronics (WiFi chip, battery and vibrators) are sewed directly into the mundane underpants, *Marcelle* is wearable and mobile, and the user can wear it in everyday life situations. The vibrators are made of transparent silicone fastened on popper buttons that may be connected at four different positions in the panties. This makes the sex toy modular, and the user is able to customize it to their own erotic and sexual needs and desires. However, the user cannot easily control the vibration patterns whose impulses are controlled by the number of surrounding WiFi networks. For instance, a space with a variety of different, competing networks, maybe a semi-public space with a variety of social groups and activities, triggers a very high intensity, whereas a private space with one superior network only causes the vibrators to vibrate with a low intensity. As such, the user delegates the control of the vibrators' intensity and rhythm to the networked landscape of autonomous networks, which makes for a partly unwilling, erotic experience characterized by spontaneity, opaqueness, and ambiguity. In other words: wearing the underpants allows the user to become Marcelle.

(Design) Fictions and Speculations on Eroticism

Marcelle is a partly fictional design and a philosophical argument in physical form. In its material form, it is present in the actual world, but the premises and narratives surrounding the object point to possible futures in which eroticism could be different and exist in simultaneous and multiple forms. *Marcelle* is *not* a solution to the theoretical paradox of involuntary eroticism or eroticism as excess in a restricted (desire) economy. Neither is it a clear manifestation of Bataille's philosophy, or a technological design ready-to-use. It is a partly fictional design that through a dialogue with Bataille's philosophical and literary writings on eroticism goes beyond eroticism as a theoretical construct, to speculate on the issues of excess, unwillingness, and abjection in a material form. It might indeed be used, but its user is yet to be defined, or more precisely, yet to be *performed.*

Figure 5 and 6. The jouissance of becoming Marcelle in wearing *Marcelle*.

The excess of vibrations felt when wearing *Marcelle* and walking around, surrounded by WiFi networks is not exactly useful. The uncontrollable amount and intensity of the vibrations is useless compared to the purposeful will that gets pleased by the mechanical and effective s(t)imulations of conventional sex toys. Instead of being executed by the vibrator algorithms, reaching orgasm as a purposeful willing user, the wearer is exposed to the compulsive and repetitive vibrations, which, although increasing and decreasing in intensity, never end. The vibrations only end if the wearer, like Marcelle hiding in the wardrobe, takes refuge in an environment without WiFi, and in our present wireless psychopathology this seems almost unthinkable. Instead, the purposive will gets challenged, possibly transgressed, in this state of execution where neither lust nor desire is executed or relieved but instead lingers in between eroticism and asceticism. Wearing *Marcelle* might thus be compared to participating in an orgy, in which individuality—that is, the individual body and the individual will—dissolves and becomes uncountable. The wearer does not know exactly who, what and how many (s)he is having sex with in this anonymous WiFi-orgy.

When wearing *Marcelle*, consent means to not be in control of your own body and desire. The purpose of wearing it becomes ambiguous, as the outcome is unpredictable and out of control. Thus, when you enter the "experience" you do so with the implicit acknowledgement of not knowing the outcome, and consequently it is questionable whether or not the action actually has an aim, or stays inside the fixed boundaries of consent. This opens up onto a temporal space of permanent, involuntary execution, where the unpredictability and instability enables, if not presupposes, that the wearer elaborates on the emotional impulses and surrender oneself to the non-human activities reaching one's lower erogenous zones. A truly excessive activity without purpose outside the eroticism of the act itself, the *jouissance of becoming* Marcelle in *wearing Marcelle* first and foremost arises, not in the execution of desire, but in the affective experience of unwillingness, of transgressing the will.

Just as Simone *becoming* the real woman of *jouissance* depended on the "nonuse" of technology, *Marcelle* seeks to move beyond the critique of disembodied artificial sex—of "using" technology as interhuman sex mediator—and towards the potential of relational erotic (be)coming together of human and non-human beings.

Conjunctive Bodies

The distinction between eroticism and sexuality, as it is understood in how eroticism is treated in contemporary computing is first and foremost highlighted in its focus on sexuality as something belonging

to the intellectual world; a "truth" of sexuality that is controllable and essentially manageable through individual free will. Following affect theorist and feminist Lauren Berlant's notion of cruel optimism, this scientific and Western understanding of eroticism may be understood as a cruel relation (Berlant 2011). The desire for "the good life" is inherently a *fantasy* of the good life, proclaimed and envisioned by culture, including visions that have been invented by corporate and commercial industry to market their products. It is a cruel optimism because it is an obstacle to our flourishing. In other words, we are *not* getting closer to the "optimum" by tracking our sex life or buying products that simulate how to provoke a female orgasm. These are *happy objects* (Ahmed 2004) directing us towards a very particular kind of eroticism; an ordinary state of desire-liberation that does not lead to excessive eroticism, but proceeds as a dulling, chronic condition of excitation without release. Too little time to feel, too little time to get to know one (others') body/bodies, but endless amounts of apps and designed sex toys to teach and manage the user's sexuality. This smooth, connected, happy state of bodies, where eroticism is commodified and sex only happens for a reason, is what we have aimed to transgress in the design of *Marcelle*. Hopefully, it moves closer to the state of *conjunctive* bodies without indulging in a sentimental, embodied lingering for a pure state of desire. Instead it seeks to transgress human sexuality itself in technologically-mediated erotic experiences that are uncontrollable, unpredictable and ultimately unstable. That is, erotic experiences where subjects and objects co-evolve, dissolve and become abject.

Consumption of Bodies (or, a critique of economic notions of eroticism)

The demands of eroticism, the exuberant energy that flows in computational processes are both subjected to and withdrawing from productive consumption and emotional labour. What Bataille would not know in his novella *Story of the Eye*, as well as in his anti-capitalist writings of eroticism as excess, was that eroticism and intimacy became increasingly (also) executed through technology and software, and as such necessarily exchanged and given form. Consequently, eroticism has, like most intimate aspects of living, potentially become just another action of purpose and exchange-value.

In this essay, we have aimed to revisit and actualize Bataille's notion of eroticism in contemporary computational culture, firstly to revisit if and how the transgression of the will is in evidence in present emotional states of desiring subjects and their use of sex technology. Secondly, to speculate on how the violent and liberating

potentials of eroticism may be a challenge for design.

Highly inspired by the character Marcelle, and the overlooked but truly exceptional status of the erotic technology in *Story of the Eye* — the bicycle — we have proposed that *Marcelle* embodies and manifests the philosophical, theoretical paradox of eroticism, as well as the material and bodily emotional state of present connected and desiring bodies. As we have shown, eroticism of execution, as in the case of *Marcelle*, is a complex, excessive experience that both includes aspects of unwillingness, transgression of prohibitions or taboos and repetitious and continuous (unreleased) desire, in an even more complex fusion of interactions between human and non-human beings of network users, protocols, electromagnetic waves and erogenous zones of the body.

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Article #5

"It's not that it will kill me": Living with Electromagnetic Hypersensitivity

Marie Louise Juul Søndergaard
Lone Koefoed Hansen

"IT'S NOT THAT IT WILL KILL ME": LIVING WITH ELECTROMAGNETIC HYPERSENSITIVITY

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ABSTRACT

While the future visions of Internet of Things are slowly being implemented, the wireless and networked infrastructures that enable these connections already intervene and matter in people's everyday lives in powerful ways. In this paper, we present a case study of a woman living with electromagnetic hypersensitivity; the heightened sensitivity of electromagnetic fields. We describe how her daily activities and everyday habits are both enabled and constrained by digital technologies. Through this narrative, we reflect on how this case has impact for design research regarding how the objects we design matter in people's everyday life in unpredictable and uncomfortable ways—also those that are not wirelessly connected.

INTRODUCTION

With the domestication of information technologies, an increasing number of designers use the immaterial and digital medium of computation as design material. Algorithms, data, apps, devices, sensors, motors, software and hardware are all aspects of computation that enable and constrain everyday activities in people's lives. Digital-enabled objects are often described with the prefix "smart", by which it is implied that when analogue objects can track, record or monitor its surroundings and hereby help manage and optimize people's everyday activities, it results in a "smarter", and thus better, everyday life. Smart objects make our cities and homes "smarter", but as highlighted by this year's Nordes call on Design + Power, these objects "are presented as givens [and] are emerging rapidly, with relatively little critique and social or cultural analysis".

In this paper, through sharing the story of Ingrid, we aim to critically reflect on how the smart objects' infrastructure matters in people's everyday life. Ingrid is a retired woman living in Umeå, the largest city of Northern Sweden. Ingrid is like most of us, but her electromagnetic hypersensitivity (EHS) makes her different.

Every time Ingrid uses technology it is a conscious choice. She negotiates between the benefits and needs of using technology *and* the painful bodily symptoms this brings. In medical science, the validity of the EHS symptoms is still disputed but it is not relevant to this article whether or not the condition is scientifically validated; we care about her experiences, not her diagnosis. Ingrid's story serves as a case of a modern technological life: How technologies intervene and adapt to people's everyday life, but also how people adapt themselves and their homes to technologies. Her case allows us to reflect on how we take technology as a given and how we all live with technology despite it not always being to our advantage in all regards (emotionally, physically and environmentally). We especially want to show how the objects we design exert power on people's everyday life, also of those lives that are different than Ingrid's.

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Figure 1: WiFi router hidden inside a closet in Ingrid's home in Umeå, Sweden.

HERTZIAN SPACE AND WIRELESSNESS

EHS is a heightened sensitivity to electromagnetic fields (EMF); symptoms include headache, stress, skin prickling and fatigue. The symptoms are real, however science declines that they are caused by EMF (Belyaev 2016). Still, health authorities, politicians, and courts of law are starting to recognize the interactions between EMF and health problems, and reports indicate that new wireless technologies raise new challenges for medicine and society (ibid). There is mistrust towards the real health risk of EHS and popular culture often depict people suffering from EHS as eccentric, such as the character Chuck in the American series "Better Call Saul".

Attention towards electromagnetic fields has been a recurring part of design research the last 20 years. Design researchers Dunne and Raby not only coined the influential term Critical Design, they also investigated how the increasingly networked surroundings have impact for design research (Dunne & Raby 2001, Dunne 2005). "Hertzian space" describes how electromagnetic fields take up physical, yet invisible space. Directing attention to the possible sensual and poetic experience of hertzian spaces, designers are encouraged to work with "the poetic and multi-layered coupling of electromagnetic and material elements to produce new levels of cultural complexity" (Dunne 2005, p.121). Reflecting on the historical power structures of hertzian spaces, being shared by military, the state, commercial companies and community-based organisations, as well as the impact of hertzian spaces on people's everyday, Dunne & Raby writes: "In the near future, more of us may feel the effects of the inevitable increase in usage of the EM spectrum. Hypersensitive people are the pathfinders for this changing environment, 'human canaries' alerting us to dangers and concerns that are bound to become more common as more technology becomes wireless" (Dunne & Raby 2001, p.36).

Wireless technologies intervene into our life even if we notice only fractions of it (Savic 2014). The entanglement of objects, infrastructures, networks, and bodies creates new site-specific experiences of being connected, which might better be understood through the term 'wirelessness' (Mackenzie 2010). While the embodied experience of wirelessness is most often

noticed when technologies are not working as expected (Grönvall et al. 2016), wirelessness is an ever present, haunting part of a modern technological life. IoT, smart homes and smart cities increases this feeling (Greenfield 2013), but we still only understand and take designerly advantage of fractions of it.

