

Feminist Living Labs as Research Infrastructures for HCI: A Socio-Informatics Approach

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Abstract

Many IT organizations still struggle to integrate female professionals, and masculinity influences their cultures as well as the operations of design teams. As a result, technology design not uncommonly excludes users or reinforces gender stereotypes. Feminist HCI as a theoretical orientation to HCI research sensitizes researchers regarding questions such as whose concerns and interests are considered, whose voices are heard, and how stereotypes are inscribed into technology artifacts. However, academic debates did not impact IT practice to a substantial degree. Ergo, how to translate the broad commitments of feminist HCI into a pragmatic, context-sensitive research infrastructure in real-life environments remains to debate.

This thesis contributes to present debates on feminist HCI, giving methodological guidance for analyzing and sharing gendered practices in IT organizations, promoting long-term reflection on women's experiences regarding technology usage and production in the process. It argues that practice theory, expressed in a Practice-Based Design notion, offers a suitable solution to engage with such issues in real-life environments and proposes feminist Living Labs as research infrastructures. Living Labs in the tradition of the PRAXLABS approach of the 'Siegen School,' where feminist HCI informs the research activities, offers unique qualities to do engaged research for and with women. They provide long-term collaboration, a broader picture from a range of stakeholders, grounds for exchange, and co-design possibilities for organizational change.

I will report from experiences of setting up and managing a long-lasting *feminist Living Lab* in Germany during a three-year project called 'GEWINN.' Collaborating with six male-dominated IT organizations and additional stakeholders, the lab allowed to engage with everyday gender practices and effectively co-design possible solutions for problems rooted in real-life practice. Throughout this thesis, I will lay out how a feminist epistemology and methodology shaped the setup of the feminist Living Lab to match ambitions for emancipation and social change. Concrete (design) case studies will present how the activities in the lab were established and maintained. My experiences shed light on the unique characteristics of a feminist Living Lab as well as the opportunities and challenges that arise when conducting such engaged, value-driven research. Opportunities involve engaging with gender practices and building trustful relationships over a longer period of time, as well as fueling emancipatory actions. Challenges mainly include managing participation, addressing the sensitivity of the context and power hierarchies by cultivating safe spaces, the role of the researcher, and sustainability issues. In

addition, based upon cross-comparisons with other Living Lab projects, I will show how my experiences can, at least partially, be transferred to other sensitive research settings concerned with so-called marginalized, potentially vulnerable, or less privileged populations, and vice versa. I will also offer reflections regarding applying the PRAXLABS framework as an infrastructural and analytical orientation. My insights might serve other scholars as guidance to conduct value-driven Living Lab work with marginalized populations in sensitive contexts in general and with an explicit feminist stance in particular.

Keywords: Living Lab, Gender, Feminist Research, Feminist HCI, Socio-Informatics, Practice-Based Design, Methodology.

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Publications of the Author

This thesis features parts that have already been pre-published as articles. Chapters 4-10 present accepted, pre-published manuscripts as pre-copyedited, author-produced versions. Chapter 11 presents a submitted, unpublished article currently under review. The following publications are included as chapters within this thesis:

Chapter 4:

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Chapter 5:

Ahmadi, M., Weibert, A., Ogonowski, C., Aal, K., Gäckle, K., Marsden, N., & Wulf, V. (2018). Challenges and Lessons Learned by Applying Living Labs in Gender and IT Contexts. *Proceedings of the 4th Conference on Gender & IT*, 239 - 249. <https://doi.org/10.1145/3196839.3196878>

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Chapter 9:

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Chapter 10:

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Chapter 11:

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Abbreviations

AR	Action Research
CSCW	Computer-supported cooperative work
CSR	Corporate social responsibility
DIT	Do it together
DIY	Do it yourself
FPAR	Feminist Participatory Action Research
GDP	Gross domestic product
GERD	Gender Extended Research and Development
HCI	Human-computer interaction
HR	Human resources
ICT	Information and communications technology
IT	Information technology
LED	Light-emitting diode
LGBTQ+	Lesbian, gay, bisexual, transgender, queer, plus
LOI	Letter of intent
NDA	Non-disclosure agreement
OD	Organization Development
PAR	Participatory Action Research
PD	Participatory Design
QA	Quality assurance
R&D	Research and development
SME	Small and medium-sized enterprises
STEAM	Science, Technology, Engineering, Arts, and Math
STEM	Science, Technology, Engineering, and Math
STS	Science and technology studies
UX	User experience
VSD	Value sensitive design

Part I: Foundations

This part presents the foundations of the thesis and the main research interests. Chapter 1 describes the main motivation of my research, introduces the main notions as well as ideas and lays out the structure of the thesis. Chapter 2 describes related work as well as the relevant concepts and theoretical foundations of feminist human-computer interaction (HCI) for analytic inspiration, and the ‘Socio-Informatics’ approach detailed in notions such as ‘Practice-Based Design,’ ‘Grounded Design,’ and ‘Design Case Studies.’ Along with the literature on ‘Living Labs’ for a methodological stance, it also introduces the ‘PRAXLABS’ approach. Finally, chapter 3 outlines the research design. It describes the research setting and activities and also includes a positionality statement.

1 Introduction

In recent years, calls for more inclusive design research that pays attention to matters of diversity and social justice have gained prominence in the HCI community. Research interests became increasingly fragmented, shedding light on diverse lived experiences and their relation to technology. Examples include, for brief mention, research on older adults (Light et al., 2015; Vines et al., 2015, 2013), migrants and refugees (Krüger et al., 2021), issues of race respectively ethnicity (Hankerson et al., 2016), disability studies (Mankoff et al., 2010; Rajapakse et al., 2014), or orientations to research such as ‘intersectional HCI’ (Schlesinger et al., 2017), ‘queer HCI’ (DeVito et al., 2021; Light, 2011; Spiel et al., 2019), and, the focus of this thesis, ‘feminist HCI’ (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011; Rode, 2011a). Research of this kind usually takes place in what can be labeled ‘sensitive contexts’ (Waycott et al., 2017). It is inherently value-driven, which is expressed in notions such as (the Scandinavian approach of) ‘Participatory Design’ (Ehn, 1993), ‘value-sensitive design’ (Friedman & Hendry, 2019), ‘post-colonial computing’ (Irani et al., 2010), or ‘social justice-oriented interaction design’ (Dombrowski et al., 2016), among others.

This thesis expands the current discourse on feminist HCI, which offers an epistemological and methodological orientation for science that focuses on the experiences of women’s ‘marginal lives’ in relation to technology usage and production (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011). As I will show later, there is still an open debate on how to translate the commitments and values of feminist HCI into a pragmatic research infrastructure. This thesis argues that a Living Lab in the tradition of the Socio-Informatics approach (Wulf et al., 2018b) is a suitable solution for applying feminist HCI on an infrastructural level, this way offering unique qualities to do engaged research for and with women. Beyond that, this thesis also contributes to the Socio-Informatics approach itself, especially regarding research work that aims to be more inclusive and value-driven and takes place in sensitive contexts (such as the works of e.g. Meurer, 2020; Müller et al., 2015b; Schorch et al., 2017; Unbehaun, 2020).

1.1 Motivation and Research Objectives

The information technology (IT) field remains male-dominated, and tech design teams are not uncommonly comprised of homogeneous groups of young, white, educated men (Cheryan et al., 2015). Masculinities in tech-related industries (e.g. Alfrey & Twine, 2017; Weststar &

Legault, 2018) are widely discussed, and working as a non-man in such androcentric environments remains a challenge (e.g. Ruder et al., 2018). As a result, IT companies have a problem attracting and retaining female personnel (Holtzblatt & Marsden, 2018; Tapia & Kvasny, 2004). One reason for this is seen in gender performativity – or *gender practices* – in organizational spaces (e.g. Bruni & Gherardi, 2001; Kelan, 2007; P. Y. Martin, 2003; Tyler & Cohen, 2010). Establishing gender-sensitive working environments to foster women (and other minorities working in the field) as team members, it is argued, is a moral imperative for a number of reasons (Herring, 2009). In addition, literature provides plentiful examples (e.g. Cassell, 2003; Criado Perez, 2019) of how the absence of diverse perspectives can contribute to fundamental design flaws, based upon rather unreflective assumptions of mainly male developers.

Such considerations are, in their essence, feminist. Bardzell (2010, p. 1301) argues that feminism has (implicitly and explicitly) shaped the field of HCI for a long time as it is a natural ally “due to its central commitments to issues such as agency, fulfillment, identity, equity, empowerment, and social justice.” She describes how early approaches in HCI followed more of a rationalistic and positivist approach, mainly pursuing ‘universal design.’ As the field progressed, the manner in which empirical design research was conducted, including the values that were associated with it, changed. This was largely constituted as an epistemological ‘turn to the social,’ although that disguised a number of variations and was predicated on a commitment to more ‘qualitative’ methods. That, in turn, prompted interest in problems of reflexivity and, subsequently, positionality. The HCI community started to borrow notions from feminist theories of inquiry (e.g. Harding, 1986), which claim that knowledge is situated, that women’s lives and experiences are different from men’s and largely invisible in a predominantly masculine world. Such a view advocates investigating the different knowledges, skills, sets of power structures, and *practical experiences* of women. In addition, epistemological and methodological stances in the HCI community were especially shaped by a significant amount of literature in science and technology studies (STS) that investigates

how social, political, and cultural values and assumptions affect technological advancement and scientific research; it also investigates the converse, that is, the influences science and technology have on society. STS theorists postulate that ideas about women and men shape science and technology, evident in the decades-long practice of more men than women studying computer science, designing, implementing,

administering network infrastructure, purchasing and using Internet and digital devices. (S. Bardzell, 2010, p. 1303)

Research of this kind argues for a politically engaged, transformative, and liberating science by evoking social change for these ‘marginal lives’ (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011). Put bluntly, feminist design research advocates that research should be conducted for and with women. Putative solutions for fulfilling these ambitions have embraced participatory and emancipatory approaches such as Participatory Design (PD) (Ehn, 1993), ‘Participatory Action Research’ (PAR) (Gatenby & Humphries, 2000; Kindon et al., 2008), or its feminist sister, ‘feminist PAR’ (Maguire, 1987). Such engaged work requires immersion in the field and aims to be more inclusive as well as value-driven. Building trustful relationships and offering ‘safe spaces’ (e.g. DeVault & Ingraham, 1999; Flensner & Von der Lippe, 2019; The Roestone Collective, 2014) is, in this view, essential to raise diverse and critical voices. It can be especially challenging in so-called sensitive settings (Farquhar & Das, 1999; Waycott et al., 2017). In my context, women working in cultures dominated by masculinity might fear occupational consequences such as potentially hurting their careers when participating in research projects (DeVault & Ingraham, 1999).

Still, “much HCI practice reflects and reproduces existing relations between groups of people, whatever they happen to be” (Light, 2011, p. 431). In response, studies advocating feminist design (e.g. D’Ignazio et al., 2016; Fiesler et al., 2016; Van House, 2011) have gained momentum in recent years in HCI research. However, despite these efforts and justified by the elaborations above, HCI research efforts seem to have limited practical impact. There has been relatively late recognition in the HCI community that investigating socio-technical environments requires a more holistic, context-sensitive approach to paint a ‘broader picture’ of the problem situation. How to best investigate the problems that feminist research tries to address and how to conceptualize feminist principles into design research practice respectively thus remains an obdurate problem. It shows that how to translate the broad, feminist commitments that have informed the HCI community into a pragmatic and practice-oriented research infrastructure remains an open question.

The Socio-Informatics approach of the ‘Siegen School’ (Wulf et al., 2018b), although never explicitly linked to feminist HCI research, has been proposing a similar kind of engaged, transformative co-design work in real-life environments for years. Briefly, Socio-Informatics emphasizes a “research paradigm (...) that is both design centered and practice oriented” and

“dealing with societally relevant problems” (Stevens et al., 2018, p. 29). Engaging with *practices* is central, and such a ‘practice-based perspective’ of conducting computing-related research encompasses a variety of notions respectively concepts (Practice-Based Design, Grounded Design, Design Case Studies, and PRAXLABS) which I am going to describe in more detail in chapter 2. To translate these commitments into a human-centered, long-term co-design research infrastructure in real-life settings, the Siegen approach has sometimes adopted the Living Lab approach (e.g. Eriksson & Kulkki, 2005) in the past. Living Labs are research infrastructures that provide a holistic approach to the creation of outputs, to co-design, and, crucially, allow the building of trustful relationships (with a variety of stakeholders) over time. Furthermore, it permits an (iterative) agenda which is so vital to the practice-based approach exemplified in the Siegen notion, namely a 1) pre-study (to understand the context), 2) design (in participatory fashion), and 3) (long-term) appropriation phase. Longstanding experiences in adopting and (adapting) this approach in research practice cumulated in the ‘Socio-Informatics way’ of doing Living Lab research, namely PRAXLABS as “a systematic approach to the generation of a scientific corpus of practice-based design work termed ‘grounded design’ (...), which is, in turn, based on the design case study approach (...)” (Ogonowski et al., 2018, p. 320).

While PRAXLABS work has its origins in the area of ‘smart home’ research spaces (e.g. Jakobi et al., 2017; Ley et al., 2015; Ogonowski et al., 2013), throughout the years, a more progressivist agenda in research areas one might label as ‘sensitive’ increasingly has evolved. Examples include PRAXLABS research with marginalized or vulnerable groups such as older adults (Meurer et al., 2018; Müller et al., 2015b) and people with dementia (Unbehaun et al., 2018). A feminist Living Lab in the tradition of PRAXLABS seems to have a considerable potential to understand and change the *socio-technical* contingencies that shape *gendered practices* in IT environments. However, a Living Lab with an explicitly *feminist agenda* has, to my knowledge, not been established before the start of the ‘GEWINN’ project in 2017 (see chapter 3), although it seems to offer considerable potential for feminist HCI. Establishing a feminist Living Lab is not a trivial exercise as no research infrastructure is per se feminist. Instead, Living Labs are just a vehicle (the methodological framework), while feminist epistemology is the driving force. To become feminist, a Living Lab must be established with a feminist ethic. It is the design of the work that takes place within it that determines its feminist ambitions, not the lab itself. A feminist Living Lab *might* provide a suitable and productive methodology for engaging

with gendered practices in IT-related organizations and might challenge the gendered assumptions present in much design work. It *can* be a canvas for feminist ambitions, but this requires translating the feminist commitments (which have informed the HCI community) into research pragmatics. This yet requires building a reflective, trustful space in which women can share and exchange experiences. The question of how to set up and maintain such an infrastructure to put the otherwise marginalized into the center of the research, to ensure that their voices and perspectives are heard, to manage conflicts of interest, and foreground the moral interests of researchers, as well as participants (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011; Rode, 2011a), remains vibrant.

In this thesis, I will report from experiences of setting up and managing such a long-lasting *feminist Living Lab* (in the PRAXLAB tradition) in Germany during the three-year GEWINN project mentioned above. By committing to a participatory approach, the project aimed to provide methodological support for understanding and sharing experiences of gendered practices in the IT sector, as well as encouraging long-term reflection on these issues. A shared, transformative goal of the participating stakeholders was to collaboratively develop potential change mechanisms in the form of policy initiatives or organizational measures respectively to enhance female participation in the IT workforce. Throughout this thesis, I will lay out how feminist commitments shaped the initial setup and how they were translated over time and to various stakeholders. I will describe how long-term engagement poses challenges over the course of the lifecycle of the project but is suitable for providing marginalized groups a voice, evoking change possibilities in the process by addressing their concerns. Thus, this thesis mainly offers a methodological contribution by demonstrating the operationalization of epistemological principles. I will reflect on how the activities in the lab were established and maintained, present concrete (design) case studies and meta-comparisons with research experiences from other labs in the Socio-Informatics tradition from a sensitive field. This way, this thesis contributes to methodological considerations to both 1) feminist HCI as well as the 2) the Socio-Informatics, more concretely the PRAXLABS approach itself. This work, therefore, seeks to address the following research questions:

- How can the Living Lab approach (in the PRAXLABS tradition) help to translate the broad commitments of feminist HCI into a pragmatic research infrastructure? What kind of methodological considerations must go on within the lab to meet these feminist ambitions?

- What kind of opportunities and unique insights can a long-term collaboration of this kind provide from a feminist perspective? Which challenges do arise regarding the management of the Lab activities throughout the course of a project?
- What are the lessons learned for the PRAXLABS approach?

1.2 Structure of the Thesis

This thesis is divided into three main sections: Part I: Foundations, Part II: Selected Findings, and Part III: Discussion. Part I includes the motivation of the work (Chapter 1), in parts already introduced in the previous section. In chapter 2, I will give an overview of the related work, diving deeper into gendered practices in relation to technology, the topics of feminist research, feminist HCI, the basic foundations of the Socio-Informatics approach, and Living Labs. In Chapter 3, I will present the research design, including a description of the research setting.

Part II presents the papers that were published in the project context. Chapters 4 and 5 detail the general epistemological and methodological considerations and the initial setup of the feminist Living Lab. Chapter 6 to 11 present insights from the field in the form of (design) case studies with different stakeholders of the lab. In Chapter 6, I will describe insights from a digital project week which was conducted in the context of the FabLab of the university of Siegen. The project week included three maker workshops that were established and investigated with a gender lens. The findings from this study provide a set of implications to design a maker environment in a gender-sensitive way. Chapters 7 to 9 present case studies from another stakeholder from the lab, a video game company. The insights from chapter 7 can be understood as a pre-study, presenting the lived experiences of the participating women in an industry dominated by masculinity. Chapter 8 delves into a problem area detected via the pre-study, thus moving on to the co-design phase. The findings provide implications on how to design external communication measures in a gender-sensitive way. Chapters 9 presents a paper that introduced the notion of feminist Living Labs to the CHI community. It reflects on the longer-term collaboration with the video game company as an example of an engaged stakeholder. I found that long-term participation has its challenges, but it may also offer significant benefits for both the organizations and the participating people. Chapter 10 presents an analytic framework to surface gender issues in agile software development that mainly emerged from discussions with stakeholders. Finally, Chapter 11 provides a retrospective reflection of the whole activities of the lab via a cross-comparison with another Living Lab from a sensitive context. This

comparison study shows how values in the two labs contextually emerged and changed throughout their runtime. The meta-comparison presents lessons learned that go beyond the situatedness of their settings.

Part III outlines the main results to answer the research questions and discusses the lessons learned. Chapter 12 outlines the characteristics of a feminist Living Lab. Chapter 13 describes the opportunities of this engaged work, demonstrating how the approach helped engage with gender practices over a longer period of time and sparked emancipatory actions. Chapter 14 outlines the main challenges, which include managing participation, cultivating safe spaces, the role of the researcher, and sustainability issues. Chapter 15 presents reflections on the PRAXLABS approach and lays out limitations and potential future work. Finally, chapter 16 closes with a conclusion.

2 Related Work

This chapter explores related work. First, I will elaborate on gendered practices in technology-related fields. After this, I will explore how feminist research and feminist HCI inform design research to pay attention to issues of gender, equity, and social justice. Building upon that, I will dive into the matter of value-driven (design research) in sensitive research contexts. Then, I will explain the approach adopted in the thesis, rooted in a non-positivist stance and advocating practice-oriented design research in real-life environments. I will also describe related concepts, including the Living Lab approach. Finally, I will close this chapter by arguing why the combination of Living Labs, a practice-based perspective, and feminist HCI can provide a fruitful alliance.

2.1 Gendered Practices in Technology-Related Fields

Technology-related fields lack diversity as they largely remain the province of white and educated males (Cheryan et al., 2015). Gendered assumptions and expectations of ‘adequate’ gender behaviors (Gherardi, 1994, 1994; Hirdman, 1998) that include a dichotomy of ‘typical’ masculine and feminine behaviors, interests, skills, and mutual role expectations, explain the low participation of women in tech-related fields: They have an impact on marginalization and exclusion regarding technology access, usage, and development. Put simply, technology development and use are strongly linked to masculinity (Wajcman, 2009). Scholars influenced by a social constructionist perspective argue that being born male or female does not determine so-called masculine or feminine behavior. Rather, social constructions of gender (compared to the biological sex) are ‘done’ (West & Zimmerman, 1987), ‘performed’ (Butler, 1990), or *practiced* (P. Y. Martin, 2003) in everyday interactions. Indeed, literature provides numerous examples of how technical skills and expertise as well as its surroundings, are gendered through social practices (e.g. Kelan, 2010; Margolis & Fisher, 2003). These socialization processes start in early childhood and endure into adulthood (e.g. Cheryan et al., 2015; Margolis & Fisher, 2003), where the gender binary prevails. This, for instance, is demonstrated in the low numbers of female participation in computing studies, (e.g. C. C. Hughes et al., 2017; Margolis & Fisher, 2003), gaming (C. Martin & Rafalow, 2015; Natale, 2002; Thornham, 2008; Weststar & Legault, 2018), or in maker spaces (e.g. S. Fox et al., 2015; Lewis, 2015; Moilanen, 2012; Toupin, 2014).

Scholars have proposed additional notions to conceptualize and also deconstruct gender-related phenomena. Judith Butler, famously, not only argued for a view on gender that shifts from a binary towards a multifaceted view (Butler, 1990) but also that the doing of gender, or gender as a practice, can be ‘undone’ when taking a critical and reflective lens (Butler, 2004). Undoing gender entails breaking up socially constructed gender identities and roles (Lindsey, 2015), as well as masculinities crafted in everyday interactions. Other scholars (Crenshaw, 1989; McCall, 2005) added that gender intersects with additional aspects of identity construction such as class, ethnicity, sexual orientation, age, religion, or disability (and that their combinations form multiple oppressions that are proclaimed by feminism, see chapter 2.2). Having said that, with people being susceptible to implicit and unconscious gender bias (Eagly & Mladinic, 1989; Eccles et al., 1990), gender practices are not uncommonly taken for granted, seemingly legitimized by men’s dominant position in society (Maguire, 2001). Masculine gender practices become especially problematic when they reproduce gender orders and limit equal opportunities (Connell, 1995) and is particularly pronounced in male-dominated environments (Acker, 1990), which still confront women (and other minorities that do not fit ‘heteronormative patterns’) with barriers to successful participation. While organizations might present themselves as gender-neutral in relation to policy, they may not always be aware of on-the-ground realities. Organizational structures may play a significant role in reproducing male power and masculinities in and through taken-for-granted organizational processes, advancement options, job roles and access to ‘male’ networks (Acker, 2006). Ergo, in organizations dominated by what Connell (1995) labeled ‘hegemonic masculinity,’ heteronormative men are those who benefit most in such environments.

Tech-related occupations such as, e.g., engineering (W. Faulkner, 2009) or, our focus here, IT organizations, have proven to be especially vulnerable to these dynamics. Technology-related industries are known for hostile environments, cultural stereotypes, sexism, pay inequality, a lack of mentorship or role models etc. (e.g. Blackwell et al., 2009; Cheryan et al., 2015; Cozza, 2011; Gregory, 2003; Prescott & Bogg, 2014; Von Hellens et al., 2001). Many organizations struggle to put diversity initiatives into practice, and corporate cultures remain relatively unchanging (Wynn, 2020). With a ‘second-sexing’ of the female (W. Faulkner, 2001) in such working environments, young female professionals, despite their qualifications, struggle to fulfill their career potential. As a result, the career opportunities of female IT professionals are damaged, and companies struggle not only to attract but also to retain them (Holtzblatt &

Marsden, 2018; Tapia & Kvasny, 2004). To cope with hostile masculine work environments in IT, women tend to develop strategies such as ‘hiding’ their femininity by adopting a masculine or androgynous identity (process of assimilation, Gherardi, 1994). Overall, “it seems women have to fit in with existing systems rather than the industry looking to understand different workplace practices and cultures (...) (and) addressing the issues which result in the gendered inequalities” (Prescott & Bogg, 2013, p. 56).

It is also argued that considerable benefits accrue with more diverse teams (Herring, 2009), along with the evident considerations of social justice: The industries’ structures, unavoidably, impact the way design teams work and thus the outcome of design processes. Scholars have analyzed masculine engineering encounters in the past and shown the gendered nature of technology production (e.g. Cockburn, 1983, 1997; Cockburn & Ormrod, 1993; Wajcman, 1991, 2009). In design practice, the assumptions and values of developers represent a largely unreflective male positionality (Criado Perez, 2019; Oudshoorn et al., 2004; E. W. M. Rommes, 2002). A lack of diversity within design teams is thus problematic from a design perspective, as it often leads to flawed products regarding usability for certain user groups (e.g. Cassell, 2003; D’Ignazio et al., 2016; Hankerson et al., 2016) by excluding ‘marginalized’ user groups (S. Bardzell, 2010), rendering them ‘invisible’ during the design process. Questions arise regarding whose concerns and interests are considered in design processes, whose voices are heard, how stereotypes are inscribed into technology artifacts, and how to conduct gender-Inclusive HCI Research as well as design (e.g., Breslin & Wadhwa, 2018; Burtscher & Spiel, 2020; Cassell, 2003; Stumpf et al., 2020). Concerns like the ones described in this section are inter alia investigated in the field of feminist research and feminist HCI. This will be described in the following.

2.2 Feminist Research and Feminist HCI

Feminism is a social, political, and academic movement that critically examines gender orders and advocates gender equality to end sexism and sexist oppression by empowering women (Herrmann & Stewart, 2018; Lorber, 2011). Thus, it tackles issues variously described as patriarchy (a social system ruled by male power), androcentrism (placing the ‘male gaze’ at the center and marginalizing others), misogyny (oppression and rejection of women and feminine qualities), and sexism (discrimination based upon one’s gender or sexuality). Feminism comes in several (often contested) forms (for an overview of the different forms of feminisms and their

history, see Lindsey, 2015; Lorber, 2011), which, even so, at the very least, examine the various reasons for gender inequality and share a similar understanding of emancipatory potential. Furthermore, feminism has an activist and transformative stance, attempting to realize its goals through appropriate measures and policies.

Feminist research (Campbell & Wasco, 2000; Reinharz & Davidman, 1992; Webb, 1993) historically developed out of the feminist movement as a “concern with the conventional social sciences, which reflected the male values, knowledge, and experience” (Gurung, 2020, p. 106). It offers implications on epistemology and methodology and proposes a more humanist approach to research, influencing all stages of the research process by taking feminist principles into account. Hence, “feminist scholars have engaged in undeniably fruitful discussion about the complex relations between research methods, knowledge, and liberatory practice. (...) Feminist researchers (...) have advocated a more engaged research praxis that might overcome some of the inequalities in doing social research” (Levinson, 1998, pp. 337–339).

Just as there are many feminisms, feminist research practices developed diverse strands, which means that there is no single definition (Gurung, 2020), although there exist key characteristics: For instance, as indicated, feminist scholars argue that certain perspectives, especially those of women, tend to be marginalized because of the ‘male gaze’ in academic work, resulting in distorted scientific results. Consciousness-raising for feminist topics is thus a crucial aspect of feminist research. In addition, feminist research explicitly emphasizes value commitments and aims for emancipatory ends. Building trustful relationships and valuing emotionality as an important resource (a trait commonly labeled as feminine and in contradiction to the rationalist, masculine approaches of traditional sciences) is another commitment.

In the field of feminist HCI (see below), feminist standpoint theory seems to be the predominant feminist perspective. Important contributors have been Sandra Harding (1997), Patricia Hill Collins (1990), Nancy Hartsock (1983), and bell hooks (1984), among others. Standpoint theory privileges marginal voices, seeing an epistemic advantage and a reduction of power relations in this approach (Gurung, 2020). It claims that women’s experiences are different from men’s, thus deserving special attention in analysis. These differences go largely unrecognized by ‘common’ scientific inquiry because of the abovementioned androcentric view in academia, meaning that women hold a different type of valuable knowledge – something which Harding calls ‘strong objectivity’ (Harding, 1992b). Furthermore, standpointism argues that individual experiences are shaped by their surroundings and experiences and that knowledge is hence

situated. While not claiming to represent a unified female experience, a feminist standpoint epistemology thus offers insights grounded in the situated experiences of women who take part in the research (Kaur & Nagaich, 2019). The point that ‘woman’ is not a unitary category is widely accepted in feminist research (e.g. Hill Collins, 1990; hooks, 1981), which means, of course, that women may experience inequality in various ways. Indeed, concerns for intersectionality (Crenshaw, 1989; McCall, 2005) and recognition of the performative aspects of gender (e.g. Butler, 1993) make this very clear. Nevertheless, it is reasonable to see such inequalities as structured. That is, all women, at different points, experience the gendered nature of social reality, albeit not all in the same way at the same time. This foundational view is, in and of itself, a justification for standpointism. Feminist research of this kind, and bell hooks (1984) is a famous example, is explicitly concerned with bringing these different experiences ‘from the margins to the centre.’ All women, in this view, are marginalized, but not all in the same way. Hooks famously pointed, for instance, to the way in which women of color, poor women, women without children, homeless women, and so on, all needed representation.

Ergo, feminist standpoint theory argues for putting women (or marginalized groups in general) into the center and conducting research explicitly for women and with women. In this context, feminist scholars (e.g. Haraway, 1988; Harding, 1986) argued the need to address the power relations at play in the processes of knowledge production (and elsewhere) and to pay attention to the researcher’s ‘situated knowledge’ as well. The research processes to examine women's experiences must incorporate an ethic of respect, collaboration, and caring (Campbell & Wasco, 2000; Gurung, 2020). Standpoint theory involves not only gaining perspectives of the social reality of women by investigating the practices and socio-political reasons that perpetuate sexism and oppression. Crucially, this also involves a moral and political commitment for action via a ‘study up approach’ (Gurung, 2020).