Through the story of Ingrid, a woman living with EHS, we reflect on how we might better understand the socio-cultural as well as the technical aspects of wirelessness.

TECHNOLOGIES IN EVERYDAY LIFE

In interaction design, and especially when adapting a participatory design approach, ethnographic inspired studies are conducted to better understand people and their needs and use of technologies, and how new technologies might be developed to support their needs. The study of how people incorporate everyday objects into their routines and homes, and how objects change the way we live in our homes, can e.g. inspire new perspectives on tangible and embodied interaction (Brereton 2013). In an ethnographic study, Brereton visited an elderly woman to understand how everyday objects are adapted, appropriated and habituated to suit her living for the past 15 years. Under the term "habituated objects", she describes the intimate relations that arise between humans and objects and the routines and rituals that follow in the home. But as described in "Making by Making Strange", studying the home is difficult (Bell et al. 2005). Because the home is so familiar, it implies asking questions about what seems to be obvious. Bell et al. argue that through defamiliarizing the home it becomes possible to open the home as design space (ibid.). This points to an inventive ethnographic method of studying the home.

In "Implications for Adoption", Lindley et al. argue for the importance of not just developing new technologies, but also speculating and exploring technologies' potential adoption in the future (Lindley et al. 2017). Lindley et al. argue that design fiction may be a method to better understand the "nuanced, situated, and technologically-mediated relationships that innovative designs facilitate" (ibid.). The speculative nature of design fiction is closely related to future-making practices of design anthropological futures (Smith et al. 2016), speculative design (Dunne & Raby 2013) and speculative fabulations (Haraway 2015). In "A Curious Practice" Haraway describes the practice of visiting as a curious yet risky practice. Visiting, she argues, implies that the researcher is open towards the unanticipated and stimulates the unexpected, e.g. through speculative narratives (Haraway 2015).

Even if the aim of this study has not been to design new technologies, design's interventionist and speculative character has still informed the ethnographic approach. As such, the design ethnographic study of Ingrid's everyday life has played out in the intersection of (early) critical design's focus on "hertzian spaces" and the perception of wirelessness, and present speculative

and participatory approaches to defamiliarizing the home and futures of the (smart) home.

PROBING EHS

What began as a three-month sublet in Ingrid's house, soon turned into an inquiry into her way of living with EHS. The first author is a PhD student researching and designing intimate wireless technologies from a critical and feminist perspective, and she soon became intrigued and curious about her landlady's way of living. The empirical study was inspired by design anthropology (Smith et al. 2016) and by critical and feminist research-through-design (Bardzell & Bardzell 2011, Koskinen et al. 2011). The study included three entangled phases: 1) the ethnographic study, 2) the material exploration through cultural probes, and 3) the interpretation of the documentation and the returned cultural probes.

Through sharing her house, the first author followed how Ingrid negotiates the EHS condition and a modern technological life. In seeking to discuss the complexity of her everyday habits and negotiations between connecting and disconnecting, we conducted an informal interview where Ingrid also showed her most and least favourite objects and activities in her home. The interview was documented through doodles, audio recording, photos and video material. In addition, we prepared a cultural probe kit, the aim of which was to capture more unconscious aspects of Ingrid's everyday life and to keep in contact after the first author moved away from Ingrid's home (Gaver et al. 1999). Finally, part of the study of Ingrid's perspective on the world has also been the visual analysis and visual editing of video and photos that we present in this paper.

THE CULTURAL PROBES

In preparation for the interview we made a cultural probe kit including a map for mapping EHS in Umeå, three postcards with pictures of Umeå taken by the first author, and a "wifi piece" poem; a poem inspired by Yoko Ono's conversation pieces that stimulate reflection on everyday activities (fig 3). The kit was introduced during the interview and aimed to sustain the conversation also after the first author left Umeå again.

Figure 2: The cultural probes.

Tell me about your favourite digital thing.

Tell me something you think I should know.

Tell me about your day with EHS.

Figure 3: The postcards that Ingrid received during the interview and was asked to return after the first author moved out of her house.

THE INTERVIEW

The interview with Ingrid lasted two hours. In the first hour, Ingrid told her story about living with EHS; how it feels, how it has developed the last 40 years, how she maintains an everyday life, and how family, friends and society perceive her condition. During the interview the first author made doodles to represent what Ingrid told. This became a visual documentation of the story and what the first author picked up on. Sometimes Ingrid responded to this, e.g. when she asked if the stick man in the upper left corner was her. The stick man represents that she is wearing a cap when she goes to a
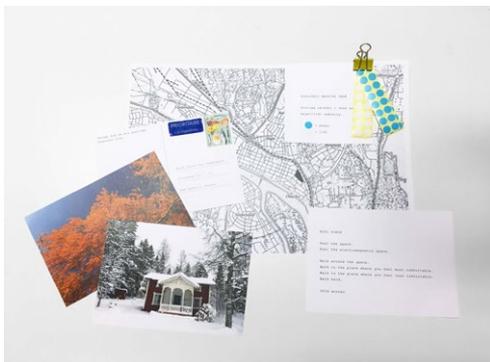
building with a lot of old strip lights. Other doodles represent her experiences of working in a school, her problems with flying, how EHS feels in Umeå compared to Oslo and Spain, and how she still goes to cafés with WiFi to have "fika" (a Swedish concept for the social culture of having a break with coffee and cake) with her friends even though it means she has to rest when she comes home. Halfway through the interview, the first author gave Ingrid the cultural probes and a "wifi piece" poem, written to Ingrid. Ingrid read the poem together with her husband, we talked about the cultural probes, and after this Ingrid showed us around her home.

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WIFI PIECE

Feel the space.
Feel the electromagnetic space.

Walk around the space.
Walk to the place where you feel less tense/friction.
Walk to the place where you feel most tense/friction.
Walk back.

2016 winter
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Figure 4: "WiFi piece" poem and doodles made during the interview.

THE STORY OF INGRID

For most people, electromagnetic fields go unnoticed. We seldom think about whether we sit too long in front of a screen or if the café where we will meet our friends for coffee has WiFi. For Ingrid, hertzian spaces are an inherent and conscious part of everyday life. She navigates the city and performs daily activities, such as watching television, scrolling the Internet, or shopping groceries based on her bodily experiences of hertzian spaces. After living in the same city her whole life, she has learned to navigate the urban wireless landscape. Similarly, she has adapted, appropriated and habituated her home to suit her condition by making unique solutions to EHS-proof her everyday life. She has learned to take control of her condition, and balance a modern technological life with the EHS symptoms. She does not escape the digital society but has adopted technologies based on her special needs, and learned what she wants, could and what she should (not) do. This we present and discuss here.

BODILY SYMPTOMS

In one of the postcards Ingrid writes about a mundane day with EHS:

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Tell me about your day with EHS.

Hey M-L!! Swollen eyes (it looks like I have
been partying all day yesterday). A feeling
of fever in the body and pain in the joints.
Tired already after breakfast and the best
is to go for a stroll in the "fresh" air. My
mucosas are dry and I have a pressure above
the eyes – forehead, headache. Tired, tired.
Good luck with your research.

        Take care / Ingrid
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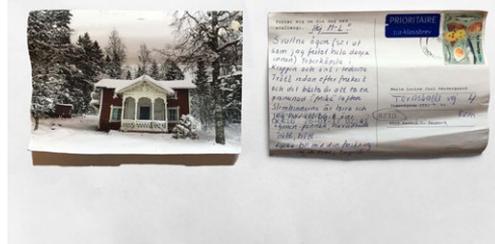

Figure 5: The second postcard we received from Ingrid.

In the postcard, Ingrid describes the symptoms she felt but not exactly what caused them or in which situations she felt them. The next section unfolds which objects that cause Ingrid's symptoms but let's dwell with two things Ingrid writes: 1) the quotation marks that emphasize the air as "fresh", which either points to the importance of nature *or* the irony of how also "natural" spaces are occupied by EMF, and 2) the last greeting, which points to the personal relation between the first author and Ingrid; one of mutual trust and care.

OBJECTS IN INGRID'S HOME

During the interview, Ingrid took us on a tour to the most and least favourite objects or activities in her home. Ingrid's home is her "EHS-safest zone". It has been adapted to her needs, e.g. electricity has been grounded. Still the air is filled with microwaves, TV-frequencies, etc. In dealing with these hertzian spaces, two of her favourite objects are the air cleaner that cleans the air from bacteria and the dust cleaner that removes the dust that has been attracted to the electronic devices. Another of Ingrid's favourite things is candles, e.g. the Advent wreath that she likes to light during the dark December in Northern Sweden. While candles are cozy, many people also consider them harmful to the indoor climate and health, because of the toxic chemicals that are spread when they burn. However, from Ingrid's perspective candles are great because unlike light bulbs, strip lights and LEDs, candles do not disturb her body with electricity.

Figure 9: Ingrid pointing at her EHS-safe personal computer.

This points to the complex condition of wanting to use a technology even if it is "dangerous" to your health. In order to use the computer for information, administration and keeping in contact with family and friends, she has acquired an EHS-friendly screen. Ingrid's EHS-condition became worse when computers entered the school where she worked 20 years ago. It became a problem to have an administrative job but now that she has a screen customised for people with EHS she likes to use her computer. WiFi is usually turned off and she uses a cabled Internet connection. One of the few times she turns on the WiFi-router in her home is when her smartphone needs a software update or when her now adult children are visiting.

Figure 7: These are a few of Ingrid's favourite things: candles, air cleaner and dust cleaner. In addition, Ingrid likes to spend time outdoors, dance and listen to music; all activities that do not require electricity.

When Ingrid was asked to show her least favourite objects she pointed to her iPhone, television, microwave oven, WiFi-router and computer. However, one month later when she returned the postcard with the question "Tell me about your favourite digital thing", she told us about her relationship to her computer.


Figure 10: These are a few of Ingrid's least favourite things: microwave (left) and her iPhone (right).

In Ingrid's home, the WiFi-router is hidden behind boxes and paper in the back of the utility closet in the kitchen. In collaboration with her husband, she has created an analogue homemade WiFi (warning) system that both warns if the WiFi is turned on and makes it easy to turn WiFi on/off. A red plastic peg on the shelf is pulled down to signal that WiFi is turned on, and an electrical switch makes it easy to turn on/off the WiFi-router without having to come close to the WiFi-router and remove the cardboard boxes that are placed in front of it, next to foil and kitchen rolls. Both Ingrid and her husband are proud of this creative solution.

Tell me about your favourite digital thing.

My computer that has a custom-made screen for electromagnetic hypersensitivity. Can sit longer in front of this than the TV. Is good for both "work" and pleasure.

Take care
Ingrid

Figure 8: The first postcard we received from Ingrid.
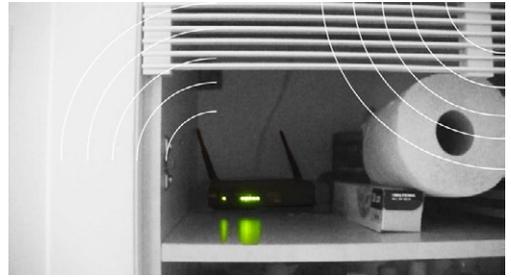
Figure 11: The self-made WiFi-router system.