For this reason, feminist research in general and feminist standpoint theory in particular advocate an activist, action-driven stance and lean towards qualitative methods that emphasize the everyday, subjective experiences of women (Acker et al., 1983; S. Bardzell, 2010; Campbell & Wasco, 2000; R. Edwards & Mauthner, 2002). Furthermore, scholars suggested that an ethnographic approach to the field (Kaur & Nagaich, 2019; Levinson, 1998) and participatory methods (Maguire, 1996) have the potential to address the explicit aim of not only empowering participants but also the need for reflexivity regarding the relationship between research and researched (Reinharz & Davidman, 1992), seeking “to undercut the distance

between the researcher and the research subject” (S. Bardzell & Bardzell, 2011, p. 681). Creswell et al. (2007) suggest that PAR and feminism share a humanistic, democratic, and emancipatory understanding and strive for social justice and equality by supporting people to achieve personal liberation. Thus, feminist theories have much to offer when examining the reason for injustices and developing context-sensitive change strategies (Frisby et al., 2009). In this context, Maguire (1987, 1996) has advocated feminist Participatory (Action) Research, which advocates the involvement of women in all stages of the research process, as a step forward. She argues that such an approach not only leads to a better understanding of the social context via a reflective analysis but it might also lead to the co-design of women-friendly policies and change mechanisms. Crucially, it furthermore provides a space for the development of skills and knowledge on the part of women (and others with marginalized statuses) so that they receive a sense of belonging and are empowered to navigate their way through the obstacles that masculine environments confront them with (Maguire, 1996). In addition, feminist researcher Dorothy Smith (1987) suggested entering research fields via an ‘institutional ethnography’ approach which treats the everyday world, including our structured assumptions, which dominate our worldviews, as problematic. She proposed that ordinary daily activities or, put differently, institutionalized social interactions become the site for an investigation in organizations.

These broad commitments of feminist research then underpin much of what is known as feminist HCI, introduced by Bardzell (2010; 2011), and later revisited by other scholars (e.g. Rode, 2011a). Bardzell (2010) argues that feminism and HCI form a natural alliance as both have central commitments to issues of agency, fulfillment, identity, equity, empowerment, and social justice. Saying that, she argues for a more explicit and conscious involvement of feminist principles in HCI research and, more broadly, to reflect on the gendered nature of technology development and usage. The latter view is influenced by a long history of research from the field of science and technology studies (STS) that has confronted masculine engineering encounters since the 1970s (e.g. Cockburn, 1983, 1997; Cockburn & Ormrod, 1993; Wajcman, 1991, 2009). There has also been considerable work from the field of information systems (E. M. Trauth et al., 2006) that predates feminist HCI. Like feminist research in general, Bardzell emphasizes that feminist HCI is not the same as research on gendered design or topics of gender and IT. These are fields of inquiry and, of course, a prominent area of interest for feminist HCI. However, feminist HCI entails an epistemological and methodological commitment rather than

an emphasis on topic. Feminist HCI, through its research inquiry, has a political motivation with an emancipatory agenda (Stumpf et al., 2020).

To summarize, a feminist HCI research agenda has implications for methodology, including a commitment to scientific and moral objectives while creating a participatory, empathic research relationship with subjects, relating to their experiences, and taking the social context into account. Ongoing reflection and self-questioning as well as disclosure of the researcher's position and values, are additional key dimensions.

In response to these claims, a significant amount of explicit feminist work in HCI design research has gained traction in recent years. Examples range from postpartum technologies to web interfaces (D'Ignazio et al., 2016; Dimond, 2012; Fiesler et al., 2016; Marsden, 2014; Marsden & Pröbster, 2019; Metaxa-Kakavouli et al., 2018; Vorvoreanu et al., 2019). Related concepts were further introduced to create more nuanced views of feminist HCI, such as intersectional HCI (Schlesinger et al., 2017) that advocates deeper engagement with identity complexities. In addition, queer HCI theories (DeVito et al., 2021; Light, 2011; Spiel et al., 2019) pay attention to matters of sexuality, hetero-normative assumptions, and exclusion of people from the queer community, suggesting ways to the 'queering' of technologies.

As suggested, feminist epistemology stresses how ethical and political values shape research practices (Cain, 1986; Campbell & Wasco, 2000; Webb, 1993), and feminist research usually also takes place in so-called sensitive contexts. These aspects are explained in more detail in the following.

2.3 Value-Driven (Design) Research in Sensitive Settings

The last half a century brought a gradual shift away from 'objectivist' (value-free) or 'scientific' approaches to research that shares an empathetic and value-driven perspective (for a detailed historical overview, see chapter 11). For instance, scholars describe how values (should) influence the choice of methodology and methods (Rokeach, 1973), or how competence and personal values impact the researcher's ontological and epistemological position (Greenbank, 2003). As HCI recognized its role in "imagining a radically better" future (S. Bardzell, 2014, p. 189), it increasingly acknowledged the importance of research ethics (Fiesler et al., 2018) and values for design research (e.g. Gilmore et al., 2008; Lumsden, 2013). For instance, a popular (though not exclusive) notion on how to conduct value-driven design

research covers much of what is labeled ‘value sensitive design’ (VSD) (Borning & Muller, 2012; Friedman et al., 2002, 2006). VSD gained popularity as a design orientation that provides axiological support to HCI research (Borning & Muller, 2012; Friedman et al., 2002, 2006). Values in the field of HCI are commonly understood to be “what a person or group of people consider important in life,” in the sense that “people find many things of value, both lofty and mundane” (Friedman et al., 2006, p. 57). Having said that, the notion of basic human values and building upon a pre-determined set of ‘human values’ has also faced criticism. Scholars showed that ethics and values are contextualized (e.g. Le Dantec et al., 2009) and emerge over time (Weibert et al., 2017), which means that they need to be initially negotiated with participating stakeholders as well as reflected upon during the whole research process. Thus, value-driven research in the field of HCI leans towards participatory methodologies that allow researchers to negotiate values with various actors involved in the research process (Friedman & Hendry, 2019). This is in line with the participatory stances that influenced feminist research, itself inherently value-driven, and advocating that “the creation of dialogue between researchers and potential research participants is fundamental if research is to become more collaborative and inclusive” (Farquhar & Das, 1999, p. 56). Bardzell (2010) argues to embrace feminist principles in value-driven design work, as at least part of the ‘engaged’ work that presently takes place in HCI and related fields is based on feminist epistemology (Alsheikh et al., 2011; Borning & Muller, 2012).

Furthermore, much of the work that feminist research is concerned with can be characterized as ‘sensitive’ as it “seeks to understand the experiences of women in relation to such things as power, domination, and disadvantage in gender relationships” (Dickson-Swift et al., 2008, p. 4). Ergo, several scholars (Campbell & Wasco, 2000; Dickson-Swift et al., 2008; Farquhar & Das, 1999; Jansen & Rae Davis, 1998; Lee, 1993; Renzetti & Lee, 1993) claimed that embracing principles of feminist research is a step forward for the conduct of sensitive research (not only for the topics that feminism is traditionally concerned with) as well. There is no clear definition of what makes a topic or setting particularly ‘sensitive.’ Sensitivity must be understood as a subjective term, depending on the context (and culture) in which the research takes place. A topic can be sensitive when the research potentially evokes strong emotions within the participants as well as researchers alike and is potentially associated with shame, exposure, or stigma. Examples of sensitive topics include sexual orientation (Farquhar & Das, 1999), mental decline or frailty (Vines et al., 2015, 2013), traumatic experiences, alcoholism,

abuse, or diseases (Dickson-Swift et al., 2008; Renzetti & Lee, 1993). Research can also be sensitive because of its setting and the investigated populations, especially if the endeavor poses potential threats of sanction to participants, and sometimes even researchers, for their involvement in the studies (Jansen & Rae Davis, 1998; Renzetti & Lee, 1993). This can be especially true for research with, e.g., marginalized, oppressed, persecuted, or disadvantaged groups (Kitzinger, 1994). In my field of inquiry, mainly the corporate world, IT can be regarded as potentially hostile towards women whose “presence is often unwelcome, and where power is increasingly enacted through the demarcation and policing of spaces” (K. Smith et al., 2020, p. 1302). While the women in my context are arguably not in physical danger in their workplaces, they could potentially be harmed with respect to their career progress. Participation might reinforce these issues (DeVault & Ingraham, 1999).

Challenges regarding sensitive research include trust-building, maintaining boundaries, and minimizing harm and anxiety by, for instance, anticipating or counteracting stigma (e.g., when making the research results public or via participative problem formulation, respectively) and ensuring the safety of participants (Dickson-Swift et al., 2008; Farquhar & Das, 1999; Waycott et al., 2017). Principles from feminist research, it has been proposed, can be instructive in how to react to these challenges (Jansen & Rae Davis, 1998): Considerations include access to the field, framing goals of research differently, the selection of the participants, and data collection and analysis and publication, among other things. Feminist interpretive inquiry is furthermore especially mindful of gender and power differentials in the research setting and emphasizes long-term involvement and the establishment of safe spaces. The latter have their foundation in the women’s and LGBTQ+ movements and provide a ground where people are not afraid to share opinions, thus encouraging them to speak up (Bustamante Duarte et al., 2018, 2021; DeVault & Ingraham, 1999; Flensner & Von der Lippe, 2019; Hoppe et al., 1995; The Roestone Collective, 2014). Borrowing from feminist notions, sensitive research also has implications for how the researcher should approach participants: The latter make themselves not only vulnerable to potential sanction by simply participating but also through disclosing their private experiences. Oakley (1981, 2016) argues that researchers should react to this by a non-hierarchical attitude to research, embracing emotionality, making their experiences salient to the process, and this way building rapport as well as reducing hierarchies. Others (e.g. Dickson-Swift et al., 2008; Lee, 1993) advocate being careful not to exploit or derogate the collaboration partners or consider the sustainability of research initiatives, especially as the transformative

potential of feminist research is equally true for sensitive contexts where people have, e.g., experienced trauma (Dickson-Swift et al., 2008).

During the last years, HCI scholars have increasingly turned to ‘sensitive contexts’ (Waycott et al., 2017), conducting work with less privileged (Ramírez Galleguillos & Coşkun, 2020), ‘overlooked’ (Schorch et al., 2016), and potentially vulnerable (Vines et al., 2015, 2013) participants. HCI research, in consequence, involved designing for complex and sensitive human experiences such as life transitions, gender transition, stigmatizing and traumatizing experiences such as domestic abuse, and mental health challenges, among others (for an overview, see Chancellor et al., 2019; Foley et al., 2020; Herron et al., 2016; Waycott et al., 2017). Apart from the general challenges of sensitive research mentioned above, scholars argue for paying attention to the particularities of the HCI field, raising methodological and ethical questions. It is argued that an empathetic approach to design research must carefully consider how technology, despite best intent, might exacerbate existing vulnerabilities. To state an example, design in sensitive settings should consider tactfulness (D’Olivo et al., 2020) or privacy issues, be empowering, and pay attention to stakeholder conflicts (Waycott et al., 2017). Methods are also under scrutiny, as HCI researchers showed that their adaption to the contingencies of specific contexts could be rewarding (Crabtree et al., 2003; Schorch et al., 2017). Additionally, scholars advocated carefully considering what happens when researchers leave the field (Nunamaker Jr. et al., 2015; Stevens et al., 2018; N. Taylor et al., 2013).

To conclude, notions about value-driven research in sensitive settings lean towards participatory methods, including participants in the negotiation of the values addressed in the research project, requiring an empathic approach from the researcher and the establishment of trustful spaces. The previous elaborations of this chapter show that the question remains of how to translate the feminist, value-driven commitments into a pragmatic design space that addresses the sensitivity of the context. In the following, I will describe how Living Labs in the Socio-Informatics tradition offer considerable potential to conduct value-driven feminist HCI research.

2.4 Socio-Informatics, and Practice-Based Design

Socio-Informatics developed as a set of socio-technical orientations to computing-related research of the ‘Siegen School’ (Wulf et al., 2018b). It is characterized by its interdisciplinary nature and incorporates “a set of theoretical, conceptual, and empirical commitments” (Wulf et

al., 2018a, p. V) with a long and complex history. Concepts related to these commitments include a Practice-Based Design approach to HCI research (Kuutti & Bannon, 2014; Wulf et al., 2011), Grounded Design (Rohde et al., 2017), Design Case Studies (Wulf et al., 2011), and PRAXLABS (Ogonowski et al., 2018).

In short, as the term ‘practice-based’ implies, the engagement with technology-related *social practices* is at the core of the Socio-Informatics approach. A practice-based perspective denies positivist notions of social sciences and emphasizes the context-sensitive investigation of technology-related or supported social practices in real-life environments. ‘Practice,’ the argument is, “ought to provide a lens of a more inclusive character through which we can understand the complex, interwoven, and evolving interdependencies of purposes, rationalities, rules, procedures, technologies, and interactions” (Randall et al., 2018, p. 10). This view is influenced by sociological practice theories from scholars such as Bourdieu, Giddens, Garfinkel, and Latour (see Rohde et al., 2017; Stevens et al., 2018 for detailed discussions). Reckwitz’s (2002) understanding of practice as mainly routinized patterns of human action that are reproduced within specific contexts is relevant here. Following this view, practices are socially situated, historically grown (e.g., via upbringing), consist of mental and physical aspects, and are grounded in background knowledge of individuals. In this context, Schmidt’s (2018) critique of such a take on ‘practice theories’ is worth mentioning, based on the view that it ignores practice as normatively organized. From a gender perspective, this is important to consider: Cultural and social norms, among other factors, shape gender as a social construct (Manohar et al., 2017), and are often taken-for-granted in everyday life (Maguire, 2001), although they might be in conflict with egalitarian values (Light, 2011). As Martin (2003) shows in her organizational study, “normative enactments were made possible by the gender institution, and their reiteration of normative gender practices kept/keeps the gender institution going. They required no reflexivity” (P. Y. Martin, 2003, p. 347). She furthermore claims “that women and men routinely practice gender – as masculinities and femininities – in embodied interactions that are emergent and fluid, grounded in practical knowledge and skills, and informed by liminal awareness and reflexivity” (P. Y. Martin, 2003, p. 359). Some of these practices, with both women and men playing a role here, can be problematic from a feminist perspective, as they reproduce gendered systems, and thus the status quo. Ergo, the non-trivial task to break them up has to take their normative organization into account.

Given what has been said, a context-sensitive, practice-based approach to research in real-life environments holds considerable potential and can be instructive for investigating such issues. To explore the opportunities for Practice-Based Design, Grounded Design has been developed as a broad, conceptual orientation for this ‘turn to practices’ (Kuutti & Bannon, 2014). Grounded Design is an iterative, participatory and ethnography-based approach to design research (for discussion on ethnographical investigations of social practices in HCI research, see Dourish, 2006) that has strong bonds with notions such as Action Research (for Action Research in HCI, see Hayes, 2011) or Participatory Design (Ehn, 1993). Inspired by these notions, Grounded Design puts emphasis on designing for the users’ needs by involving them during the research process. Similar to Action Research, Grounded Design follows an iterative and self-referential cyclic approach (see below). As the design of IT artifacts needs to take the given social practices into account, understanding initial practices lays the ground for later design intervention. Apart from its general explicit focus on engaging with and designing for social practices, Grounded Design implies a particular focus on the appropriation phase and the emerging character of social practices initiated through its design inquiries. This is one of the reasons why Grounded Design emphasizes a long-term approach to design research, as “the addressed practices typically undergo changes while appropriating the artifact” (Stevens et al., 2018, p. 31). While my thesis aligns with the theoretical notions of Grounded Design, eventually expressed in a PRAXLABS approach to Living Labs (see chapters 2.5 and 3), I will use the term Practice-Based Design in the remainder of this thesis. The reason for this is my understanding of the term ‘design’ which I outline below.

Design Case Studies (Wulf et al., 2011; Wulf, Müller, et al., 2015) are then a central element in a Grounded Design research paradigm. They offer an orientation for conducting, documenting, and comparing individual research activities or insights. Design Case Studies happen with one case (e.g., one or two households or organizations) and can be defined as fine-grained documentations of evaluation and intervention, entailing three iteratively connected activities that, in part, build on each other: 1) A context or pre-study of given social practices in a specific application area. This offers detailed micro-level descriptions of existing social practices (in relation to technology and beyond). 2) Building on that, a (co-)design study that involves documentation of the design process and the created design. 3) A study of the appropriation of the ICT artifact and the accompanying changes in social practices over a longer period of time. The three stages of the cycle do not necessarily follow a chronological order in

research practice as with actual design practices being “reflective and iterative, these activities are treated as overlapping, interleaving, and recursive” (Stevens et al., 2018, p. 31).

Notably, the Design Case Study approach not only offers an orientation to the research practice but also for comparative research. Design Case Studies aim at transferability and concept building through later comparison via structured documentation and analysis. Collecting and comparing individual, contextualized accounts about practices in and through design thus allow to transfer of insights to similar contexts. This is a way to address the problem of generalization, one inherent to each (qualitative) research that is highly contextualized. Finding similarities between different Design Case Studies can, eventually, lead to the creation of bottom-up concepts that, at least, reveal patterns across different settings.

The above-mentioned concepts are still evolving and are not always adapted in a ‘complete manner’ in research practice. This means that their practical application requires a degree of flexibility and adaption, based upon the individual research situation, which leaves several implications or restrictions respectively: First, while long-term engagement in the field is stressed, it is not always realizable to conduct the whole cyclic approach. A reason for this might be research pragmatics, such as the limited lifetime of terminally funded research projects, although researchers are accountable for taking the sustainability of interventions into consideration (Nunamaker Jr. et al., 2015; Stevens et al., 2018; N. Taylor et al., 2013). These results, labeled ‘Partial Design Case Studies,’ are nonetheless of value, for instance, if an empirical pre-study has been conducted to explore the design opportunities in a specific context.

I note here, and it is critical to what follows, that such practice-based approaches are socio-technical in a profound sense. That is, they cannot be easily disentangled since practices are always contingent on material (technological) factors, and technologies only come into existence as technologies when used. It follows that there is no linear process such that one investigates practice independently of technology use and subsequently designs a technology without designing the practice. Indeed, this is fundamental to the notion of ‘material culture.’ In this thesis, the design of the practice is propaedeutic to considerations of the implications of technology. Practice-Based Design is instructive for investigating the nature of practices in socio-technical environments in general, e.g., computer clubs (Weibert et al., 2017). While Practice-Based Design research tended to focus on technical innovation in the past, there is obvious potential beyond that, as it also seems useful for ‘design’ that is not necessarily of technical nature. As feminist technoscientist Wendy Faulker (2001) argues, technology shapes

social life and vice versa, which is a position Socio-Informatics sympathizes with as well. Such a view is also in line with critiques of ‘technosolutionism’ (Baumer & Silberman, 2011; Light, 2011; Lindtner et al., 2016), which go against implying at the outset that technology will constitute the solution. At its core, design can be understood as *any innovative idea or measure for intervention in a social system*. Design, in a broader sense (e.g., experience sharing, case studies, learning opportunities, organizational measures), is purpose-driven, or functional respectively, aims at evoking social change, and has to pay attention to the necessities of the field that it investigates (Dombrowski et al., 2016). Schön (1983) conceptualizes design as a reflective practice, a position that non-positivist notions go hand-in-hand with. For the situation at hand, women’s experiences and involvement in IT organizations (where gendered technologies are the outcome of practices shaped by a masculine culture), it is the organizational processes and measures (Gherardi, 2019) that require a ‘re-design’ (e.g. Ely et al., 2011) by engaging with gendered practices. Such a broad understanding of the concept of design has been applied in a variety of disciplines, from, to name a few, industrial design, media design, architectural design, adversarial design, infrastructural design, design management to instructional design. Dunne & Raby (2013) propose a design notion to speculate about possible futures, regardless of whether design is understood from a technological, product, process, or other perspective. Thus, a general and broad understanding of *design* can be as beneficial as a purely technical one for Practice-Based Design – as long as the design intervention takes place in *socio-technical environments* (D’Ignazio et al., 2016). Design interventions of any kind – such as regarding tech design teams’ processes and policies – are hence relevant to the contribution they make to the practices of technology development and usage. For this reason, although no technology was designed in the context of this thesis, its research approach (chapter 3) is still deeply rooted within the ideas of Socio-Informatics nonetheless. It investigates issues that the field of Socio-Informatics is inherently concerned with, namely to “inform the work of programmers and others involved in technology-development processes” (Pipek et al., 2018, p. 543) by considering the “context-specific nature of design-relevant knowledge” (Randall et al., 2018, p. 2). In my case, it means evaluating the context-specific and gendered practices in IT organizations and designing for change measures. Despite this, I prefer to use the term ‘Practice-Based Design’ instead of ‘Grounded Design’ in this thesis to avoid confusion.

Over the years, Living Labs have been adopted as a pragmatic research infrastructure to apply practice-based research (Ogonowski et al., 2018). This alliance becomes apparent when taking a look at their characteristics. In the following, I will describe the Living Lab approach, PRAXLABS as a specific notion of Living Labs, and their potential for feminist HCI.

2.5 Living Labs, PRAXLABS, and their Potential for Feminist HCI

For more than a decade, Living Labs have been a research tool, but a precise definition still does not exist (Alavi et al., 2020), mainly because their proximity to real-life practice contexts varies (Ogonowski et al., 2018). Generally speaking, the literature treats Living Labs as an open and innovative research and development (R&D) methodology that is ‘human-centered’ and therefore focused on user-centered research methods (Eriksson & Kulkki, 2005). Researchers realize this approach in projects by bringing together multiple stakeholders from various fields, such as the public, academia, business, civil society, and citizens, who collaborate over a certain period on a specific goal (Corallo et al., 2013; Ogonowski et al., 2013). Methodologically flexible, Living Labs are usually associated with co-design approaches such as Participatory Action Research (PAR) (Kindon et al., 2008) and Participatory Design (PD) (Dell’Era & Landoni, 2014). However, Living Labs go a step further as they provide a broad stakeholder view. Thus, all involved parties receive a more comprehensive picture of the problem situation (Ogonowski et al., 2013), which in turn helps to trigger the process of co-creation of products and services. Living Lab research does not isolate findings. Instead, it fosters discussions and experience sharing through the formation of ‘value networks’ (Corallo et al., 2013; Ståhlbröst, 2013) such as ‘networks of excellence.’ Crucially, Living Labs usually provide a *setting* for such exchanges in the first place. As a result, they provide potential to share knowledge and experience (mutual learning) for a longer period. Furthermore, they offer participation in designing for change (technical or otherwise) (Almirall & Wareham, 2008). It is important to understand that Living Labs provide the grounds for such an exchange that do not otherwise exist. Hence, Living Labs are sometimes referred to as ‘Social Innovation Spaces’ (Edwards-Schachter et al., 2012) because they aim at promoting social justice and equality through assisting individuals in their liberation. To conclude, Living Labs provide a *holistic, broad, and human-centered co-design* perspective in *real-life environments*. Their commitment to *long-term, sustained, engagement* is a vital characteristic.

Over time, the PRAXLABS approach (Ogonowski et al., 2018) developed as a specific way to set up a Living Lab research agenda that matches the affordances of a practice-based agenda (figure 1). It is understood as a long-term-oriented infrastructure to engage with practices that allow trustful relationships and continuous cooperation between various (regional) stakeholders. Such an infrastructure allows accessing multi-contextual settings and offers an understanding of dynamic, socio-technical aspects. On a side note, PRAXLABS has a sustainable orientation for regional stakeholder interactions that might allow research collaborations beyond terminally funded projects. In addition, it provides opportunities knowledge and resource exchange. The PRAXLABS framework (see chapters 3.1, 5 and 11 for details), which encompasses four main ‘spaces,’ emerged out of experiences with different Living Lab projects and offers orientation to infrastructural, analytical, and methodological aspects of PRAXLABS work. Apart from practical guidance to research activities, it offers a more systematic approach to the abovementioned comparative research of different case studies as well as between different Living Labs and PRAXLABS projects.

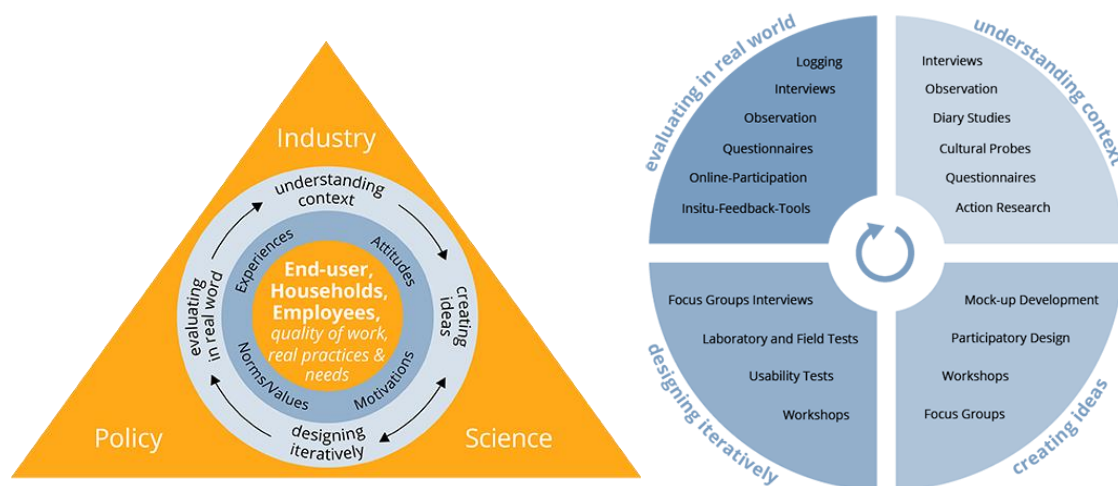


Figure 1. Left: Stakeholders and process in PRAXLABS. Right: Method toolbox (source: praxlabs.de)

Just as feminist theorizing implicitly occurs in engaged HCI in general, the same might be argued regarding Practice-Based Design, since both are implicitly critical of more rationalistic approaches. Though it has not been explicitly stated, Socio-Informatics (and PRAXLABS as research infrastructures) understands itself as “a set of critical convictions about mainstream computing” (Wulf et al., 2018a, p. 5). Practice-based approaches are, first and foremost, human-

centered and arguably emancipatory, fulfilling societal needs with an ambition to make “computer sciences more relevant with respect to societal problems in the real world” (Wulf et al., 2018a, p. 5). A quality criterion for design is its contribution to societally relevant problems. This perspective, in general, seems in line with the commitments of feminist HCI.

Furthermore, there seems to be a methodological fit with its criticism regarding positivist epistemology lacking practical validity. The political commitments of Participatory Design not only shaped Socio-Informatics from an ideological but also methodological perspective with its aim on ‘genuine participation.’ This is achieved via its approach to fieldwork via an ‘ethnographic turn’ (Randall, 2018) that aims at empirical accounts of human experience (S. Bardzell & Bardzell, 2011; Suchman, 2001). An emphasis on a ‘situated view’ (Suchman, 1987) of practices and taking the cultural context into account, which involves people with a multiplicity of identities, perspectives, experiences, and biases (Maguire, 1996), then neatly aligns to positions raised by feminist (science and technologies) researchers.

Living Labs in general and the PRAXLABS approach in particular thus seem to hold considerable potential for feminist HCI research. Said that, it is striking that the compendium of the Socio-Informatics approach (Wulf et al., 2018b) barely contains a mention of feminist theory. There seems to be a ‘feminist gap,’ and what a practice-based and, respectively, the PRAXLABS approach can offer for feminist HCI and vice versa is also still up for debate. Such research with more progressive and value-driven research agendas in sensitive contexts has proven to be successful in the past (e.g. Meurer, 2020; Müller et al., 2015b; Unbehau, 2020). Having said that, the “ambition to demonstrate that Living Labs are ‘human-centric’ has not yet been fully realized” (Ley et al., 2015, p. 22), especially from a marginal perspective, and methodological considerations in Living Labs are in constant development (Schoorman et al., 2015). Socio-Informatics is, without a doubt, value-driven. However, arguably, values require a more explicit articulation through design research in some contexts than others. As a result, we have to assume that women’s demands and the incorporation of feminist values into Living Labs have not been sufficiently addressed. Tackling gendered practices design work requires a comprehensive approach and a feminist perspective on the whole process (Bath, 2014). Equally, the character of a Living Lab that is explicitly designed to be feminist (see chapters 4 and 5 for detailed discussions) to engage with gendered practices will presumably be substantially different from other labs. Hence, there must go some design consideration into its setup.

Feminist standpoint theory, the dominant stance in feminist HCI (see chapter 2.2), privileges the knowledge of the marginalized and can shed light to different knowledges, skills, sets of power relations, and practical experiences of women. The Living Lab can then be the vehicle of this feminist standpoint epistemology and a practical means through which that knowledge is brought to bear by paying attention to those aspects that do not, and cannot, happen merely through the deployment of a method alone (e.g. Agozino, 1995; Campbell & Wasco, 2000; Frisby et al., 2009; Maguire, 1987). The argument is that a long-term, feminist Living Lab can provide a stable and trustful research environment that creates new opportunities to address stakeholder conflicts (Ogonowski et al., 2013) and power relations in safe spaces (DeVault & Ingraham, 1999; The Roestone Collective, 2014). With their integration of a broad and heterogeneous stakeholder base (Corallo et al., 2013), among other things, they have the potential to reveal unique insights (Almirall & Wareham, 2008; Schaffers et al., 2008) which otherwise would be ‘hidden.’ Thus, they provide a suitable infrastructure for engagement with gendered practices in real-life, socio-technical environments. We can further assume that, in such research infrastructures, participants are more likely to adopt a constructive mindset and find creative solutions by breaking down existing (gendered) attitudes and stereotypes (Higgins & Klein, 2011). In addition, Living Labs usually have a transformative agenda and try to evoke a particular type of social change within a system in iterative research cycles (Higgins & Klein, 2011; Schaffers et al., 2008; Ståhlbröst & Holst, 2017). Eventually, they provide a ground to co-design in accordance with women’s design decisions.