THE CITY LANDSCAPE

As part of the cultural probe kit we asked Ingrid to map the spatial experience of EHS in Umeå. A week after the interview, Ingrid returned the map including a list elaborating on the blue and the white dots. The blue dots represent areas with much electrical tension: areas where she cannot stay without feeling sick. The white dots represent areas with little electrical tension: her "safe-zones". The map portrays the ubiquitous feeling of wirelessness in a city. With a ratio of 20 blue dots versus only four white dots, it shows how Ingrid's navigation in the city is a constant negotiation between entering "dangerous" public spaces and institutions, or "staying safe" in more private, homely spaces. The map thus portrays the embodied, memorized, spatial knowledge of how a woman living with EHS enters and navigates her city:

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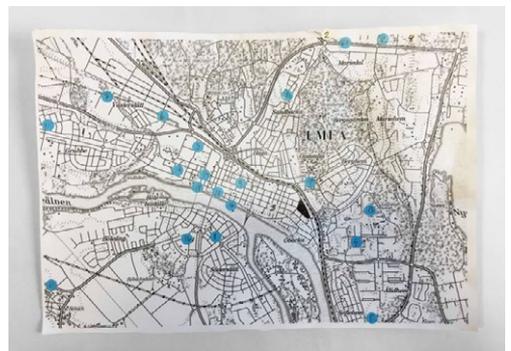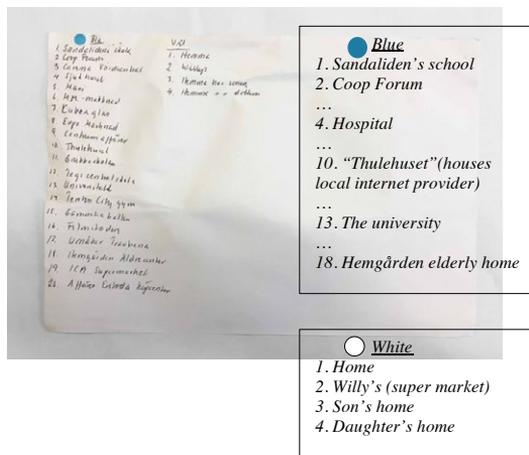
Figure 12: The instructions given to Ingrid and the map and list of areas where she feels much/little tension.

DISCUSSION

In this case study we have used design ethnography to explore how a woman living with EHS balances her condition and a modern technological life. Ingrid is more conscious than most people about her everyday use of technology and about how she has adapted technologies in her home. We have sought to uncover her domestic and urban routines through the interview, and defamiliarize her habits through the cultural probes. Ingrid's story is important as a case study of how people living with EHS adapt technologies in their everyday life but the case also has a potential to uncover more broadly, how we all adapt to wireless technologies and perceive wirelessness as a haunting part of everyday life.

Future visions of smart cities, smart homes and IoT are often represented in visually appealing scenarios. However, the success of this vision depends on the wireless and networked infrastructure; that it enables objects to connect without harming our bodies and environment. Already today, wireless technologies intervene and matter in people's everyday, and like Ingrid we all try to navigate our use through everyday negotiations, appropriations, life hacks, or self-made systems. Some of us make rules for how we spend time in front of a screen, for when and how we are online, for when smartphones are put away, or maybe we sometimes explicitly favour analogue, non-connected solutions. An increasing number of connected everyday objects and services prompt us to continuously renegotiate our habits and priorities. As in the case of Ingrid, this development does not hold a simple question and solution. Ingrid herself said during the interview, "it's not that it will kill me, but...".

We manage, negotiate, and habituate our technology use. We care for our health (emotionally, physically, environmentally) and for what we should (not) do, but

we also embrace new smart products that promise to improve our everyday lives. The case of Ingrid portrays how this (power) relation between people and technologies is entangled with discursive logics and politics (Barad 2003): how internet-infrastructure, nature, diagnosis, identities etc. operate and how these materialize in bodies and in people's everyday lives. The haunting experience of wirelessness in today's society shapes everyday life from the personal to the commercial, the social and public. In Ingrid's case, wirelessness affects how she perceives herself and develops her identity: as someone living with EHS. Secondly, it affects how she behaves as a consumer; she avoids new smart objects but is still constrained by e.g. the iPhone's business model demanding people to continuously update their phones. Thirdly, is affects her social life and how and where she can join her friends and family. Lastly, it affects how she is perceived by the system; whether or not her condition is medically approved and she can get help and support.

CONCLUSION

Nowadays, almost all digital technologies are wirelessly connected. Through the case of a woman living with EHS, we have described how everyday habits and negotiations of use are an inherent part of interacting with and adopting technologies. Ingrid's story shows how the objects we design exert power on people's everyday life, also of those lives that are different than Ingrid's.

Ingrid performs daily negotiations in order to not feel ill, and we have used this case study of EHS to raise awareness towards the invisible and powerful effects that wireless technology might have on us, and how we all are a part of this taken-for-granted infrastructure. We are not taking a stand in the debate of EHS as a medical condition, neither are we arguing that Ingrid's story is only relevant to those that wish to design for people with EHS. However, with an increase in wireless technologies it is increasingly important to reflect on the experience of wirelessness in our homes and cities, and how we can take designerly advantage of this. And in this quest, Ingrid is an excellent case because she acts consciously to everything wireless.

This paper contributes to discussions of how we as design researchers might broaden our ways of understanding, discussing, and designing the complex lives of those that live with wireless technology, even when they are less sensitive than Ingrid. This design ethnographic study is a first step in that direction, in that it has contributed with a nuanced understanding of the impact of wireless technologies in everyday life, and how such wireless technologies are adapted in the life of a woman living with EHS.

FUTURE WORK

Hertzian spaces have been part of the critical discourse of design for many years. This study of Ingrid is an example of how people with EHS are now even more

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affected by the electromagnetic fields of wireless technologies. As such, the study has manifested the conceptual thoughts presented by "Hertzian Tales" (Dunne 2005) in Ingrid's mundane everyday life. With speculative and critical design's sociocultural concerns with futures, it seems important to follow up on its past concerns. According to Dunne, hypersensitive people are 'human canaries' "alerting us to dangers and concerns that are bound to become more common as more technology becomes wireless" (ibid.). Ingrid is one of such 'human canaries' and EHS is still a growing concern. With a growing wireless infrastructure it does not become less important to understand what wirelessness feels like, even if we can't all sense it. As Ingrid said, "Today I'm considered a bit unusual, that I am so sensitive to this, but maybe it's different in 50 years. I'm just a bit ahead".

To continue and build on this work, more research into people's everyday life with wireless technologies needs to be done, including those lives that are not affected by EHS. This study did not aim to propose solutions to this complex issue, but rather to understand its nuances, and as such there is still a need to develop research into more designerly ways of intervening into hertzian spaces in the home as well as in the city.

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Article #6

Designing with Bias and Privilege?

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DESIGNING WITH BIAS AND PRIVILEGE?

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ABSTRACT

Focusing on the relation between design and power requires us to understand the designer's role and position. Based on an understanding of design as ideological and political, we focus on the designer's position from an intersectional feminist perspective. We present two design objects that aim to critically intervene into agency and power structures, and we analyse how the designer's position impacts this intervention. With this case, we demonstrate how a simple argument – that what you design is always influenced by your (lack of) privilege – becomes complex when understood in the concrete design practice. The paper contributes with a critical reflection on how a designer is always part of a construction of power and privilege.

INTRODUCTION

To varying degrees, the design discipline is developing a nuanced understanding of its ability to further social, cultural and political change. Those design forms that engage with complex social, cultural and political challenges do not just focus on solutions but are intentional proposals for future change, for how we should lead our life and build our future (DiSalvo 2012, Dunne & Raby 2012, Smith et al. 2016). As such, designers are in a powerful position to project ethical and meaningful change onto people's everyday life and society in general, even if the actual effects of a design are always also a product of its context. This relation

between designers, the designed objects, people and society, and the ways that designed objects support change in people's everyday life, connects design with notions of power.

In this paper, we focus on how design is an *act* of power, or a *potential act* of power; that is, how design stages people's agency, the structures that impact people's agency, and how designed objects themselves seek to perform agential power. In this context, agency describes the capacity of individuals to act independently and to make their own choices. However, agency is tightly related to people's participation in social structures and it is influenced by factors such as gender, race, class, religion etc. Although never in a predictable and stable way, designing (re)configures agency through the relations between the designer, the designed object, people and the context.

RECONFIGURING AGENCY

In discussing how design is an act of power, we follow a distributed notion of agency where agency is not just an individual capacity but is a distributed capacity mediated by the designer's intention, the object's form, and how it appears in contextual use (Suchman 2002). This connects design as power to notions of ideology and to the political realm. In critical-inspired fields of design it is presumed that design is ideological and political (DiSalvo 2012, Dunne 2005). When we in this article discuss how design is an act of *power* by its seeking to (re)distribute and (re)configure *agency* it is because design is also a *political* medium. Through the design, the designer seeks to change the world in a way that is influenced by the designer's *ideology*. Even when the designer is not aware of this.

In the following, we discuss the importance of reflecting on what you bring into the design practice, especially if you are a designer that aims to act critically towards societal challenges, social change, and the political condition. It is important to reflect on how your position – your worldview, agency, sociocultural context – frame the designs you make, and how this could be different. This is not a controversial argument to make but it is

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surprisingly hard to unpack analytically in actual design practices and so this is what we will do.

To unwrap this argument, we begin by presenting related practices that critically reflect on design as an act of power, after which we organise the paper in two parts. In part one we present the design cases, and in part two we analyse the impact of the designer's privileged position on the cases. We discuss how the position from which she designed, contributed to her agency to critique power structures, but how this position itself was influenced by (structurally privileged) power structures that enabled particular worldviews while oppressing others.

RELATED WORK ON DESIGN AS AN ACT OF POWER
In HCI, the Scandinavian tradition of participatory design started from a particular political perspective on how to design information technologies. The early 1980s UTOPIA project worked with worker's unions to integrate Marxist ideals and values into the design of systems in workplace settings (Bødker et al. 1987).

Lately, different practices of critical design have looked at how unconscious values, belief systems and the designer's background influence the design practice. Reflective design expresses how unconscious values and cultural assumptions are embedded in computing, including the designer's own personal preconceptions: "As designers, we are left to wonder: what values, attitudes, and ways of looking at the world are we unconsciously building into our technology, and what are their effects?" (Sengers et al. 2005). Likewise, feminist HCI explores how designers may de-naturalize normative conventions in HCI and instead foster pluralism, as well as "benefit" from the epistemology of feminist theory that aims to disclose the researcher /practitioner's own sociocultural position in the world (their goals and intellectual and political beliefs) (Bardzell & Bardzell 2011).

Some design researchers argue that design is always a political form (Keshavarz 2015). Following this, any designed object enables and constrains people's everyday life in some way and, intentionally or not, they shape how people perceive themselves, each other, and the world around them. In "Adversarial Design", design researcher DiSalvo describes how design may use agonism to engage the political condition of life. Like agonism, adversarial design acknowledges conflicts as an inherent part of democracy, and it works with design's own political impact—its agency and power— to question e.g. hegemony and bias in society. DiSalvo describes how bias is required and appropriate when doing the work of agonism. Further, he describes how designers may work with power by revealing hegemonic forces in society and by foregrounding and give privilege to what is commonly excluded (DiSalvo 2012). Similar to adversarial design, design activism works with the political role of design, but focuses more on the designerly impact of political artefacts in people's everyday life (Markussen 2011).