As Bruni & Gherardi (2001) state, to understand and change gendered practices in IT organizations, there is the need to

abandon essentializing modes of thought about gender and identity for a conception of them as cultural achievements located in material and semiotic practices. This shift entails the treatment of notions such as culture, organization, identity, gender and knowledge not as ‘substances’ but as ‘achievements’ performed in – and through – sociotechnical relations. (Bruni & Gherardi, 2001, p. 174)

To summarize, the general commitments of Living Lab research make the approach eminently suitable for an explicit engagement with strategies for understanding and improving women’s experiences in masculine work settings. The flexibility of PRAXLABS regarding matters of methodology also allows to fruitfully integrate ideas from feminist social sciences and feminist HCI to analyze and change gendered social practices in the IT field. As shown in chapter 2.1,

the efforts to establish a female-friendly IT culture and to sustain women as team members have not translated well into wide-ranging changes in practice. Grounding feminist HCI on the infrastructural level of a value-driven, socio-technical Living Lab initiative and actively engaging with the social practices in IT organizations from a practice-based perspective was thus the main approach of the project. In the following, I will explain the setup of our feminist Living Lab in the PRAXLAB tradition.

3 Research Design

On the one hand, as the term implies, Practice-Based Design engages with practices to explore design opportunities. On the other hand, feminist HCI is, among other things, concerned with investigating context-related gendered practices in computing-related fields. Both notions are, in turn, influenced by seminal work of feminist STS scholars such as Lucy Suchman and colleagues (2002a, 2002b, 2001; 1999). The argument here is that there can be a fruitful alliance between both perspectives to reveal unique insights into gendered practices in IT organizations and co-design change measures with (female) participants.

In order to address these aspects, a feminist Living Lab in the praxeological tradition of PRAXLABS was established with a long-term and women-centric ethic, which is concerned with emancipation and empowerment. As explained in chapter 2.1, gender is generally regarded as an unconscious practice, an often taken-for-granted social construct deeply rooted in people's life. A methodological approach that not only aims to analyze but also changes complex and 'stubborn' gendered practices in real-life IT working contexts has considerable potential. We unraveled gendered practices (based on women's experiences) from various perspectives by providing a Living Lab infrastructure, offering spaces to share them, and co-design change measures. Indeed, we understood employing a Living Lab approach as a strategic position to reach "a deep level of understanding and insights based on real-world experiences, and when a changed behavior is a desired outcome, a living lab approach is useful" (Ståhlbröst & Holst, 2017, p. 31).

The methodological framework of PRAXLABS as a specific variation of the Living Lab approach was thus an obvious fit with its emphasis on engaging with social practices in computing-related environments. As stated in chapter 2.5, PRAXLABS as an infrastructure supports long-term (and sustained) co-design research in real-life environments (Ogonowski et al., 2013, 2018) from a broad stakeholder perspective, building trustful relationships in the process. Through a cross-comparison of several projects in the Living Lab tradition, Ogonowski et al. (2018) developed the infrastructural, analytical, and methodological 'PRAXLABS framework,' which was "motivated by the need to structure experiences among a multiplicity of projects" (Ogonowski et al., 2018, p. 355). The framework consists of four spaces:

1. The user (or stakeholder) space involves a network of contacts, such as individual participants, organizations etc. that form the stakeholder pool of the lab. Activities in this space encompass two main tasks: acquiring and selecting participants.

2. The creative space offers a ground for stakeholder interactions, especially more creative co-design activities.
3. The methodology space covers the ‘method toolbox’ that is used for each iterative phase.
4. The management space mainly deals with coordinating stakeholders and other project-related duties. This includes matters of organization (e.g., legal aspects), communication with stakeholders, or the management of trade-offs regarding different expectations.

As stated, a feminist Living Lab is informed by commitments of feminist HCI that need to be translated into research pragmatics. Living Labs embody flexibility in terms of ideology, methodology, and desired outcomes. Again, a feminist epistemology is the driving force, and Living Labs are the vehicle for these ambitions. Regarding the ‘infrastructural design’ of a feminist Living Lab, this, e.g., means putting the otherwise marginalized into the center of research, ensuring that their voices and perspectives are heard, managing conflicts of interest, and foregrounding the moral interests of researchers and participants. Put differently, the setup and maintenance of the lab required decisions and research activities that were explicitly feminist, informed by the epistemological and methodological considerations of feminist HCI.

3.1 Research Setting and Activities

The concrete infrastructural (setup as well as activities in different contexts) and analytical Living Lab work, which was guided by the four different spaces of the PRAXLABS framework, is central to the papers that form the middle part of this thesis. Therefore, I will only summarize the research context in the following by giving a more general overview of the setting and the research activities.

This thesis covers the whole lifetime of the gender and IT project (2017-2019), from the initial setup phase of the Living Lab infrastructure to its maintenance throughout the project. The project was a joint initiative consisting of two universities and a non-profit organization located in Germany. The shared and overarching goals of all stakeholders were to strengthen the role of young female professionals in IT organizations by understanding gendered practices in the IT industry and design teams, respectively, as well as the co-design of policy initiatives. Working towards establishing a female-friendly IT culture, the attractiveness of IT workplaces

for women should, in principle, be increased. This requires addressing gendered practices that women are confronted with at all stages of their career progression within the company (see chapter 7): 1) Becoming aware of the company (and industry) in the first place, 2) the process of onboarding and getting familiar with the corporate culture, 3) putting the existing skills to use during daily work and dealing with workplace satisfaction and maintenance, and 4) career development, leadership, and promotion. In the context of this research, a young female professional is to be understood inclusively: She is someone who has career ambitions, is highly educated, professionally competent, and sees herself as being on a career path in an IT context. Our activities aimed to receive a variety of perspectives via a ‘broad view’ from different stakeholders and provide a ‘safe space’ for exchange. We wanted to gain insights into women’s experiences in IT-related real-life environments, learn about different *modus operandi* in organizations, and establish a network of excellence that allows interested parties to collaborate over time. The group of relevant stakeholders (figure 2) was thus broadly diversified, consisting of company representatives, (female) students, and trainees from IT-related areas and researchers (including us).

Despite a women-centric stance, and although we wanted to work from and for ‘the margins,’ we rejected a misandric perspective and deliberately decided to work with female *and* male stakeholders alike. As Harding (e.g. 1992a) argues, a feminist standpoint can involve studying men. Including men’s perspectives, apart from my contribution, was important to us for several reasons: 1) to receive a ‘broader picture’ of the problem situation from men who were both sympathetic and less sympathetic regarding our endeavor. 2) to make our activities transparent within the organizations, this way also evoking more sympathy for our activities from a potentially more critical audience as well as reaching a greater awareness for our topics amongst a diverse group of employees (see chapters 9 and 11). 3) Participation in the project confronted men with critical topics regarding the gendered nature of their life in general and workplaces in particular. This potentially allowed them to understand themselves as gendered beings and liberate themselves from gendered restrictions and gender role expectations by adopting a more critical mindset (Digby, 1998; Hearn, 1998; Maguire, 2001).

The project understood gender as not being anchored in binary gender schemes and as socially constructed, or ‘performed’ respectively, via continuous repetitions (Butler, 1993). We were much aware of the different notions of intersectionality, queer theory etc. (see chapter 2.2). However, apart from rare exceptions, we lacked a level of participation from different

intersectional interests. Because of that (and the gender imbalance in IT at the practical level, which we strived to improve), the focus of this work was mainly, perforce, on the gender binary.

A vital part of the user space was represented by six organizations with whom we collaborated closely via extensive fieldwork. These organizations represent a mix of small and medium-sized (SME) and larger enterprises from different locations across the region of North Rhine-Westphalia. (table 1): 1) A smaller nano optic and sensor technology company, 2) a video game company, 3) a service provider for IT services for local governments, 4) a large, international manufacturer and service provider of vehicle registration marks, 5) a local fabrication lab (FabLab) and, 6) a scientific data management department. The two latter are located at our local university.

To emphasize the participatory side of our endeavor and make clear from the beginning that we wanted to meet the real-life concerns, we encouraged our partners to define their gender-related research questions at initial meetings (table 1). These research topics were not intended to be exclusive foci but rather specific areas of interest, as knowledge exchange between the organizations was intended. In addition, as the middle part of this thesis will show, we shed light on ‘blind spots’ we had identified through our fieldwork in the first place. Organization B originally proclaimed a different research interest (gender-sensitive design of an IT device), but these ambitions were halted when the company faced patent issues with its current design project. Thus, the decision was made to change the topic to ‘gender and organizational culture.’

Table 1. Participating organizations

Organization	Sector	Research topic
A	Gaming	Gender and talent development
B	Nano optic and sensor technology	Gender and organizational culture
C	IT services for local government	Gender and organizational culture
D	Manufacturing of vehicle registration marks	Gender and organizational culture
E	Scientific FabLab	Gender and making
F	Scientific IT, media, and data management center	Stereotypical distribution of roles

Within the organizations, we worked with a diverse mix of employees regarding gender, occupation, position, and duration in the enterprise. To broadly diversify the remaining user space and receive different viewpoints, we added eleven mixed-gender HCI and business informatics students from our local university to the stakeholder pool. This way, we were able to receive the perspectives of young professionals regarding their expectations around future employment via interviews. This data, then, was cross-referenced with findings from the organizations.

To offer additional stakeholders who share similar feminist ambitions a ground for exchange (creative space), we organized five symposia across Germany (Berlin, Heilbronn, Hamburg, Munich, Cologne) as physical events where ideas can be shared, and solutions developed collaboratively. There, we disseminated insights from the fieldwork and offered stakeholders a place for exchange. Concretely, we used insights from the organizations as a hook for discussions and to conduct workshops to co-design gender-sensitive organizational measures (see below). Each symposium hosted 50 to 80 attendees. The results from the symposia were made public on a designated project website. In collaboration with organization E, the FabLab, we organized three maker workshops during the summer of 2018 that aimed to inclusivity of female makers (see chapter 6).

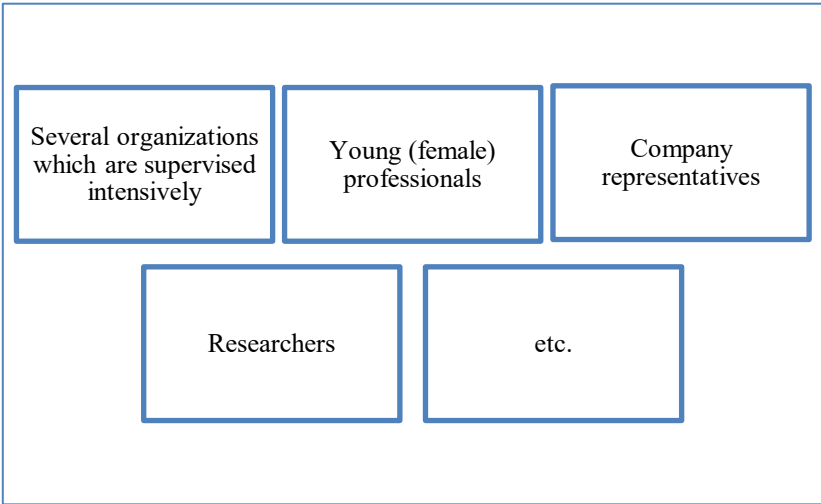


Figure 2. Stakeholders of the feminist Living Lab

Biannual meetings with a steering committee, which consisted of a network of additional company representatives and gender researchers, accompanied the project. Aside from our

regular internal meetings, conversations with the committee allowed continuous reflection to avoid bias regarding our progress, our roles as Lab organizers, and the methodology we applied (see also chapter 3.2).

Our ethnographic approach to the fieldwork was guided by feminist ambitions of giving marginalized groups a voice. As Dourish (2006) argues, an ethnographic stance in the field of HCI can not only unravel the practices of individuals but also explore the mechanisms which shape and reproduce these (often taken-for-granted) practices in a social system. An ethnographic study with a feminist stance has the potential to make gendered practices in organizational spaces (Bruni & Gherardi, 2001; Kelan, 2007; P. Y. Martin, 2003; Tyler & Cohen, 2010) and design work (e.g. Cassell, 2003) salient. Our inquiry was especially informed by notions of feminist Participatory Action Research (FPAR) (Maguire, 2001) and 'institutional ethnography' (D. E. Smith, 2005). In short (see the middle part for a detailed discussion on feminist approaches to fieldwork, the methods used and my experiences of their deployment in different settings), these notions propose to shed light (with a transformative stance) on the taken-for-granted gendered social practices and the daily experiences of women. They served as a means to translate an otherwise abstract feminist epistemology into an iterative and cyclic research approach.

Regarding data collection and analysis, we leaned heavily towards a mix of qualitative methods to reflect our participants' experiences (e.g. Campbell & Wasco, 2000; Oakley, 1981, 2016; Webb, 1993). We aimed at achieving a rich understanding of the field through a combination of interviews, observational work, and focus groups. A focus on gendered practices informed the interview guides. The interview guide encompassed questions *inter alia* aiming at our participants' childhood and adolescence, education, and entrance to the field, previous and current experiences in business life, perceptions of corporate cultures and career opportunities, etc. Using observations allows to unravel the doing of gender dynamics in everyday situations (Berger et al., 2015). To validate our findings and provide the participants with a sense of belonging and empowerment by allowing them to speak up (Farquhar & Das, 1999), we usually conducted focus groups after this initial phase.

In line with the approaches described in chapter 2, our data collection and analysis process followed a cyclic process: A pre-study aimed at understanding gendered practices within the organizations and identifying hooks for discussions about change mechanisms. This laid the ground for design activities, usually conducted at the symposia workshops (or, to a lesser

degree, at the focus groups). These design activities, e.g., encompassed the design of gender-sensitive external communication measures, onboarding processes, or other organizational processes (see chapters 6, 8, 9, and 11).

Overall, we collected an array of data, including transcripts from more than 50 interviews, field notes from observations and several focus groups, notes about informal talks, and documented workshop results. The qualitative data were analyzed using thematic analysis (Braun & Clarke, 2006).

The following figure quickly summarizes the research activities. For this purpose, I draw on the four dimensions of the PRAXLABS framework.





 <p style="text-align: center;">User Space</p> <ul style="list-style-type: none"> • Six organizations • 11 gender mixed HCI/business informatics students • Symposia attendees (young professionals, company representatives etc.) • Researchers 	<p style="text-align: center;">Creative Space</p>  <ul style="list-style-type: none"> • Five symposia across Germany • (Design) Workshops • Online resources
 <p style="text-align: center;">Methodology Space</p> <ul style="list-style-type: none"> • FPAR, Institutional ethnography • ~ 50 interviews (mix regarding gender, occupation, duration in organization and position) • Observations (shadowing) • Focus groups 	<p style="text-align: center;">Management Space</p>  <ul style="list-style-type: none"> • Coordination of stakeholder interactions • Legal aspects • Public relations for symposia

Figure 3. Setup of the lab

3.2 Positionality

I am convinced that my value-driven, qualitative, feminist research requires a reflexive component and a declaration or self-disclosure of my position, including my role in the field as well as my perspective on knowledge production (e.g. S. Bardzell, 2010; Borning & Muller, 2012; Darwin Holmes, 2020; Manohar et al., 2017; Oakley, 1981, 2016; Stolterman & Fors, 2008; Webb, 1993). Turning towards a position on research influenced by critical theory, I recognize that ‘knowledge’ is not ‘pure fact’ (Campbell & Wasco, 2000). Instead, social factors,

including gender, can shape how we construct our visions of the world. Hence, I follow the perspective of Harding (1992b), who argues that recognition of the gendered nature of reality confers a higher standard of objectivity in research than so-called value-neutral research. In this sense, the process of knowledge creation is situated (Haraway, 1988) and influenced by the social context the research takes place in, including the assumptions, background knowledge, values etc., of researchers (and participants).

Identifying as a white, cisgender, heterosexual, and pro-feminist man, I acknowledge that I might be privileged because of the statuses granted to men in a patriarchal society and that many research initiatives still tend to have an androcentric bias (as described in chapter 2). With my research, I want to help break up masculine structures in the IT field, adding my part to a more equal and fair society. Early notions of feminist research denied men an entry to feminist truths and the possibility of contributing to feminist research (for a discussion, see e.g. Campbell & Wasco, 2000; Liddle, 1996; Manohar et al., 2017; Webb, 1993). However, such argumentations became increasingly contested as being essentialist in their own way (Jayaratne & Stewart, 1991). For this reason, in line with several female and male feminist researchers (Agozino, 1995; Bird, 2019; Cain, 1986; Campbell & Wasco, 2000; Digby, 1998; Harding, 1992a; Hearn, 1998; Jardine & Smith, 2013; Levinson, 1998; Stacey, 1998), I argue that ideology and not biology determines the outcome of research. In this vein, a feminist standpoint is, in principle, not barred from men (Liddle, 1996). For this reason, “although it is true that men cannot experience women’s problems and concerns in the same way as women, it does not restrict men to make a contribution to feminist research” (Manohar et al., 2017, p. 5). Agozino (1995) argues that while sympathy, empathy, and rapport are vital requirements concerning a feminist research approach, a general commitment to ending sexism, racism, and class exploitation is arguably the most essential prerequisite.

Qualitative, ethnographic researchers frequently regard themselves as ‘insiders’ or ‘outsiders’ in relation to their research settings and the groups they are studying practice (Hammersley & Atkinson, 2019; Weiner-Levy & Abu Rabia Queder, 2012). The insider-outsider dichotomy has been criticized as a constant shift of researchers between ‘spaces’ instead of fixed boundaries is arguably the case in research practice (Darwin Holmes, 2020; Manohar et al., 2017). However, it might still be helpful to explain my role as a man conducting feminist research: I generally considered myself a curious outsider to the ‘lived familiarity’ to female experiences (in IT organizations). The argument given by Safdar & Yasmin (2020, p. 4) helps to frame my

perspective: A male researcher has “to be more reflective and empathetic to understand the women participants’ sensibilities; however, this sexual opposition of the author enables him to be more interested and curious to explore the experiences of the women.” As my thesis will hopefully show, I am confident that I was able to establish trustful relations over time with female participants and address their perspectives thoroughly (for similar experiences of male researchers conducting feminist research, see e.g. Bird, 2019; Bruni & Gherardi, 2001). This way, I was possibly also making modest steps towards becoming an insider to their unique experiences. The central goal of an ethnographer is to obtain an insider’s or ‘native’s’ point of view via immersing in the field. At one point in time, ethnographers are able to understand and explicate the reasoning of the people they are working with. In the case of a male researcher, he is an outsider as a man but becomes, over time, an insider to women’s experiences (Gurung, 2020).

I was always keen to communicate this kind of positionality to the research participants, trying to reduce potential power gaps in the researcher-participant relationship. While my research was politically engaged, I aimed at being mindful of the view that an activist stance “seems to privilege the social values of the designer” (S. Bardzell, 2010, p. 1304). Still, I recognized that I had to take certain sides (Becker, 1967) and embrace the ‘underdog perspective.’ This, for instance, meant engaging in discussions about gender-sensitive language with male participants or deciding to shift our resources to more committed stakeholders (see chapter 11 for detailed reports).

The impact of my intervention as a male researcher when conducting gender opposite research can only be speculative, but it is helpful to be at least reflective about it. As others have described (Bird, 2019; Levinson, 1998; Manohar et al., 2017), there can be opportunities (e.g., female participants potentially appreciating the ambitions of male researchers) and challenges (e.g., regarding topics of body experiences or sexuality) to gender opposite research, especially regarding sensitive topics. Also, the potential impact of social desirability bias, e.g., interview partners not wanting to be perceived as sexist with their interview statements (C. L. Williams & Heikes, 1993), has to remain hypothetical to a degree. Furthermore, I accept that there have been occasions when I engaged with men and women differently, despite my efforts to be as neutral as possible (sometimes, also because of what seemed to me ‘for the sake of the project,’ see chapter 11 for examples). Nonetheless, I tried to stay reflexive about these issues (see Levinson, 1998 for a similar case). With research projects usually being conducted with project

partners and within teams, the exchange with a mixed-gender group of critical colleagues (B. Smith & McGannon, 2018) in the form of regular formal team/project meetings (Weibert et al., 2017) and informal exchanges was also beneficial to reflect on the fieldwork, analysis of the data, and writing processes. The steering committee meetings were another instrument for regular reflection and input from gender experts. Adopting a triangulation strategy (Webb, 1993; C. L. Williams & Heikes, 1993) to foster different researcher perspectives during the fieldwork and beyond, we conducted interviews, focus groups, and observations in mixed-gender teams whenever possible. Sharing my findings and analysis with mixed-gender colleagues who have provided a source of potential critique helped in identifying if I have inadvertently fallen into gendered assumptions. Said that, internal discussions often revealed that the impressions and the openness that I received did not significantly differ from my female colleagues.

It is important to note that positionality is not fixed and that a reflexive approach is transformative, as researchers learn throughout their studies and should adapt their own assumptions as well as their processes. Indeed, the possibility of a transformative process is also inherent in the PRAXLABS philosophy. My critical and pro-feminist stance increasingly developed with time, the more I was challenged by engaging with critical literature and through the long-term fieldwork. Hence, I regarded my sensitization for the matter as a process, as I continually developed my gender expertise (Attia & Edge, 2017) – and will continue to do so in the future. I had similar experiences to those of Bird (2019, p. 67) in terms that my research activities “forced me to confront my own memories and desires about home, family and agency and of how those are gendered and become embodied within everyday acts. (...) In this way the research was emancipatory for me as well as for the participants.”

Part II: Selected Findings

This part presents accepted manuscripts and a version of a journal paper under review. Chapters 4 and 5 provide detailed considerations of how epistemological and methodological orientations of feminist HCI can inform a feminist Living Lab. Chapter 4 describes these considerations not only regarding the GEWINN but also the nett.werkzeug project that took place in the context of migrants and refugees. Chapter 5 then gives a detailed description of the initial setup of the feminist Living Lab during the first months of the GEWINN project.

Chapter 6 describes insights from three maker workshops established and investigated with a gender lens in collaboration with the FabLab Siegen, identifying themes that were consequential for gender-inclusiveness. These themes can serve as analytical hooks to design environments in a gender-sensitive way.

Chapters 7 to 9 present case studies from the collaboration with a video game company, an engaged stakeholder from a corporate context. Chapter 7 presents insights that can be understood as a pre-study. Based upon extensive fieldwork, it describes the everyday working experiences of the participating women in an industry dominated by masculinity. Following the pre-study, chapter 8 zooms into a concrete problem area, namely employer branding initiatives to foster gender diversity in IT organizations. Partially based upon co-design activities, it describes implications for designing external communication measures to attract more female personnel. Chapter 9 then provides descriptions of the longer-term collaboration with this company. It lays out the substantial benefits that arose for the organization and the involved people through our collaboration as well as the challenges that we faced.

Chapter 10 presents an analysis framework to inform thinking about gender processes in agile software development. This framework mainly emerged from discussions with stakeholders and can help IT organizations to surface gender issues.

Finally, Chapter 11, making use of the PRAXLABS framework, provides retrospective cross-comparisons of my experiences with another Living Lab from a sensitive context. The complementary analysis of the two projects shows how the contextuality of values shaped research collaborations and how initial commitments to values translated over time.

4 Gender Factors and Feminist Values in Living Labs

4.1 Introduction: Utopia in Tech Design

“Most women fight wars on two fronts, one for whatever the putative topic is and one simply for the right to speak, to have ideas, to be acknowledged to be in possession of facts and truths, to have value, to be a human being” (Solnit, 2014).

In this paper, we describe the feminist perspectives that have informed design in the HCI community, and develop an argument for an approach that translates these broad commitments into a pragmatic design space, drawing on emancipatory agendas such as Participatory Design (see Wagner, 2018). As designers of technologies, we regard creating research infrastructures that offer safe spaces for the development of user-centered artifacts based on diverse and critical perspectives as not only a utopian vision, but as a practical contribution to a more equal society. Shaowen Bardzell (2014) stresses this point when she states that in envisioning utopias, we are “seeking not so much to predict the future, but rather to imagine a radically better one” (S. Bardzell, 2014, p. 189). Recognizing that technology shapes social life (W. Faulkner, 2001) and amplifies social practices both good and bad (Toyama, 2015), research in the field of Human-Computer Interaction (HCI) increasingly focuses on how technology has been developed in the past, and how constructive futures may be envisaged. More and more, academics are inviting multidisciplinary and embracing ethnographic methods as part of the design of networks and technical artifacts, realizing that innovation cannot be user-centered if designers employ a bird’s-eye perspective (Wulf et al., 2018b, 2011; Wulf, Müller, et al., 2015). This leads to an approach that advocates designing socially embedded technologies in real world environments (Wulf, Schmidt, et al., 2015). Thus, for some time now, collaboration and Participatory Design approaches have provided a means for enacting positive social and technological change. If we agree that “those who design technologies are (...) designing society” (W. Faulkner, 2001, p. 82), new questions arise in terms of responsibility for the future shape of the world (Haldrup et al., 2015): How do we design technologies to design a better society for people of all genders?

Opening up space for communication does not – on its own – mean understanding other people’s needs and values. Characteristics like self-reflection and empathy are regarded as equally important for technology design as intelligence and innovativeness (Ahmadi et al., 2018). They all are prerequisites for designing truly user-centered technologies (Fogelberg

Eriksson, 2014; Herring, 2009). Once we gain the ability to understand and empathize, a bigger picture opens up. Participation in long-term collaborative formats helps us to not only gain deeper insights into the lives of others but also to participate in real social contexts in all of the rich and changing nature of human experience. From inside this trustful space where participants meet, findings can empower academics and their so-called ‘subjects’ through (digital) design processes (Ahmadi et al., 2018). This makes every research approach based on participation and openness more than just a method: It is a practical tool to defoliate multi-layered perspectives, bringing them to the fore, creating awareness of what it means to do user-centered design, and creating possibility like skipping stones create waves in water.

As “social movements embody activism by group action – a collective aspiration to maintain or change the existing situation” (Fuad-Luke, 2009, p. 26), researchers in the context of a design philosophy that includes user participation can be understood as activists (Haldrup et al., 2015). This is especially true for research in feminist technology design. Embedded in a world that is based on separation and has taught us difference, which we have then internalized and embodied, letting go of these socialized belief systems is difficult. To put it in Tony Fry’s (2012) words: “Making a futural world within ‘the world’ (...) is without doubt the greatest challenge to imagination that humanity has yet to face” (Fry, 2012, pp. 147–148). The solutions we pursue here to create the framework described above are based on the Living Lab approach as we think it is a first step towards giving a design voice to otherwise marginalized design subjects. With this book chapter we would like to share our experiences of setting up our perspective of a Living Lab in the Gender and IT context and contribute to the array of feminist methods for technology design.

4.2 Problematic Scripts

Marginalization and exclusion processes in relation to technology usage, access or development can be considered to be the result of social ‘scripts’ (Wiederman, 2005). Scripts are prescribed and anticipated behaviors, actions and consequences in a social system. In a gender context, scripts e.g. reinforce androcentric as well as patriarchic structures and thus cause social actors to follow specific ‘gender roles’ (Lindsey, 2015). To state an example, STEM (Science, Technology, Engineering and Math) fields are commonly perceived as overtly masculine constructions (Cheryan et al., 2015) leading to barriers to female participation because of hostile environments, pay gaps, a lack of mentorship or role models and more (e.g. Blackwell et al.,

2009; Gregory, 2003; Von Hellens et al., 2001). This has been noted as one reason for the low participation rate of women in IT workspaces, limiting their potential as well as their career opportunities (Holtzblatt & Marsden, 2018).

It seems natural that social scripts then influence scripts embedded into technology ('technological scripts') (Akrich, 1992, 1995) leading to decreased user experiences or even exclusion. Since the 1970s a considerable amount of feminist literature, especially in the field of Science and Technology Studies (STS), confronts masculine engineering encounters and shows the gendered nature of (particularly domestic) technology (e.g. Cockburn, 1983, 1997; Cockburn & Ormrod, 1993; Wajcman, 1991, 2009). More concretely, previous studies showed the results of problematic gender scripts (Oudshoorn et al., 2004; E. W. M. Rommes, 2002) or, important from an intersectional lens, discriminatory ethnicity scripts embedded into technology (Hankerson et al., 2016). Ellen van Oost (2003) showed how electric shavers from the Philips company were biased in terms of their design when the corporation started producing for a female target group in the 1950s. In her latest book, Caroline Criado Perez (2019) provides us with further practical examples of attitudes, behaviors and needs of women largely being ignored in design. This is manifested, for instance, in the design of the stove, the limits of speech recognition systems (see also Churchill, 2010), the 'chronic gaps' in medical data with respect to women's illnesses, the design of the motor car (it seems that women are 47% more likely to be seriously injured in a motor accident, largely as a consequence of the positioning of foot pedals), the breast pump, fitness monitors, VR headsets (see also Gäckle et al., 2018), mobile phone screen size, and so on. So, what is going wrong during the design process? Mostly, design teams are comprised predominantly of young, white, educated men – the 'sea of dudes' (J. Clark, 2016), as Margaret Mitchell terms them. This means that design decisions are often based upon 'dude' assumptions or tastes, a technique called 'I-methodology.' Technology scripts hence display designers' visions of the world (Bath, 2014) which are then inscribed into the technology (Akrich, 1992, 1995). Our point is that many of these ideas, assumptions and values represent a largely unreflective male positionality, based on user representations which substantially ignore women. There is, of course, no reason why this *must* be so (see for examples of an explicitly feminist design, D'Ignazio et al., 2016; Dimond, 2012; Fiesler et al., 2016), but the evidence attested to above demonstrates that it is so in large part. Indeed, in the context of software design, its gendered aspects are manifest (Aaltojärvi, 2012; Oudshoorn et al., 2004; E. W. M. Rommes, 2002). It is also important to consider that such design

assumptions are rarely a product of ‘malicious intent.’ The mindsets and perceptions of developers inevitably influence design decisions and technology can never be neutral (Bratteteig, 2002; Marsden & Haag, 2016). We are all susceptible to implicit and unconscious bias and all lack a degree of awareness (Greenwald & Krieger, 2006), which is especially true in terms of gender (Eagly & Mladinic, 1989; Eccles et al., 1990) with gender being either an explicit or implicit element when developing technology (van Oost, 2003). This makes it all the more challenging to think about how we can work against such mechanisms. When technology (and hence its creation process) is considered to be a social construction (Bijker et al., 1987), this means that we are able to ‘rewrite’ scripts. Tackling gender issues in design is possible but it needs a comprehensive approach and a feminist perspective on the whole process as Corinna Bath (2014, p. 58) points out:

(...) A deeper understanding of the mechanisms that are at work when technology artefacts are gendered, however, is a crucial prerequisite for making suggestions for an alternative design that might be called feminist. In order to be able to change the design of artefacts and apply more appropriate design methods, designers of technologies need to know in which sense their artefacts might be problematic.