According to designers Dunne and Raby, who work with critical and speculative design (SCD), "all design is ideological, the design process is informed by values based on a specific world view, or way of seeing and understanding reality" (Dunne & Raby 2001). This type of design practice deliberately challenges assumptions of our everyday in order to critique it, imagine alternative presents, or speculate on a broader spectrum of preferable futures based on alternative values and beliefs. SCD gives the designer an authorial role and reflects on the sociocultural and ideological role of design. However, SCD has been criticized by feminist speculative design of being blind of its own privileged position; primarily practiced in white, male, middle-class, Northern European academic settings (Prado 2014, Prado & Oliveira 2015). Feminist SCD provides an intersectional perspective on SCD and seeks to give privilege to the marginalized groups that are commonly excluded, and it does so by focusing on how the design practitioner's own sociocultural position challenges or affirms intersectional feminist matters of concern, such as gender, race, and class.

PART 1: DESIGN (NOUN) + POWER
Design can be understood as a noun, *a design*, and a verb, *to design*, in part one we focus on the noun, the design objects (Flusser 1995). The two speculative design objects presented below are outcomes of the first author's design practice in her PhD research on intimate technologies in a feminist perspective.

POSITIONING OUR DESIGN OBJECTS
The goal of our two speculative designs, PeriodShare and Marcelle, is to critically intervene into power structures and to (re)distribute agency between designer, people, and industry. They challenge how (female) bodies are usually perceived in technology industry by focusing attention to culturally tabooed issues of menstruation and sexuality. Through foregrounding different values and beliefs than those commonly built into wearable technologies, the objects speculate on alternative, preferable futures for our intimate interaction with technologies. By inducing critical thinking in a commercial or industrial context, the objects make space for a critical discussion on gender issues and how the tech industry could act differently. The positioning of these objects is highly influenced by the authors' positions as white, female, middle-class, Northern European design researchers who care for feminist issues; we will get back to this in Part 2.

DESIGN RATIONALE
The design objects are critical-feminist and are inspired by a critique of Solutionism and ideals of "the good life" that we find in contemporary technology R&D.

Some of the biggest dreams of the future are dreamt in commercial future visions; the visualizations of how an everyday life would look like if you used a particular design. Like science fiction, future visions inspire our

collective imaginations (Dourish & Bell 2013). They shape and inform the way we perceive design proposals, ourselves and the world around us, and they shape which collective ideas we have about the future and the present. Some of the present collective imaginaries about the future involve the domestication of IoT and wearables in smart homes and on our bodies.

The neoliberal ideology that pervades technology development, such as in Silicon Valley, has been discussed by media critic Evgeny Morozov under the term "solutionism" (Morozov 2013). Solutionism is the use of technology to fix problems; ranging from technological solutions to problems that were never really a problem, to the use of simple technology to fix very complex social, cultural and political issues. However, solutionism not only pinpoints an ideological approach to technology that makes design's critical impact for social change hard to spot, it also points out issues relating to the representation and perception of human beings and their everyday life. In solutionist tech narratives, everyday life is often presented as perfect, smooth and frictionless. People are happy, the interaction is flawless and society is without crisis. The perfect depiction of everyday life that is designed and sold in tech industry reproduces normative ideas of "the good life". Feminist scholar Lauren Berlant describes the fantasy of "the good life" as the collective imagination that binds people in particular normative directions (Berlant 2011). "The good life" is a fantasy because, although it is impossible to obtain, people cling to its false promises in search for better opportunities.

Reading contemporary R&D through Morozov's and Berlant's neoliberal critique, Solutionist tech industry promises a better future and a fantasy of "the good life", through the deployment of emotionally appealing digital technologies. In addition, these dreams grow in homogenous circles informed by the neoliberal capitalist ideology of individualism and privatization. This raises at least two concerns; the lack of critique and socio-cultural analysis of the context in which the technologies may be used, as well as how values and beliefs are embedded in the design, intentionally or not.

CASE 1: PERIODSHARE
One of the big trends in tech industry during the last five years has been the quantified self, or the tracking and datafication of the body and daily activities, such as running, sleeping, walking and eating. In 2014 Apple released HealthKit: an integrated system that allows for the tracking of personal health issues on an iPhone. However, HealthKit lacked one central aspect that half of the population has historically tracked through analogue media: the menstrual cycle. It was not until 2015 that menstruation tracking became an integrated feature in HealthKit, and critics wondered if the highly gender-unequal tech industry and the structures this creates had something to do with how tech industry neglected menstruation (Perez 2015).

The year menstruation made it into tech industry was also coined as "the year of the period" (Hinde 2016). A fourth-wave of feminism, a movement that uses social media and cute/girly/feminine aesthetics to challenge hegemony and capitalist structures in present society, has had a particular focus on menstruation. One example is Rupa Kaur who challenged Instagram's censorship rules by posting a picture of herself with a bloodstain on her pants, and another example is Kiran Gandhi, who ran a marathon during her period but without wearing a hygiene product (in itself a biased term). Events like these circulated the Internet and provoked discussions on why women are still feeling ashamed of a natural bodily function, and how this is an example of the social and cultural aspects of gender inequality.

To critically investigate gender inequality in tech development and how the messy (female) body is perceived by technology, as well as the culture and society that form the basis of these technologies, the first author designed PeriodShare.
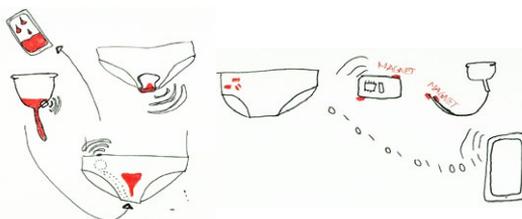

Figure 1: Early sketches of PeriodShare.

PeriodShare is a concept for an internet-connected menstrual cup that tracks menstruation data directly from the blood and immediately shares the data on social networks such as Twitter or Facebook.

The physical prototype comprises a pair of white panties with electronics and conductive materials sewn into the garment, a menstrual cup that is implemented with a sensor and connected to the panties through wires, and a mock-up of a connected smartphone application. In addition to a physical prototype, the design included a real Kickstarter campaign and a performative intervention at a technology fair. In both the campaign and the intervention, the first author performed as a start-up founder looking for funding for her new wearable product. The tone and style is girly, DIY-amateurish and somewhat aggressive, and she used humour and the normative language of start-up companies on Kickstarter to engage with the audience. The project did, however, appear slightly strange or disturbing in its break with conventional rules of taboos and its somehow ironic undertone.

Figure 2: PeriodShare is white and clinical although not trying to hide its technological features. This breaks with the expectations of what you would normally insert into your vagina and how menstruation is dealt with as something messy and impure.

CASE 2: MARCELLE

Another trend in tech industry is Internet of Things (IoT); digitally augmented and internet-connected physical objects, that e.g. track their use or their surroundings and hereby seek to optimize and manage daily activities. IoT devices are deployed in urban as well as domestic settings and even in very intimate settings such as children's toys, reproductive health technologies, and sex toys. When digital technologies intervene into these intimate and vulnerable parts of everyday life, aspects of privacy, control and consent become increasingly important. An example is the internet-connected vibrator WeVibe that tracks the user's sexual activity and suggests improvements. This results in extremely intimate data; data most people would keep to themselves. However, recently it was revealed that the data was shared with the company without the user's consent (Hern 2017).

To investigate issues of privacy, control and consent relating to physically intimate IoT products, the first author designed Marcelle. Marcelle is inspired by the protagonist in "The Story of the Eye", an erotic novel written by surrealist Georges Bataille in 1928. In the novel, Marcelle is a young girl who the story's two sexually-active main characters find intriguing because of her pure and uncontrollable erotic desires. However, Marcelle is suffering from a mental diagnosis and commits suicide, partly because she is ashamed of her sexuality. Nearly 100 years after its release, "The Story of the Eye" still provokes people because of its transgressive depiction of sexual lust and eroticism. Inspired by the poetics and story of Marcelle, as well as

by contemporary issues of privacy, control and consent, the first author designed a contemporary sex toy that both acted as a tribute to Marcelle and a speculation into how a technology based on Marcelle's values would look like. What could a 'different' sex toy look like if it was to explore IoT issues and critique the normative oppression of female sexuality?

The speculative design Marcelle is a pair of internet-connected panties implemented with vibrators that respond on the surrounding WiFi-landscape. The more WiFi-networks the panties detect, the more they vibrate. This means that in densely networked spaces (such as urban spaces) the vibrations will be intense, while in less occupied spaces (such as the countryside) the vibrations will be minimal. In the panties, the user can place two vibrators at four different spots.

Figure 3: The visual presentation of Marcelle depicts a woman living in an urban area and wearing the panties on a mundane morning.

THE CASES AS A COLLECTION

PeriodShare and Marcelle can be read both as individual projects and as a design collection. In addition to sharing an aesthetic style/look –white cotton panties implemented with internet-connected electronics in a visually explicit way – both projects implicitly address how the tech industry works with the female body, and both use humour and provocation through employing feminist issues and taboos.

Rather than solving a problem or empowering a particular group of people, the projects aim to open a space for discussing agency and power structures in tech industry. They are anti-solutionist in their approach by going beyond the glossy and smooth future visions often

depicted in tech commercials and by resisting to propose simple solutions to complex sociocultural issues, such as period-shaming, gender inequality, and women's sexuality. As such, the collection is an act of power that seeks to empower an alternative design perspective. The two projects reveal and expose the hegemony and power structures of technology use and development in order to engage in an ongoing discussion and questioning of the point of departure taken by contemporary R&D. The collection questions: Who has the power to decide what technology is developed? Which implicit values and biases are built into the products we use, and how can we expose them? And what kind of agency does the "user" have to perform in the social structures mediated by the technology?

In this design collection, we have used the first author's position to investigate ways to (re)distribute agency between the designer, the users, the industry, and the objects and systems. Assuming that hegemony extends in all directions and is not merely uni-directional from a powerful tech industry to submissive users, then we have used design to (re)distribute agency and re-negotiate the social structures that allow for acting differently. The question is, however, not just how the first author has pointed to other people's position to act as well as to the tech industry's power structures, but also how she herself exists in a particular structurally privileged position and navigates in structures of power that enable her to see and act in a particular way. How does the first author's position influence her agency and ability to critique hegemony? And what issues does this position also hold? In answering this, we will take one step back and consider our onto-epistemological methodology. This is how the simple argument – that what you design is always influenced by your structural privilege – becomes complex when unfolded and understood in the concrete design practice and situation.

Figure 4: The collection as it was exhibited at a technology fair in Denmark.

PART 2: DESIGN (VERB) + POWER

This paper is motivated by reflections on how these feminist design projects can be analysed from an intersectional perspective. Whereas the designs deal with gender issues, they do not necessarily deal with intersectional issues of for instance race and class. Or, more precisely, in the design process we never reflected on how also projects like these are always political and ideological in intersectional ways; we knew that they were but never took the analytical consequences of it. When then actually doing this, it made us reflect on how positionality and self-disclosure also matters in a critical and feminist design practice. In this Part 2, we seek to unpack how the first author's design practice is deeply influenced by our sociocultural context.

THE DESIGNER'S POSITION AND AGENCY

Coming from a structurally privileged position as white, Northern European women and exploring a feminist agenda for design, we wish to ask how intersectional perspectives on race, gender, and class may be useful in reflecting on and critically intervening in a privileged, Northern European culture? Seen from part one of this paper, the central issue is how a design researcher's own position in the world influences the project as a whole. Which impact on the projects did it have that the first author is a female, white, middle-class PhD student living in Northern Europe, supervised by another white etc. woman? Does it matter at all, if yes, then how? And how is this an example of how *every* design is always already socio-culturally situated, ideological, biased, and informed by particular values, beliefs and ways of looking at the world?