What such an *alternative, feminist design* might look like and how its production process has to evolve remains however a question to debate. Research has shown that designing for specific target groups as well as “for everyone” (Oudshoorn et al., 2004) can result in problematic gender scripts because of stereotypic and thus problematic anticipation of users’ needs and behaviors. Integrating gender aspects by taking into account diverse users might be a step forward and leads us to collaborative methods like ‘Participatory Design’¹ (PD) (Ehn, 1993) or frameworks building upon this tradition like ‘Grounded Design’ (Rohde et al., 2017). Scholars such as Tone Bratteteig (2002, p. 103) advocate a PD approach claiming that “the design process itself would benefit from having different sets of experiences as bases for ideas and visions, which is a reason for advocating participatory design.” One might however argue that such a view is still not sufficient to create substantial changes as associated issues take place in a cultural context which involves people with a multiplicity of identities, perspectives,

¹ In Participatory Design (PD), participants such as potential, future users are involved in the innovation design process together with designers, researchers etc. It has a strong moral and political (democratic) stance, as the cooperative tasks aim not only at user friendly design but also at including (marginalized) users in all design decisions as a matter of emancipation (Wagner, 2018).

experiences and biases (Maguire, 1996). We propose Living Labs as a way to tackle the above-mentioned issues in design (Ahmadi et al., 2018). Living Labs, where technologies for women can be introduced, tested and modified in accordance with women's design decisions, seem an obvious candidate for rectifying staggering biases and understanding complex problem situations. This seems like an adequate fit as “the active involvement of practitioners and researchers in complex live settings characterized as networks is not yet well understood; Living Labs attempt to address this” (Higgins & Klein, 2011). In the following we will explain why we believe that a Living Lab offers an adequate research infrastructure to pay attention to feminist values and rewrite social as well as technological scripts. To make our descriptions more vivid, we will later describe lessons learned from the establishment of two Living Lab projects. Firstly, though, we will describe Living Labs in more detail.

4.3 Living Lab Approach: Now and Then

Living Labs (for a detailed overview see Ahmadi et al., 2018; Ogonowski et al., 2018) provide a holistic approach to the creation of ICT artifacts by entailing a long-term co-design philosophy. Because of the cooperation with diverse stakeholders they offer researchers as well as participants a broad view on a problem situation (Ogonowski et al., 2013). Since their emergence, Living Labs' main ambition has been the creation of social change linked with a strong focus on collaboration with research participants; as they aspire to reach “a deep level of understanding and insights based on real-world experiences, and when a changed behavior is a desired outcome, a Living Lab approach is useful” (Ståhlbröst & Holst, 2017, p. 31). Despite Living Lab research is tending to focus on technical innovation, we argued (Ahmadi et al., 2018) that a Living Lab infrastructure can be used to foster any kind of innovation in a social system (such as innovative formats in organizations etc.). The creation, introduction and exploration of *innovative ideas* is as important as the introduction and testing of technologies. Regardless, technology introduction into a field is not understood as ‘l’art pour l’art’ (as we will lay out in the next chapter) but as a matter of recognizing how social and technological (sociotechnical) aspects go hand in hand. The definition of a Living Lab as “a design research methodology aimed at co-creating innovation through the involvement of aware users in a real-life setting” (Dell’Era & Landoni, 2014, p. 139) underlies this view.

Although methodologically flexible in principle, Living Labs are usually closely connected to methods emphasizing collaboration, such as (Participatory) Action Research (AR respectively

PAR), User Centered Design and Participatory Design (Dell’Era & Landoni, 2014). The principles of Action Research as introduced by Kurt Lewin (1946), who challenged traditional social science, advocating a more activist, transformative stance, have been an important influence to Living Labs’ ideologies: With Action Research, researchers strive to understand complex situations, peoples’ varying perspectives and to solve immediate, real world problem situations. For this reason, it is regarded as a valuable method if some sort of change is the desired outcome for a community (Creswell et al., 2007; Rapoport, 1970). Especially with Participatory Action Research (PAR), which highlights the collaborative side of Action Research (Whyte, 1991), researchers and participants develop solutions together and test interventions in iterative cycles (Susman & Evered, 1978).

The potential of Living Labs lies in their infrastructures which support mutual learning among several stakeholders by building a ‘network of excellence’ (Ståhlbröst, 2013). This is what brings added value to the common PAR process: Living Labs have been characterized as ‘Social Innovation Spaces’ (Edwards-Schachter et al., 2012), fostering participative processes, citizens’ empowerment, stakeholder interests and being a good instrument to identify people’s needs to improve quality of life. Living Lab research does not isolate findings as participants receive access to value networks as well as knowledge and parties can share and discuss experiences in a ‘safe place’ (the latter, as we will show later in detail, is especially important in sensitive research settings). Having elaborated that, a natural fit in terms of the possibilities that Living Labs offer for feminist research appear plausible: There already exists a strong connection between feminism and PAR as both aim for social justice and equality, sharing an humanistic, democratic, and emancipatory understanding (Creswell et al., 2007). Indeed, PAR paradigms have been used in feminist and gender studies work before (e.g. Gatenby & Humphries, 2000; J. Williams & Lykes, 2003). However, one should not assume that Living Labs are *per se* feminist. Rather we argue that they have to be ‘designed’ or set up so as to develop “... those tools plus enhance women’s ability to develop, expand, and express their capabilities” (Layne et al., 2010, p. 3). This becomes clearer when tracing back the history of Living Labs and taking a look at their predecessors as well (for a detailed overview see Ballon & Schuurman, 2015): At the beginning of the century, the term “Living Lab” was framed by William Mitchell at the MIT Media Lab as an instrument to study user interaction with new IT artifacts in real life environments over a longer period of time (Eriksson & Kulkki, 2005). User involvement can take a variety of forms (Almirall et al., 2012) and the main ideas are commonly assumed to date

way back to the 1970s. Topics of such predecessors included cooperative design (70's), social experiments (80's), digital cities (90's) and home labs (00's) (Ballon & Schuurman, 2015). Concepts such as the Scandinavian tradition of user involvement in IT design processes (Ehn, 1993) or appropriation of technologies (Silverstone, 1993) were important inspirations but undoubtedly the works by Eric von Hippel (1976; 1986) mainly influenced ideas of user-co-production and hence Living Lab research in particular. Von Hippel popularized the notion that the 'needs' of users should be placed at the center of the innovation process by focusing on user-centered product design created in a quasi-naturalistic (controlled) environment. The thought of an 'user innovation' where 'lead users' increasingly innovate for themselves might seemed to have a democratic appeal at first sight. Nonetheless, von Hippel focused on *commercially* successful or unsuccessful industrial innovation projects and the title of his 1986 publication called "Lead Users: A Source of Novel Product Concepts" already displays an underlying (arguably back then prevailing) understanding which regards the user as exactly that – a *source* for receiving innovative ideas. Far from wanting to discredit von Hippel for his groundbreaking and important work it is important to acknowledge that his ideas were influenced by a marketing management research environment in which feminist reflections were scarcely a topic at the time. Indeed, research into technological innovation by and for women is notable for its scarcity (for rare exceptions, see Graham, 1999; Hayden, 1978, 1982). Only with the start of the 1990s (for an overview, see Catterall et al., 1997), the dominant ideology in marketing and consumer research then has been criticized by feminist scholars such as Hirschman (1993) as being overly masculinist and using an "overarching machine metaphor, rooted in the notion of homo economicus, that privileged the mind and cognition (assumed male) over the body and emotions (assumed female)" (Maclaran, 2012, p. 466). Hence, such early takes on theoretical inspirations for Living Labs almost per definition clash with feminist notions in terms of consumer research (Woodruffe, 1996), consumer culture (McRobbie, 2008) and respectively (from a broader perspective) neoliberal feminism (Stambaugh, 2015). This becomes especially obvious when acknowledging that von Hippel barely made attempts to lay out the contingencies that affect the participation process. Furthermore, relying on 'lead users' to receive innovative ideas as he propose comes along with the risk of leaving out important other perspectives with marginalized voices remaining unheard (as the needs of lead user are probably of little appeal for the average user) (Ulwick, 2002). Hence, for example, from a feminist marketing perspective one has to ask the critical question, whether such endeavors are

based upon “exploitation or empowerment?” (Maclaran, 2012, p. 462), especially with some views from second wave feminism (e.g. feminist Marxism (Lorber, 2011)) which regarded market conditions as a patriarchal system fueled by manipulation and ideological control.

With Living Labs being grounded in real life environments or, put differently, being participatory laboratories ‘in the wild’ (Ehn et al., 2014), they undoubtedly have historically been associated with conventional (mainly masculine) assumptions concerning product design. This becomes obvious when tracing back the research fields in which Living Labs were first used: Initially being associated with consumer products in the area of domestic goods, subsequently with ‘smart home’ research spaces (e.g. Jakobi et al., 2017; Ley et al., 2015; Ogonowski et al., 2013; Randall, 2003; Tolmie & Crabtree, 2008), their deployment may seem ironic from a feminist perspective: Feminist scholars argued that in comparison to men, domestic duties are still regarded as a feminine task, irrespective of whether women follow professional occupations outside of home or not (Catterall et al., 1997). Furthermore, feminist literature suggested that technology tends to reinforce inequality in domestic settings with white goods falling under the remit of women while entertainment technologies are the privilege of men (Cockburn, 1997; Cockburn & Fürst-Dilić, 1994; A. Gray, 1992; Morley, 2005).

Over the years and with increasing popularization, Living Labs have been established in many contexts such as smart cities (e.g. Cardone et al., 2014; Cosgrave et al., 2013), or otherwise dealing with topics of sustainability and marginalized groups in ICT usage such as elderly (Meurer et al., 2018). In particular, methodological questions in Living Labs are still the subject of discussion today (Schuurman et al., 2015) and the “ambition to demonstrate that Living Labs are ‘human-centric’ has not yet been fully realized” (Ley et al., 2015, p. 22). It is not far-fetched to ask if the needs of women and the integration of feminist values into Living Labs have adequately been paid tribute. To our knowledge there is no publication that deals with how one might embed an explicitly feminist approach, nor upon what foundations that approach might be based, in Living Lab research. Our aim is precisely to close this gap.

4.4 Socio-Informatics: On Building Feminist Living Labs

Feminist theory and research, of course, takes many (often contradictory) forms. Yet, one can argue that there are shared values across all forms of feminism such as democracy, emancipation, social justice and equality. A Living Lab, we suggest, embodies a flexibility in terms of ideology, methodology and desired outcomes. It could be designed with radical

feminist, social feminist or postfeminist outcomes in mind, since it is not the Lab itself that determines such matters, but the design of the work that goes on within it. In our field, that of HCI, standpoint theory seems to be the predominant feminist perspective. Feminist standpoint theory owes much to work of Sandra Harding (1997), Patricia Hill Collins (1990), bell hooks (1984) and others. Popularized by Shaowen Bardzell (2010) and later discussed by other scholars such as Jennifer Rode (2011a) it is probably the dominant strand in the field of HCI. Standpointism, briefly, claims that knowledge is situated and feminist standpoint theory argues that women's lives and experiences are different from men's and that these differences go largely unrecognized – meaning that women hold a different type of knowledge. Feminist standpoint theory thus emphasizes that research and policy commitments of whatever kind should be (in the main) *by women* and *for women*. Our view is that many factors may underpin outcomes of design, including explicit *ideology*, background assumptions, male performativity (Butler, 2011), and so on. Not biology determines outcomes, also such of research, which is shown by the active involvement of the first author in the projects described below. Feminist standpoint theory, then, provides the in-principle position which we adhere to in and through its commitment to a social epistemology. In design terms, this can be translated into practical locations for its deployment through the lens of the Living Lab. Arguably still underused, standpoint theory (as well as other feminist research methods) seem to offer a lot of potential for HCI research in coming to terms with the different knowledges, skills, sets of power relations, and practical experiences of women. In Dorothy Smith's (1987) terms, standpointism treats the everyday world as problematic. What appears to be objectively true (or a 'good' design) is seen that way because of the kinds of structured assumptions which dominate our worldviews. Thus, standpoint theory privileges the knowledge of the marginalized and Living Labs can be a practical means through which that knowledge is brought to bear. This does not, and cannot, happen merely through the deployment of a method. As Mark Schrödter (2007) has pointed out, the experiences and perceptions of the minority, here women, are themselves structured in a strongly gendered culture. The Living Lab, then, is the vehicle, but feminist standpoint epistemology is the driving force, where the cooperative frame of multiple stakeholders allows for the uncovering of the background underlying power relations.

In the following we will present two of our Living Lab projects which will give practical examples of 'Social Innovation Spaces' (Edwards-Schachter et al., 2012) that seek to develop answers to two distinct societal matters: First, the 'GEWINN' Living Lab was built to foster

knowledge transfer between gender studies and IT practice, thus enhancing the situation for women in IT companies. Second, ‘*nett.werkzeug*’, a digital platform to aid people with their arrival at a new place, focuses on migrants and refugees. We build on Ogonowski et al.’s PRAXLABS framework (Ogonowski et al., 2018) for the structuring of these Living Labs (as laid out in detail in Ahmadi et al., 2018). In the following sections, both projects are first introduced before we then discuss their feminist nature.

4.4.1 GEWINN: Enhancing the Situation for Women in IT Practice

Starting point for this Living Lab are gender-related questions and issues raised by IT companies and organizations across smaller and larger cities in Germany. These topics were collected by the researchers in an open call for participation in this Living Lab that brings together company representatives responsible for diversity, (female) students and trainees from IT-related areas and (gender and/or IT) researchers (including two of the authors of this chapter). It is the aim of this Living Lab to create a space where knowledge transfer between gender studies and IT practice is enabled. Participating institutions are supported in starting a process that tries to develop practical changes from scientific knowledge from gender studies and test these in their everyday working contexts for feasibility (see Ahmadi et al., 2018 for a detailed overview). Each organization agreeing to a participation in the Living Lab started the process by finalizing their topic and question in a ‘kick-off-meeting’ with relevant members of their staff. Importantly, stakeholder interactions – within organizations as well as across – are fostered throughout this Living Lab initiative by a series of physical events as well as online resources. Aligning and relating topics of physical events and Living Labs creates space for collaboration and broadening of perspectives among stakeholders, and raises awareness for specific gender-related issues, which can then mark the starting point for subsequent practical changes.