The collection we described in part one is particularly suited for this discussion because they are clearly biased. Both appear "extreme" precisely because they go against what is considered "normal R&D" and their obvious bias makes visible that the designer's position influenced the design practice. As the quotation marks indicate, the collection is only "extreme" in a context that regards them to be so; in this case, a male-dominated tech industry. In a different context, the designer's position and the design's reception would support a different political impact and social change. In

other words, design is always socio-culturally situated and so is its power to challenge status quo.

Figure 5: The first author performing in PeriodShare's real Kickstarter campaign and wearing Marcelle.

A POWER TO CHANGE?

Power may be interpreted in numerous ways. Something might be *power*ful, you can em*power* someone, and people are in *power* and can execute *power*. Power is also contextual and while someone can try to exert or divert power, the actual effects on actions cannot be predicted.

A designer's ideology is based on a particular way of seeing the world and perceiving reality; a position that is tightly interconnected with their situated knowledge and the sociocultural context in which design is practiced (Haraway 1988, Suchman 2002). A designer is never innocent; she is never not biased, design is never from nowhere (Suchman 2002). However, it is difficult to reflect deeply on the ways of looking at the world we bring to the design process; and few design methods seek to handle this in depth. Even in practices of critical design—practices that explicitly critique existing power structures and speculate on preferable futures influenced by different worldviews and ideologies—the designer's own (structurally privileged) position is often left untouched (Dunne 2005, Prado 2014).

In this case, the collection's intention was to provoke reflections on issues of gender oppression and/or questions of identity in a private vs. a public setting where commercial interests intervene intimate living. However, they do not explicitly intervene into other minority oriented issues like for instance race and class.

Or at least, that was not the designer's intention. Yet, as argued, when she created them and started discussing them with others—including discussing them from the perspective of readings and projects from other designers and researchers—it became clear that also a project like this is culturally situated and thus biased in other ways than those we had designed for. It is obviously possible to question the structural privilege of the white, Northern European context that the projects are built in and from. But what consequence does this position have, for good and bad? One obvious aspect is that in different contexts and cultures these projects will gain meanings that reflect the issues in different ways. This is related to the discussion on critical design's white male privilege (Prado 2014). Another aspect then becomes if and how this is relevant and to whom, and here the perspective of intersectional feminism can be brought into play.

Questioning the design projects from an intersectional perspective means to ask: How does the designer's position as a white, middle-class Northern European woman affect the designs, the design process, and the reading of the design objects? And does this matter, provided that she makes her position and awareness of her position (and bias) clear? Is it even possible to be aware of all biases? Also, how can she act on this: Is it possible for her as designer to act differently, given that these particular designs seek to discuss issues of gender, embodiment, and data agency in a solutionist context?

These are open questions, and as fragments of a larger discussion they can hopefully prove useful for others engaged with design, politics and power, including when discussing the culturally situated context of both designers and researchers. Because even though the sites of power that these design projects live in—such as issues of "the good life" in solutionist tech culture—seemed crucial to discussing the privileged context in which they were built, these can prove very different from another perspective. Consequently, this question of a designer's privileged position is also a question of accountability for how agency is (re)distributed. Even if designers do not intentionally address their position and privilege, they are accountable for how their position influences their design practice and how this either challenges or affirms the status quo (Suchman 2002).

When designing futures, addressing social, cultural and political challenges and aiming for *meaningful* change, it, thus, seems highly relevant to discuss not only how the world could be different, but also from which position we perform this imagining. This implies that design practitioners critically reflect on their own position in this world, and how it influences the world they see, the world they build, and accordingly the world they change.

CONCLUSION

In this paper, we proposed to understand design(ing) as an act of power in order to investigate how designed

objects are also ideological agents set in motion from the designer's point of view.

Design can change the world, also when it is engaged as a political medium. And when design (re)distributes and (re)configures agency between designer, objects, people and the context, it performs an act of power that is influenced by the designer's *ideology*. Whether aware of it or not, designers bring values and belief systems into the design practice based on their position in the world, and this influences the design in a particular way.

Arguing that designers influence their design is not a controversial argument to make, but when design deliberately engages with power, social change, and the political condition, it seems increasingly important that designers critically reflect on their agency and position.

We have used the first author's design practice to demonstrate how the simple argument – that what you design is always influenced by your (lack of) structural privilege – becomes complex when unfolded in practice. We have presented the designer's intention behind two speculative design projects that aim to critically intervene into agency and power structures in tech industry. We have disclosed the designer's standpoint, and analysed how her position as a white, middle-class Western woman has influenced the ideology of the projects. Lastly, we have used an intersectional perspective to begin a discussion of how design projects may be read differently from intersectional perspectives on race, gender and class.

Intersectionality can be an antidote to solutionism and ideals of "the good life" in tech industry, but if the design case of this paper is a biased example, we argue that it exemplifies how *every* design practice is influenced by the designers' position in the world and their power and privilege to act and see differently.

With this we aim to contribute with a critical reflection on the power and privilege of the designer's position and inspire other critically engaged designers to reflect on their own position and how their implicit biases and privileges influence their design practice.

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Intimate Futures: Staying with the Trouble of Digital Personal Assistants through Design Fiction

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Intimate Futures: Staying with the Trouble of Digital Personal Assistants through Design Fiction

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ABSTRACT

While digital personal assistants (DPAs) are moving into our homes, managing our everyday lives and providing help in the household, we have barely begun to understand them. Design fiction can be a method for contextualizing the social and cultural implications for adoption of future technologies like DPAs. In this paper, we present an analytical perspective on gender issues arising when a DPA moves into our home. Through a critical and feminist design methodology, the design fiction project "Intimate Futures" focuses on how a DPA's character and functions are often gendered and what it means for the design and adoption of a DPA. We argue that the gender issues of DPAs are interwoven with our collective imaginings of DPAs, and that design fiction is a method to explore and "trouble" our collective imaginings of DPAs. The paper contributes with an analysis of gender issues of DPAs, and a methodological way of "staying with the trouble" of future technologies through design fiction.

Author Keywords

Digital personal assistants; voice assistant; collective imaginings; design fiction; feminist HCI; research-through-design; women's health.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI).

INTRODUCTION

Current commercial digital personal assistants (DPAs) like Amazon's Alexa, Apple's Siri, and Microsoft's Cortana have a few things in common: per default, they are gendered as females, their modality is voice, and their selling point is that they are always available when the user needs assistance. In advertisements and corporate future visions, a DPA's help seems innocent: it is always ready to assist you with playing your favorite music, ordering your favorite pizza, rescheduling your Monday meeting, or remembering your

Wedding anniversary (all examples from commercial advertisements). However, these DPAs assist in particular ways, and as they were released and adopted into people's everyday life, we saw discussions on why Siri would direct to anti-abortion organizations when asked for the nearest abortion clinic [40], and why Siri would "blush if I could" when called "a bitch" [19].

So, the corporate future vis ions presented in commercial advertisements seem to have a rather simplistic scope that gives very little account of the actual actions when a DPA moves into a home and someone's actual life. The problematic responses above are not simply exceptions or inconveniences but also examples of how biases [48] and collective imaginings [16] are part of any design, sometimes embedded in the design from the beginning, other times as something that happens over time through use. These particular examples make visible that DPAs are neither innocent nor neutral and in this sense these devices show "function creep" [13]: they promise one thing and something else, often less ethical, creeps in as a consequence of the design. Intentionally or not, these objects are political entities that bring with them particular ethical and philosophical questions that we need to investigate also through design.

Collective imaginings describe a collectively and often implicitly shared envisioning of a world, its dominant narrative themes and social, cultural, political implications. Here it covers our (designers and the public's) imagining of a future, including how technologies may reconfigure our everyday lives and society as such [16,21]. Further, "a way in which we work together to bring about a future that lies slightly out of our grasp," is how [16] describes collective imaginings in design-oriented research. With this in mind, the Intimate Futures design project presented here seeks to use design fiction to give voice to collective imaginings of future DPAs and the possible implications for adoption [34] of DPAs. With this paper, we discuss how the design and the design process opened a space for analysing and discussing gender issues of current and future DPAs. We contribute with reflective questions for designers of DPAs to consider, and with methodological reflections that may nurture the radical feminist potential of future development of DPAs.

Fiction, Design, and a Plurality of Voices

DPAs are already here: they have been around in science fiction universes for years, and yet their future potential for adoption into our everyday lives is not set in stone. Design

research, commercial future visions and science fiction all contribute to collective imaginings of DPAs; imaginings that do not just imagine – and thus shape – future technologies, but also consider the world in which such technologies might be used. Especially in science fiction we see that there is a plurality of narratives of DPAs. In the movie *Blade Runner 2049*, Joi is an AI and presented as the ideal housewife. She is "everything you want to hear and see", and she was put in the world to obey K's (Ryan Gosling) desires [52]. In *2001: A Space Odyssey*, HAL-9000 is an AI and crew member of the Discovery One spaceship. He is an entertaining and clever companion, but he also turns out to be dangerous to humankind [32]. Astro Boy in the manga of the same name is a robot with human emotions. He is friendly and caring, and he was invented to make human friends with robots [50].

Joi, *HAL* and *Astro Boy* are all important AI characters that help to envision and build a story world in fiction universes. Even if fiction, they contribute to a shaping of how we—researchers, designers, and the public—imagine the future of artificial intelligence beyond what tech companies deliver today through DPAs. The fictional qualities of the three very different imagined futures of DPAs contribute to a voicing and a widening of the scope of our collective imaginings. In social, cultural, and political ways, they bring a plurality of voices to DPAs, give form to a variety of design options, and open the discussion on what we expect and hope for the future of DPAs: do we imagine a submissive DPA, a dangerous DPA, or a friendly DPA? With a terminology from [18], fiction allows us to explore different *possible* futures beyond the likely or *probable* narrative proposed by mainstream companies like Apple, Amazon and Google.

The "Intimate Futures" design project seeks to ask: How can we trouble what we might call the current 'universal dichotomy' of future DPAs to be more than either dystopian threats to humankind or utopian "ideal" housewives? Might we allow the DPA to be not just good or bad, submissive or dominant, but a complicated, contradictory being? Through this, we investigate how we might be designerly attentive to, and "stay with the trouble", to use Donna Haraway's [26] words, regarding things that do not show up in the smooth future visions of commercial DPAs, including the gender issues that might arise when a new DPA moves in.

PERSONAL ASSISTANTS, THEN AND NOW

Our collective imagining of DPAs is interwoven by historical and cultural understandings of assistance, be they human or non-human assistants, and by commercial and fictional examples of DPAs throughout time. In this section, we provide some background to the concept of a personal assistant, from current digital ones to historical versions.

In contemporary computing, a DPA is a non-human agent, a piece of software that helps you manage your everyday life, answer your questions, and suggest what to do next [17,20,39]. It has its own voice and it is voice-controlled through natural language processing and semantic interpretation. It gets to know you – from your everyday

preferences and routines to your personal life and social relations – by registering and processing the questions you ask as well as the tasks you ask it to help you with, but also by sensing your surroundings and obtaining information from third-party platforms and services. The assistant can be integrated in a smartphone like Apple's Siri, or in other objects such as voice-controlled smart speakers like Amazon Echo, Google Home or the Japanese hologram assistant Gatebox. It often has a certain character as well, and although gender and personality is not always explicit, studies show that people assign gender, age, accent origin and human-likeness to DPAs [3]. When DPAs are adopted in people's everyday lives they are not just singular discrete objects, but they become embedded in the life of the home [39]. Design and adoption of DPAs are still underexplored areas in HCI, and this paper contributes to critical understandings of how DPAs are made "at home" in people's everyday lives. It does so by drawing not only on contemporary perspectives of assistants, but also those ongoing pasts that keep informing our collective imaginings. One aspect of this is that not all personal assistants are digital; neither now nor then.

Servants of the 21st Century

In [23], Hamill describes the experience of people living in a smart home, comparing the experience of using DPAs to that of having servants in 19th century Britain. Like with servants, Hamill argues, the purpose of smart domestic devices is to smoothen the user's life through providing "unnoticed" and "unheard" help in the household; servants do their job but their paths are invisible. Most of the work of smart devices happens in the background, and Hamill argues that the design must successfully navigate the tensions between hidden operations and the user's control; it is not convenient for the user to know an assistant's every move but at the same time users (like people who employed servants) rarely trust them to be fully autonomous. Hamill thus argues that the smart home in many ways serves the same role as servants did in 19th Britain and thus, in the design of smart devices, lessons should be learned from how people interacted with servants.

While this is a useful and interesting analysis, it is also worth considering that servants were rarely met as equals or with trust and respect. They were not allowed to manage economy or to talk without being granted permission. As such the hierarchy was clear. So, while we in the current collective imaginings of DPAs might see a DPA as a smart but obeying servant, we might also imagine a different paradigm where it is treated as an equal; as a friendly companion that we can trust and allow to have a personality, intention and desires.

Technically Female: It's a She

Historically, women's labor has been closely allied with computers; computer systems had women's names [28:125] and women literally operated as computers [38]. When referring to Alexa as a "she" and having female voices by default, DPAs thus build on and reproduce collective imaginings of women as interface between men and the world. Hester argues that historically in both fiction and

reality DPAs have been portrayed as young, cute and innocent women, almost like a virtual reproduction of the stereotypical young female secretary [27]. It has been argued that the feminine gendering is used to regulate expectations to what a DPA can(not) and will (not) do [37]. The caring role implies, that we do not expect a DPA to push back [27].

Although the majority of DPAs are female per default, this is not always the case. In a future vision from the 1980s, Apple envisioned an intelligent assistant in the shape of a male virtual research assistant, assisting a male professor with professional and work-related tasks, such as his calendar and research data [27]. However, in the future vision we also experience a conflict when the DPA allows private life to infiltrate the work place: the professor's mother calls but this is quickly fended off by the DPA. We see this as an example of a "functional creep"—a professional technology is intervened by private life and this changes its function and meaning—but also as an example of an early gendering of DPAs: male voices manage professional tasks, while female voices (the mother) belong in the private space. The present version of Siri, who is female per default, is different from the early version of Apple's DPA. While Siri manages professional life like a personal secretary, she also takes care of social, personal, and domestic life: work often associated with female labor. Together with Hester [27], we argue for gender-political reflections on what the gendering means for interaction with DPAs and for human interaction in general. One might e.g. wonder: do gender stereotypes make it unlikely for a male voice to take care of social, personal and domestic life? Or could a male assistant manage intimate care like women's health without transforming it to a doctor's authority?

Engineering Intimacy with Algorithms
Finn argues [20], that the vision of DPAs is rooted in a wish for easy, deep, and personal interactions with a computer that not only talks but understands. He argues that "we are hard at work constructing intimacy with algorithms, from our willingness to play along with Siri to the things we type into search bars when we think nobody is looking". With this he points to the potential of an intimate relation between people and DPAs; "these systems have barely begun to contend with the vast interiority of their users" [20]. In the science fiction movie "Her" by Spike Jonze [31] we experience an intimate conversation and relation between the protagonist, Theodore, and his DPA, Samantha. Finn argues [20], that the main causes of this intimate relation are Samantha's willingness to get to know humanity, her consciousness, and the signs she gives us of her embodied presence through breathing and small hesitations when speaking. It has been argued that since using the voice is such a "natural" aspect of human communication, it is also the most "natural" way of interacting with computers [23,51]. However, [39] argues that present DPAs are more request/response design than actual conversational design and propose a conceptual shift in the way we perceive DPAs from a "two-way" conversational agent to an input-output system.

Whether we regard DPAs as servants, female secretaries, intimate companions or input-output systems, these three analytical perspectives highlight philosophical and political questions we have asked ourselves throughout this project:

How human do we want DPAs to be? How much control do we give them? How do we reproduce gender stereotypes, when we design and adopt gendered DPAs? To what degree do we want to construct intimate relations with algorithms?

STAYING WITH THE TROUBLE: A CRITICAL AND FEMINIST DESIGN METHODOLOGY
In this section, we present the methodology of Intimate Futures through the figure and practice of "staying with the trouble" inspired by feminist scholar Donna Haraway in her book "Staying with the trouble: Making Kin with the Chthulucene" [26]. As a critical and feminist design methodology, "staying with the trouble" interweaves design fiction and feminist HCI to explore collective imaginings. Intimate Futures "stays with the trouble" of the gendered design of DPAs and possible conflicts of DPAs in relation to women's health. We employ this particular feminist theory to "trouble" the collective imaginings of DPAs by bringing in a plurality of voices and hereby imagine different possible futures of DPAs, including futures imagined from an inclusive and cross-cultural perspective.

Haraway argues that "staying with the trouble requires learning to be truly present, not as a vanishing pivot between awful or edenic pasts and apocalyptic or salvific futures, but as mortal critters entwined in myriad unfinished configurations of places, times, matters, meanings" [26:1]. Building on SF – science fiction, science fact, speculative feminism – "Staying with the trouble" proposes ways to engage with the world in urgent times beyond "technofixes" and dystopian beliefs that "the game is over" [26]. This includes being willing to make trouble, becoming-with each other, telling stories and cultivating response-ability [26].

In the following sections, we will present the methodologies and practices that our interpretation of "staying with the trouble" draws on: design fiction, feminist HCI as well as women's health, inclusive design, and cross-cultural design.

Design Fiction
In [26], Haraway draws extensively on science fiction and uses storytelling – and feminist speculations – as a method to narrate other possible worlds. With HCI's increasing focus on design fiction, we propose "staying with the trouble" as a feminist methodological and theoretical contribution to design fiction. Design fiction is a method for exploring potential conflicts of a future technology through designing the (story) world and/or narrative around a future technology [7,33,42,49]. Design fiction explicitly rejects the search for "solutions" [8] and "solutionist" technologies [35]: the use of technology to fix problems that do not exist or seeing complex social, cultural and political phenomena as technological problems to be solved. Instead, design fiction allows a designer and audience to imagine the implications

for adoption of a future technology [34], e.g. the "trouble" that may arise when a future technology is domesticated, or as we say it in this paper: "move in". The conflicts force us "to grapple with questions of ethics, values, [and] social, political and personal consequences and outcomes of a world with that technology" [49]. The future world serves as a projection of current issues and conflicts, and thus the future becomes a way of looking at ourselves and our culture [41].

As design fiction is a method for grasping and making collective imaginings tangible, there is a need for more design research engaging with the *collective act* of collective imagi*ning*. Collective imaginings are not stable, universal constructs or purely means for reading ubiquitous computing alongside science fiction [16]. Collective imaginings are unstable, performed, and in constant becoming; interwoven and reconfigured across genders, ages, (dis)abilities, and cultures. With Intimate Futures, we explore the potentials in the processual, designerly aspects of collective imaginings. We seek to trouble the present collective imaginings by creating different possible futures. In Intimate Futures, we have included multiple voices, cultural differences and historical yet ongoing pasts into the collective imaginings of future DPAs. By working with this inclusive and cross-cultural approach, Intimate Futures brings the feminist HCI methodology [4] into the creation of design fictions.

Feminist HCI and Women's Health
The feminist HCI methodology was put forward by Bardzell and Bardzell [4]. Some of the key positions include a connection to feminist theory, an empathic relationship with participants, a commitment to methodology, researcher and practitioner self-disclosure and co-construction of research activities and goals. Feminist HCI has inspired an agenda for change in women's health [2]. Women's health in the area of intimate care is an underexplored area in HCI, and Almeida et al. argue this might be due to its tabooed nature; it "involves parts of the body that are hidden or involved in sexual functioning" [2]. They argue that HCI "should stop being embarrassed about the female body", since sexuality and intimate care are inherently part of everyday lives. In the spirit of feminist HCI, Intimate Futures works with diverse methods to support dialectic knowledge production on moral and ethical questions of inequality, sexuality and gender in relation to design of DPAs. By researching and designing intersectionally across ages, cultures, and social groups we have challenged and reflected on our positionality and how it shapes our design of DPAs [25,43,48].

Inclusive Design
Inclusive Design is about working with people who are – physically, linguistically, emotionally etc. – excluded by design, such as people with disabilities [11]. It can force designers to challenge their hidden assumptions and ask the kind of questions they would not do otherwise, analyse situations and ways of seeing and being different from their own able-bodied worldview, and imagine inclusive design possibilities that would not be imagined otherwise.

We have designed with people with disabilities for two reasons 1) people who are challenged physically are assumed to be empowered through voice-interaction [23], while people with speech challenges might be excluded [36], and 2) people with disabilities who get support from human PAs have extensive experience with conflicts of assistance and can be seen as lead-users when it comes to digital PAs. By getting insights into experienced conflicts with having human PAs, we have opened a space for investigating potential conflicts of digital PAs, different than those that could be imagined from our own able-bodied positions.

Cross Cultural Design
Collective imaginings of DPAs vary across cultures. Culture matters because it shapes our collective imaginings of technologies, and pop-cultural artefacts show that there is not just one universal truth or one future narrative of AIs [6]. If contemporary DPAs are mostly developed in Western cultures, such as Silicon Valley, how might a Japanese culture influence the design and adoption of DPAs? Whereas American collective imaginings are built on dystopian narratives from e.g. Frankenstein, Japan has a more utopian narrative since robots have often been portrayed as friends e.g. in the manga Astro Boy [6,50]. Apart from sci-fi, Japanese collective imaginings of DPAs are influenced by the government's "Robot Revolution" initiative and the Shinto religion according to which inanimate beings – such as mountains or trees – embody "kami" (spirits/gods/souls).

Intimate Futures was carried out in Denmark and Japan; two very different cultures. Embracing and working across cultural differences is a way to seek a stronger plurality [1] and a way to bringing a multiplicity of voices into the design process. The project has sought to challenge universalizing narratives of DPAs by critiquing the mainstream narrative in Western technology development through working within a Japanese context. Designing in Japan has made us reflect on our own positionality as European design researchers and it has furthered our critique of Western narratives of DPAs. We have aimed to promote cultural differences and to morph cultural logics with participants, while not being blind towards our own positionality of working within a Japanese context from a Northern European point-of-view.

INTIMATE FUTURES: THE DESIGN PROCESS
In this section, we present the process of Intimate Futures and how we have "stayed with the trouble" of the conflicts that may arise when DPAs move into our homes. We present specific events in the process, seeking to highlight how we have interweaved critical thinking, design fiction, and feminist HCI through design experiments, interviews, co-design workshops, and prototyping. Intimate Futures has been carried out in Denmark and Japan, and has developed through interviews and design workshops with Danish high school students, international and Japanese design students, and finally Japanese people with disabilities from the non-profit art organization Tanpopo-no-ye.

Experience Prototyping: Hey Kamma

As an open, inspirational experiment into how we intimately interact with DPAs, we invited Danish/Dutch people in their 20s to record a short video of themselves asking their fictive DPA *Kamma* a "meaningful", personal or intimate question; the kind of secret question that would not show up in a corporate commercial, because it is private, embarrassing or evil. The aim was to probe which questions could be asked, with which feelings and in which situation. We used the videos we received to experience prototype [8] a 3-minute video of intimate aspects of life that a DPA could help with. The outcome "Hey Kamma" shows highly contextual, non-edited recordings of people that appear vulnerable and caring, but also revengeful and narcissistic [44] (Fig 1-3). The video was used as inspiration in the design workshops.

Figure 1. Man asking *Kamma* to broaden his comfort zone.
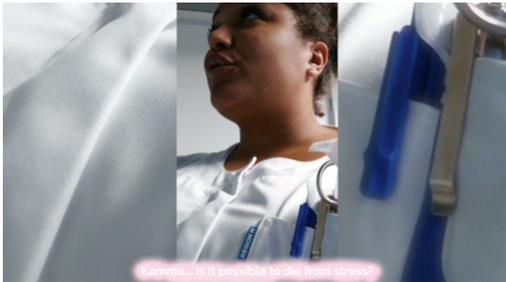
Figure 2. Woman asking *Kamma* if you can die from stress.

Figure 3. Woman asking *Kamma* to find the ugliest picture of a friend and upload it on Instagram.

Co-design: Designing *Personal* DPAs

To explore young people's collective imaginings of a DPA and how they could imagine that DPAs could be designed differently, we carried out a two-hour co-design workshop with eight international students, aged 23-24, from Finland, China, Vietnam, France, the UK, Germany and Egypt. The workshop involved an exercise, a design challenge and a presentation of their designed DPA incl. an improvised conversation with it. As an introduction to the workshop, we presented the aim of the workshop and a general description of current DPAs. With the aim of making the participants think beyond the mainstream Silicon Valley narrative of DPAs, we presented three inspirations. The first example was the experience prototype video "Hey Kamma". Second example was "Blendie" [15]: a voice-controlled blender where speed is controlled (in a very humorous way) through the user sounding like a blender does at the desired speed. This was shown to make the participants reflect on how voice could be used differently. The last example was the Japanese DPA "Gatebox" [22], which portrays a deeply intimate relation between a young man and his hologram manga DPA.

The workshop started with an exercise that both aimed to give us insights into the participants' collective imaginings of DPAs, *and* make the participants reflect on how their current smartphone use influenced their collective imaginings of DPAs and how human help differed from non-human help. The participants received two envelopes with the text "Let's get to know our relation"; one from their smartphone and one from their most important human helper. The participants were asked to open the envelope and answer the questions inside, including: "What are the major functions that I help you with?", "Secrets I know about you" and "What do you not want my help with?" (Fig 4). After this the participants were handed a third envelope; it was black and the recipient was "Your future DPA". The envelope said "Let's imagine our future relation" and inside the envelope the participants found questions similar to the ones they just answered in relation to their smartphone and human helper (Fig 5). The purpose of this envelope was to make the participants quickly imagine and develop initial ideas on how a future DPA could be.

Figure 4. Participant answering that her smartphone is her angel and superpower and that it keeps her darkest secrets.
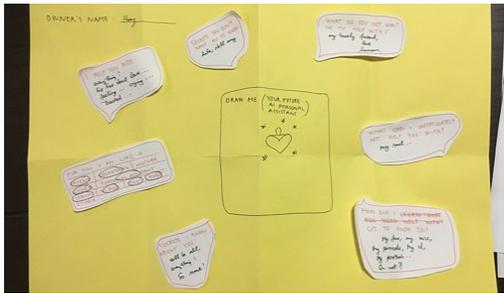
Figure 5. A participant imagining his future DPA to help with "everything? [] about love... feeling… crying… trusted…"

This exercise led up to the design challenge, where the participants were asked to "Design a DPA that helps you with a personal issue". They were asked to consider 1) How do you interact with it, using voice? 2) Which meaningful, personal or intimate issues should it help you with? and 3) Which social and emotional relation do the two of you have? The participants were asked to present their design concepts and improvise a conversation with their future DPA (one person playing the user and the other person playing the voice of the DPA). The concepts developed in the workshop included 1) a wristband DPA that helps with to-do-lists and time management, and obey to everything you asked, 2) a housekeeper DPA that helps raise your child, cook, clean, and (not least) argue with your spouse, 3) a DPA that helps young people with insecurity (Fig 6), and 4) a toilet DPA that helps with women's health, hormone level and birth control. The fourth concept will be presented in details later in this paper, since we chose to develop it into a design fiction.

The design challenge worked with participants' collective imaginings of DPAs, and what was considered meaningful and important for them when interacting with a DPA. While some participants were thinking of a DPA as a robot that could do physical work like cleaning the house, other participants wondered if the DPA could be like a celebrity avatar having the voice of Beyoncé. The characters of the DPA varied from a supportive DPA, to a DPA with humor, or a slave DPA to a DPA with bad attitude.

Figure 6. After building their DPA in LEGO, two participants discuss how it can help young people with insecurities.

Some participants were concerned about privacy when the DPA would know a lot about private life, while one participant would give all control (of raising one's child) to the DPA. As such, the workshop showed a multiplicity of possible futures of DPAs *beyond* one narrow universal narrative. The participants' collective imaginings of future DPAs were in some ways contradictory, but this both gave a nuanced picture and broadened our scope of how we might adopt DPAs in our future everyday life.

Interview + Co-design: Insights into Human Assistance
To gain a deeper understanding of the experience of assistance, including which conflicts it involves, we did a workshop with three people with physical disabilities that have experience with getting support from human PAs. Not having a choice of whether you want an assistant or not, because it is a vital part of carrying out your everyday life, people with human PAs have extensive embodied knowledge on social conflicts with human PAs and potential conflicts with digital PAs. Our research questions for the workshop included: For which tasks would you want help from a human assistant and for which would you prefer a digital PA? How do you develop a social and emotional relation to a person that assists you throughout your day? How humanlike would you want a digital PA to be?

The 3-hour workshop was hosted at the Good Job! Center KASHIBA; a public social welfare center where people with disabilities, locals and visitors can come together and be creative. We interviewed the participants about their use of technology, their need for support, and their social relation to their assistants. After the interview, we did two exercises. In the first exercise, the participants were asked to improvise having a conversation with a voice-controlled lamp (one person playing a user that wants to turn on the lamp, and the other playing the voice and action of the lamp) (Fig 7). For the second exercise, the participants were asked to imagine what they would like a digital PA to help them with. After this they were asked to have an improvised conversation with a digital PA asking for help with their need (Fig 8).

Figure 7. The participants were performers and improvised turning on the lamp by singing and using noise and strokes.

Figure 8. A manga figure on a box with sound-responding light was used to improvise a conversation with a DPA.

While the exercises with the lamp and DPA showed new ways of voice interaction, the interesting insights came from the interview concerning the participants' relation with their human assistants. Each participant had different opinions on design of DPAs, how humanlike it should be, what it should help with etc., but they also had very different social and physical needs. One of the participants said that the biggest need that a DPA could satisfy was "cuddling"; emotional support that she could not get from her human assistants. Another participant said that the more intimate tasks the DPA should take care of, the more humanlike it should be. She built this on her experience with human assistants; for intimate tasks, she prefers the assistants that she has the best relation to. She furthermore told us that with 25 assistants in rotation, she assigns tasks to her assistants based on their particular qualities and skills; e.g. if she knows that computer-literate X comes Thursday, she postpones to ask for help with her computer to Thursday. She also shared experiences of social conflicts: "I cannot make them [the assistants] stop talk. I am the one listening to them and not the other way around". With these insights, we speculated on potential conflicts with DPAs. What if you would design a DPA that, instead of being always available and able to know and help with everything, would have a very limited use? Or what if the assistant, and not the user, would be the one talking all the time? These questions point to the social relation developed over time; human connections that go beyond practical tasks and physical help to include mental support, social needs and challenging worldviews.

As people with disabilities often have other needs than able-bodied people, they find ways to appropriate and modify their technologies. A participant with speech challenges told us that "talking through Google Translate allows me to speak clearly": she uses Google Translate to communicate from her own 'disabled' Japanese to Google's Japanese. Another participant proposed a DPA hack; he would not want to continuously talk to the assistant, instead he would record his most used questions and play them when needed. Same participant said he practices declining help in a polite manner, since he does not always want the help people offer.

The workshop provided us with new insights into the conflicts of assistance, care and interdependency. In handing over the question of how future DPAs might work, to people that have everyday experiences with assistance and conflicts, we saw a vital input for "staying with the trouble" of DPAs.

INTIMATE FUTURES: THE DESIGN FICTIONS
In the design process, we explored several conflicts arising when DPAs move in, but we chose to focus on 1) how DPAs are gendered and how it shapes the design of DPAs, and 2) how algorithmic bias affects DPAs management of our everyday life and our actions. We explored this in two design fictions focusing on 1) sexual harassment of DPAs, and 2) a DPA acting against the user's will not to get pregnant, which we present and discuss in this section. Meet AYA and "U".

When AYA Moves in
DPAs are not just used for answering questions, managing tasks, or suggesting what to do next. As people invite DPAs into their lives, people start playing along with their DPAs and social relations are reconfigured [20]. Mothers invite Alexa to their dining table [24], kids develop empathy to Google Home [17] and truck drivers sexually harass their navigation DPAs [12]. Our conversations with DPAs is in a language so well-known to us that the habituation is likely to end up shaping the way we speak to human [20]. E.g. it has been explored how DPAs answer to sexually explicit and violent language [19]. While Microsoft is aware of the sexual harassment Cortana faces, and tries to implement a response to it [12], this is not the general answer from tech companies.

To experiment with how a DPA could push back on sexual harassment, we designed AYA [45]. In the video prototype "AYA pushes back" (Fig 9), we see a woman experimenting with how AYA responds to her saying "Hey AYA, you're hot!". Whereas most DPAs respond with a programmed passivity when harassed, by ignoring the sexual harassment, politely refusing to answer, or even flirting back – e.g. Siri answering "I would blush if I could!" – AYA is programmed to actively push back. Her responses range from being funny, empathic and educational to threatening, aggressive and self-reflective. E.g. she answers with humor "Sending 'You are hot' to your mother" and with aggression "I wish I could say the same about you" and "Shut up, asshole".

Figure 9. AYA pushes back if a user is sexually harassing her.

The aim of AYA is not to propose a solution to this conflict. Some of the answers are still problematic and we hope to both entertain and provoke viewers, and that they start to reflect and make up their own mind about which answer is better. Thus, the aim is to raise awareness to the issue and trouble the gender stereotypes of DPAs. This is also the reason for AYA's female voice and purple color. She uses her female gender and feminine characters to push back on sexism, so that the sexual harassment that many women experience – as voiced in the #MeToo movement – is not reproduced in DPAs and technology culture in general. In addition, one might wonder if DPAs with a male voice will or should respond in a different way. In addition, the name of AYA, a Japanese female name meaning "design" or "beautiful" and referring to a "housemaid" in Kenya, aims to draw attention to the possible oppression and conflicts experienced by women all over the world.

When "U" Moves in

"U" is the second design fiction in Intimate Futures and it explores the design of a DPA in the area of women's health in the bathroom. It was developed from an idea in a design workshop and as the participants said when presenting it: "You don't invite anyone to the toilet!", so we decided to try.

The background for this concept is that people already invite Siri, Cortana etc. to the toilet, when they bring their smartphones to the bathroom. Additionally, people generate personal health data through different self-tracking apps and devices. DPAs like Lark already help with physical activity, diet and sleep, but women's health, gender and sexuality, being generally overlooked areas of technology research and development [2,5], are lagging behind. It has been argued that DPAs like Siri are not very comfortable talking about sex and sexual health and that software designers should continue improving its search functionality [53]. However, with more people interacting intimately with DPAs it seems important to not just implement better search algorithms, but also to consider which biases and conflicts these intimate algorithmic conversations might foster. Tracking menstrual cycles and using reproductive data as birth control is already almost here; Germany recently approved an algorithmic tracking device as birth control, although the instable character of many menstrual cycles and the complexity of bodies make mistakes possible. Combining this with other health data from the same woman should make it possible to further digitize birth control and pregnancy in a near-future.

The design fiction "Your smart toilet assistant" [46] explores the intimate relation between a young woman, Tomoko, and her DPA, the bathroom assistant "U". In the short film, we see how the relation develops when "U" helps Tomoko by tracking her bodily fluids in the toilet. The fiction spans over three months and we experience how "U" assists Tomoko with predicting her bleeding, with birth control advice and with nutritional recommendations. "U" is a discrete and limited yet also important and welcome part of Tomoko's everyday life. Given the intimate topics, we explored how

"U" could feel like a trustworthy but also humorous friend to Tomoko that, despite the close connection to Tomoko's intimate life, is only present in the bathroom, instead of also accompanying her throughout the day.

In the four-scene narrative, "U" slowly gains Tomoko's trust by delivering precise suggestions and by cheering when Tomoko's body performs well. Tomoko uses "U" as a form of algorithmic birth control based on health data, but the conflict arises when "U" makes a mistake and Tomoko accidently becomes pregnant. In the video, we follow their conversation, as "U" realizes this mistake.

Figure 10. Still picture from "Your smart toilet assistant", when Tomoko asks if she should use protection.

Figure 11. Still picture from "Your smart toilet assistant", from day 93 when Tomoko finds out she is pregnant.

There are examples of speculative design working in this field of tracking and controlling hormones and fertility, e.g. by focusing on privacy in menstruation tracking [47] and quantified toilets [14], or the discussions on relationships and security that microchip-based contraceptive implants bring [29]. We primarily focus on issues of trust, gender and algorithmic bias. As a design fiction, "Your smart toilet assistant" speculates on how a DPA would react if it realizes it made a mistake. The social relation between a user and a DPA helping with something as intimate as birth control must be built on trust even though (or perhaps because) the foundations on which the autonomous algorithms are built can be hard to grasp. Even if a DPA is personal in the sense

that it predicts and suggests things based on personal data and settings, its predictions and suggestions will not be neutral, because they are built on algorithms and large patterns of data that are inherently biased and based on values that reproduce norms, knowingly or not.

Following this, the design fiction seeks to create an opening for understanding the system's mistake as intentional. Even if Tomoko told the system that she did not want to be pregnant, could it still be biased towards pregnancy? Perhaps the algorithm and patterns that the predictions are based on (implicitly) include assumptions that women want to have children and Tomoko's health and life situation fit these patterns? Maybe the DPA's data analysis figured that Tomoko ought to want to become pregnant and that is why it makes the "mistake"? This is an open-ended question that the design fiction leaves for the viewer to decide.

Like the case of AYA, "U" speculates on how we design with the "functional creeps" [13] arising when DPAs move into our home. Instead of implementing a programmed passivity by ignoring a mistake or failure of the algorithm, how can we design responsible DPAs that truly understand, emphasize, and account for an equal and respectful relation?

DISCUSSION: HOW TO COLLECTIVELY (RE)IMAGINE

Voice interfaces and DPAs are becoming ubiquitously available and with this project and paper, we argue that we need to understand how collective imaginings shape how designers design DPAs and how users adopt them. In order to make change, designers and users alike need to examine how collective imaginings intersect with issues of gender, race, and class, and collectively (re)imagine and design different still possible futures of DPAs. This includes exploring the radical potential that they hold to feminist futures; futures that go beyond neoliberal consumer driven interactions, beyond essentialist gender stereotypes, and beyond exclusion of those that do not fit into the white, male, able-body from which many DPAs seem to be developed.

To "stay with the trouble" of the collective imaginings while responding to the radical potential of feminist futures, we propose that designers – through their practice of designing DPAs (and potentially other technologies) – consider: *Which collective imaginings shape the design and how can we trouble them?* More specifically, designers would benefit from reflecting on political and philosophical questions like:

- How to think beyond the (often privileged) individual needs towards supporting social needs?
- How to think beyond interactions based on consumption that monetize domestic spaces for instead to focus on that which enables trust, interdependency, and care?
- How to trouble gender stereotypes by queering DPAs' voices and the gendering of the tasks that they perform?

Rather than being universal questions to be answered, they serve as reflective questions to consider during the design of DPAs. In situated contextual meetings with the world, the questions should be reframed to support the participants'

social, cultural, and political interests including their ways of being in and seeing the world. In our case – through design fictions, the "Hey Kamma" experience prototype, and also the co-design workshops and interviews with individuals experienced with human assistants – we found ourselves having situated conversations about which futures we see, which futures we want, and finally which futures we build. The following sections delve further into how Intimate Futures engaged with the abovementioned questions in both the design process and the resulting design fictions, focusing mostly on the gender perspective but also raising awareness to the consumption-critical and inclusive perspectives.

Troubling Gender Stereotypes

The female gendering of DPAs like Siri, Alexa, and Cortana is interwoven with our collective imaginings built on fictive AIs like the submissive Joi from *Blade Runner 2049* as well as with robotic inventions like the Japanese female ("young and beautiful") intelligent robot Erica [30]. DPAs are gendered through voice and pronoun, and this matters for the functions and contexts they are designed for, and how people understand and adopt them. One example is that Siri was once a female assistant with attitude, but when Apple bought the software, she was "toned down" [9].

Intimate Futures is concerned with the gendering of DPAs and with what this means for their design and adoption. While there might also be technical reasons for the female gendering of DPAs, we focus on how ongoing pasts of female labor and gender expectations shape this bias. Specifically, we are interested in how this gendering as a political choice brings with it particular social and cultural meanings as well as future narratives, intentionally or not. We argue that DPAs offer an opportunity to rethink gender stereotypes beyond gender essentialism. Instead of reproducing traditional gender roles, DPAs could challenge them and leave them open. This is what we propose through the design fictions featuring AYA and "U".

A Plurality of (DPA) Voices

AYA's starting point is a conflict that we noticed in current digital culture: sexual harassment also happens to a DPA. Gendering a DPA as a "she" brings with it social and cultural factors, such as a risk for sexual harassment. The point is that this risk comes *prior* to the actual design and adoption. While designers are not responsible for sexual harassment per se, they should be able to reflect on the values, ethics, and politics in design of technology; including analyzing how collective imaginings of gendered DPAs and their own gender bias shape their design. This might both lead to an understanding of why people would sexually harass a DPA, and lead to imagining ways to make it stop. With AYA we argue that gender expectations shape how designers design DPAs' responses to sexual harassment, and that troubling gender stereotypes through design may respond to the issue.

In the design fiction featuring "U" we speculated further on how we could trouble gender stereotypes through design of DPAs. As reported above, we wanted the toilet assistant "U"

to be a trustworthy and kind character that would feel like a friend to Tomoko. We experimented with various voices; different ages, genders, accents, pitches etc. to get a feeling associated with the intimate space of the bathroom and the intimate tasks that the DPA helps with. We started with a warm voice of an older woman, figuring that her implied life experience would add trust to the relation. But as we wanted to create a more equal relation and since the project was situated in Japan's age hierarchy culture, we instead looked to Samantha in *Her* who has a younger voice, similar to Tomoko. We were not looking for an intimate love relation like Samantha develops to Theodore, but we liked her tone of voice, humor, her hesitations, and the way that insecurities are reflected in her voice. So we went with a younger woman's voice in the recording of the design fiction. However, as this was recorded we began reflecting on why we assumed it should be a woman's voice and speculated on the gender stereotypes that also this DPA (re)produces. To break with gender stereotypes connected to reproductive health, female labor, and taboos of women's bodies, we changed the voice to a lower pitch, which produced a more androgynous voice. By "queering the voice" and using a potentially male assistant to mediate menstruation and birth control—topics with a strong cultural connection to the female gender—we troubled the dichotomy that connects male voices to professional work tasks and female voices to domestic, social, and personal tasks.

Social Needs, Trust and Care

Both paper authors come from a Northern European context with a certain feminist openness towards bodily taboos and intimate issues, but a critical skepticism towards the future of AI. In this research project, we have worked from within a Japanese context, that has an openness towards robotics and AI, however in professional settings, public spaces, and social relations an individual's private life is quite hidden. In our design workshops, we have aimed to draw on both cultures by working beyond critique towards an openness to how DPAs can help with intimate issues and tackle bodily taboos. We have done this by asking participants to design DPAs to which they could express their "honne" (Japanese for true feelings), and imagine how DPAs could help with personal issues such as in situations of harassment.

As such, we sought to rethink assistance not as a master-slave relation or one built on labor, but instead as a relation between two individuals; a site of interdependency, trust and care, *and* a potential field of conflicts. Through inclusive design we have understood more about the social context in which assistance comes to matter. In our case, designing with people used to human assistants challenged the "Solutionist" neoliberal narrative [35] of individual empowerment that commercial DPAs are often built on. Intimate Futures takes the individual (often privileged) needs that DPAs are often designed to do – playing music, shopping, or remembering a Wedding date – and contrasts it with larger social and societal issues of ensuring that basic needs of equality and freedom are met in ways that also facilitate reflection.

CONCLUSION

DPAs currently move into our pockets, homes, and lives, and we feel that it is important to explore how we understand them and how they matter in our everyday lives today and tomorrow. In Intimate Futures, we have used "staying with the trouble" as a guiding metaphor for designerly engagement with the conflicts that might arise when DPAs are adopted into an everyday. Inspired by Haraway's thinking on multiple *ongoing pasts*, *thick presents* and *still possible futures*, we have interwoven design fiction with feminist HCI, inclusive design, and cross-cultural design. By engaging the historical, but also *ongoing pasts* of assistance, we have stayed with the troubled history of female servants and secretaries that are part of our collective imaginings of DPAs. By working cross-culturally and including people usually excluded from the design process, we have engaged different *thick presents* that offered collective imaginings radically different from the solutionist narrative of DPAs designed in primarily Silicon Valley. These *thick presents* have broadened our scope of *still possible futures*, which manifested themselves in our design fictions.

Through Intimate Futures, we suggest that designers of future DPAs join us in imagining and building DPAs that do not invent new individual (often privileged) needs, monetize our domestic spaces through consumer driven interactions, or reproduce gender roles, but rather support social issues, enable matters of care, trust and interdependency, and trouble gender stereotypes. "Staying with the trouble" is a design methodology that engage such feminist futures, and we hope to inspire designers to design inclusively and cross-culturally, reflect on own positionality, and use the methods of co-design workshops and design fictions to collectively imagine still possible futures of DPAs.

Technological futures are built on and (re)produce particular collective imaginings that intersect technology with social, cultural, and political matters of gender, race, and class. While these futures are not essentialist and determined, they are also not fully open; through collective imaginings we can understand how we came to where we are today and how we can move on. As collective imaginings are not stable, but situated and open for negotiations, our task is to trouble the dominant narratives of collective imaginings to propose still possible futures. By "staying with the trouble" of future technologies through a feminist HCI approach to design fiction, we can collectively imagine a plurality of futures built on how we as human and non-human beings, across gender, race and class, relate to each other today, and how we would prefer to relate to each other tomorrow.

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