4.4.2 *nett.werkzeug*: Co-Creation of a Digital Place of Arrival

A large workshop bringing together all the relevant stakeholder groups – (forced) migrants, professional and volunteer helpers (including one author of this chapter) – marked the starting point of this Living Lab research. Jointly, the relevant topics characterizing the arrival process in a new place were identified and agreed upon as relevant for the envisioned digital platform. These were: language, orientation, understanding everyday life, making contact with locals,

health, access to education and work. Subsequently weekly gatherings were established and employed in the format of computer clubs and language cafés, to work on digital tools that can then serve to ease certain aspects of arrival and settling in the new place. Importantly, the design process in this context follows Mäkinen’s notion of digital empowerment – a process for enhancing citizen participation in a community. This process is described not as “a direct consequence of having and using the technical facilities, but a multi-phased process to gain better networking, communication and cooperation opportunities, and to increase the competence of individuals and communities to act as influential participants in the information society” (Mäkinen, 2006, p. 381). In the context of the nett.werkzeug Living Lab, the design process itself serves as a tool to constructively deal with contested issues related to the process of arriving and settling in a new place. An example for this is access to resources like language classes, housing, or job trainings. Here, difficulties regarding access, approachability and openness come to the fore as a result from the design process, which can create an awareness of necessary changes.

4.5 Lessons Learned From Our Living Labs Projects

Living Labs constitute a means to challenge the assumptions that are present in much design practice, and more specifically, through a principled approach to the long-term involvement of women, offer opportunities to build a competence network to broaden the perspective of every participant and sensitize them with regard to persistent stereotypes. Thus and for instance, any consideration of the migrant experience has to pay account to its heavily gendered nature (Freedman et al., 2017). Furthermore, we believe that a Living Lab cannot only foster gender topics but lead to more inclusion of diverse users in general. In this collaborative setting the researcher herself brings her expertise but also her own socialized perspective. In collaborative acts around design, she comes to learn more about the way in which gender is performed in specific circumstances. Again, because migration is one of the issues we contend with, we can learn from Nasser-Eddin (2017) who observes that, “(w)omen and men experience refugeehood, asylum, conflict, post-conflict situations and displacement differently; they do not share the same challenges because of the social construction of gender roles” (2017, p. 143). Standpoint epistemology provides us with the intellectual apparatus to understand and appreciate this fact, the Living Lab provides us with the means to understand how it ramifies in specific circumstances, and how we might best design better outcomes (technological or not).

Note here that it is not the person but the epistemology that is important. In principle, a male researcher can adopt the same systematic viewpoint. The feminist Participatory Action Research approach (Maguire, 1987), which emerges in our Living Labs raises Participatory Action Research/Design to its next level from an otherwise abstracted feminist perspective and is the means by which the cycle from academia to individual to society and back is realized.

The management of such a Lab remains a challenge as we have laid out in a past publication (Ahmadi et al., 2018). Leveling power dynamics between different groups of participants across legal status, social status, age, gender etc. is not an easy task, which is especially true in offering marginalized groups an adequate space for reflection and to ensure that their voices are not unheard. In such sensitive research settings, where people might suffer from trauma or fear negative consequences when revealing information (DeVault & Ingraham, 1999), offering a ‘safe space’ to open up is anything but trivial. Indeed, we believe that we were able to offer such a space as several women at interviews, symposia, or focus group discussions were able to tell about their experiences and express their thoughts. To create such an environment requires a high degree of empathy and we are constitutively learning in terms of requirements. To lay out our rationale will be a topic of another publication which then will also analyze cross-comparison cases over several Living Labs to offer more in-depth insights. Furthermore, we will elaborate on the role of the researcher.

4.6 Conclusion

Bringing Utopia to life as imagined in our introduction requires attention to practicalities. We have been at pains to show that broad feminist commitments of whatever kind require translation into pragmatics if desirable outcomes (from the point of view of participants) are to be realized. Living Labs, we argue, provide a means for doing so because they embody a long-term commitment to understanding and developing technologies by challenging dominant approaches to design which leave women out, and which we outline above. Nevertheless, Living Labs are themselves only methodological frameworks. A ‘feminist’ Living Lab will be one which is explicitly designed to be so, and the particularities of the design will, of necessity, be informed by the perspective on feminist research one holds to. The first stage, strongly associated with the Living Lab as a long-term strategy, is the building of *networks of excellences* with multiple actors who can actively participate in identifying and reconstructing (in)visible gender scripts. Here, different aspects, e.g. a full set of basic knowledges, openness, empathy,

as well as internal and external reflection, have to be interlinked. Furthermore, from a feminist view, it is crucial to consider (and to manage) the way in which the stakeholder base contributes and how safe spaces for creative reflection are established so that the marginalized are heard. At second stage the outcome has to be taken into account during the technological design process, reshaping the *I-methodology* (Bath, 2014) by transferring the new social scripts into technological ones and letting them enter the daily lives of others. Of course, the achievements of Living Lab interventions represent modest beginnings. Nevertheless, they also represent part of the progress, as others have put it, ‘from the margins to the center’ progress, which gives women a voice in the design of technology, of artifacts, and of their own lives. This progress comes about through what Paulo Freire (1970), for instance, called, ‘praxis’ (drawing from Marx). Praxis is defined as “reflection and action directed at the structures to be transformed” (Freire, 1970, p. 126) and applies as much to design decisions as it does to wider areas of injustice and oppression. Here the Living Lab approach helps tremendously with its space for multiple stakeholders, giving them a neutral arena for individual positioning, for dialogue and exchange, and for envisioning future technology put to progressive social purposes. The feminist standpoint theory we choose, and its claim to create an alternative objectivity, finds its ground in this practical manifestation, where the critique embedded in standpoint and related epistemologies can be a resource for designing a “radically better (future)” (S. Bardzell, 2014).

5 Challenges and Lessons Learned by Applying Living Labs in Gender and IT Contexts

Abstract

Women interested in computing are still facing several problems considering equality and career chances. Companies realize the opportunities of diversity and yet for several reasons they are struggling to hire or integrate young female professionals. Although gender study research provides promising frameworks there are still issues in applying them in working environments and practices. For this purpose, we made use of the Living Lab approach in the context of gender and IT. The Living Lab's methodology offers opportunities to reveal new, relevant insights and create social change in a collaborative way. We stretched the existing understanding of this concept and follow a Participatory Action Research approach. In this paper we describe the setup of the Living Lab and present first insights from our research. We found that showing patience, organizing adequate spaces for reflection as well as facilitating motivation and trust is vital in such a sensitive research context.

5.1 Introduction

In the information technology (IT) sector, participation is still unequally distributed with female programmers, software developers and engineers being a minority (Cheryan et al., 2015). Over the last decades the situation barely saw positive development and in some cases even became severe as there has e.g. been a decline in the percentage of women software developers in the US from about 40% to less than 25% since the 1980s (Ashcraft et al., 2016). This was despite the fact that in numerous contexts like some fields of game-playing female users even form a majority (e.g. Dickey, 2006; Kirriemuir & McFarlane, 2004). Several factors like cultural stereotypes, hostile environments, disadvantages in pay, a lack of advancement or missing role models and peers among others are reasons for women showing less interest in computer science (Cheryan et al., 2015; Cozza, 2011). Especially missing role models are a problem as the role of mentors in the career development of young professionals is seen as bringing benefits to the mentor, the protégé and the professional organization (C. A. Wright & Wright, 1987). In addition, there is evidence that diversity with respect to gender can facilitate innovation (Fogelberg Eriksson, 2014; Herring, 2009), hence leading to more competitive advantages for companies. This can also be said for IT-related sectors like software development (Judy, 2012).

For instance, the participation of women in the development of IT artefacts makes it more likely to attract wider target groups, thus resulting in higher business opportunities (G. Williams, 2014). In 2013 the European Commission estimated that bringing more women into EU digital sector would lead to €9 billion GDP boost for the EU annually (European Commission, 2013). Although scientific discourse has evolved around gender and IT topics (e.g. Bath, 2014; Hazzan & Dubinsky, 2006; E. Rommes, 2014), practitioners still wonder about the relationship between gender and design opportunities. Efforts to increase attractiveness as a workplace for women, to establish a female friendly IT culture, and to sustain women as team members, have remained under-explored, especially from a practitioner viewpoint. That leads to the question how companies may integrate knowledge about gender issues into their working contexts and where that knowledge will come from. Hence, this project aims to make research from gender studies applicable to support young female professionals in IT. To address this topic, the Living Lab approach (e.g. Eriksson & Kulkki, 2005) is employed. Through the provision of a Living Lab platform, we work towards eliciting information about best practices from a variety of perspectives, and to provide chances to share them. Our study provides the opportunity to get access to the field, gain insights into experiences of women in IT-related real-life environments, receive knowledge about different modus operandi in organizations when dealing with gender-related themes, and to build a network of excellence where interested parties can create social change in a collaborative way and over time.

The establishment of a Living Lab in this context can help to contribute to a positive development in the IT sector by bringing scientific gender concepts into practice. To our knowledge, such an approach has not yet been applied to the field of gender and IT studies. Our study contributes to the methodological landscape by providing initial findings about the application of the Living Lab approach in the gender and IT context in Germany. We also discuss methodological challenges for setting up such a lab and further describe potential uses for the future.

5.2 Related Work

In this chapter we give an overview of previous studies about women in IT. We further explain the Living Lab approach, discuss methodology in such labs and point out the research gap.

5.2.1 Gender in IT

Current gender studies are rooted in feminist research from the 1970s and 1980s. From 1968 onwards, a new movement developed from the various feminist tendencies of gender equality and differential feminism, paving the way for gender studies (Degele, 2008). Since then, with a social constructivist and poststructuralist focus, not only inequalities and discriminations of binary gender groups have been considered, but also power relations and identity constructions. We follow the theoretical orientation of gender studies and consider gender as socially constructed through continuous repetitions and not anchored in binary gender schemes (Butler, 1993). At the same time, we perceive a gender imbalance in IT at the practical level. We strive for an improvement of this practical shortcoming with the establishing of our Living Lab in the gender and IT context. For this reason, the practical focus of this work is mainly on women in IT, justified by current data detailed below, indicating a large gender imbalance here. In the future, however, we hope that more gender identities will be brought into the spotlight and that gender pluralization can also be promoted in IT.

There has been extensive research about women facing entry barriers, prejudices, stereotypes as well as problems with organizational structures and cultures, hostile environment, pay gaps and a lack of mentors in science, technology, engineering, mathematics (STEM) fields and especially computing (e.g. Bailyn, 2003; Blackwell et al., 2009; Gregory, 2003; C. C. Hughes et al., 2017; Von Hellens et al., 2001). These problems hinder young female professionals, despite their qualification, from fulfilling their potential and career opportunities (e.g. Cheryan et al., 2015). This imbalance is also visible in statistics: Men still dominate the IT and engineering sector. Statistical comparisons between countries can turn out to be difficult as the information cover different courses and levels but they overall indicate that there is a strong underrepresentation of women in computing worldwide: In the US workforce the percentage of women in computing occupations stated only 25% in 2016 (U.S. Bureau of Labor Statistics, 2018). Those women are yet leaving in larger numbers than men; 56% of women in the IT sector leave mid-career and half of them leave the STEM occupation field completely (Hewlett et al., 2008). Silicon Valley is no exception: According to the EEOC “Diversity in High Tech” report in 2014 only 23% of all technicians working at the top ranked 75 Silicon Valley tech firms were female (EEOC - U.S. Equal Employment Opportunity Commission, 2016). Across Europe the majority of information and communications technology (ICT) specialist positions are staffed with men as well, meaning that young female professionals are underrepresented at

all levels, but especially in decision-making positions. The proportion of women working in this segment of the labor market in the EU-28 has declined from 22.2% in 2005 to just 16.1% in 2015 (eurostadt, 2018). Besides, of the women who graduated with a degree in ICT in the EU, only 9% still work in the field at age 45 (Iclaves S.L., 2013).

The situation in Germany is similar: According to statistics from 2015 to 2016 computer science was the third most popular field of study among male students, while it ranked 17th among females (Destatis - Statistisches Bundesamt, 2016). In the first quarter of 2017 women in the IT sector in Germany accounted for only 16%. East Germany shows a slightly higher percentage of 16,9% compared to the West with 15,8%. In terms of federal states, the numbers are especially low in the state of Bremen with 13,7% while Saxony-Anhalt holds its place as the state with the highest percentage with 19,4%. North Rhine-Westphalia presents rather low 14,22% (Statistik der Bundesagentur für Arbeit, 2017). Considering income inequality men in IT earned averagely € 4647 compared to € 4246 earned by women in 2015 (Institut für Arbeitsmarkt und Berufsforschung (IAB), 2016).

Taking into consideration gender sensitive approaches across numerous areas of the IT field can be one way to tackle the low participation rate of women and literature offers a range of guidelines on how to support gender sensitive approaches in computing, e.g. ways to integrate feminism into HCI (S. Bardzell & Bardzell, 2011; Rode, 2011a), (de-)gendering of IT artefacts respectively by developing IT software in a gender sensitive way (Bath, 2014; E. Rommes, 2014) or utilizing agile processes to create a better work environment for women (Hazzan & Dubinsky, 2006; Judy, 2012). Furthermore, there exist several frameworks with practical implications for example the ‘Gender Extended Research and Development’ (GERD) model (Maass et al., 2014). The model shows that implicit assumptions often remain invisible. In line with feminist research on the gendering of technology (W. Faulkner, 2009), the authors show the ways in which women are excluded from design and how gendered use practices need to be reflected throughout the design process. The GERD model lays out a procedure that integrates different levels of reflection. These help the designer to be aware of how gender identities are articulated in relation to technology and the way gender is inscribed into artefacts.

That way, academics have identified various subjects and offered mechanisms to adequately respond to gender issues. Their efforts have however not translated well into wide-ranging changes in practice. Also, the impact of the implementation of such intervention techniques

remains to be studied in detail. Thus, there is an obvious need for more ‘transformative’ approaches which lead to substantial changes in the social system. With the establishment of a gender and IT Living Lab in Germany we build upon the aforementioned works and foster the connection of their insights with practical environments. We believe that such an approach is especially suited for the context of gender and IT and can lead to new, relevant research results. However, it is important to consider that all associated issues take place in a cultural context involving people with a multiplicity of identities (Maguire, 1996). Linking complex theory to problems of real life practice often proves to be a difficult task, especially in areas where organizational management is concerned with the introduction of processes of change (e.g. Tranfield & Denyer, 2004). This is also true for gender science in technology (Trojer, 2014). We will lay out our argumentation in more detail in the following.

5.2.2 Living Lab Approach

Living Labs provide a holistic approach to the design of ICT-artifacts, entailing a co-design philosophy and, just as importantly, offer the possibility of long-term engagement. According to Eriksson et al. the term was framed by Mitchell at the MIT Media Lab as an instrument to study user interaction with new IT artifacts in real life environments over a longer period of time (Eriksson & Kulkki, 2005). As such, it drew on early insights from the work by von Hippel (1986) focusing on user-centered product design created in a quasi-naturalistic but controlled environment. Although their origin was in the area of domestic spaces like smart home services (e.g. Jakobi et al., 2017; Ley et al., 2015; Ogonowski et al., 2013) Living Labs have been established in many contexts by now.

Living Labs have been a research instrument for more than one decade but there is still a lack of a clear definition and practice of the concept (Schuurman & De Marez, 2009). It is commonly understood as an open and innovative research and development (R&D) methodology that is ‘human-centered’ and thus focuses on user-centric research methods in real-life environments by including different stakeholders from several sectors such as public, academia, economy, the civic society and citizens who collaborate over a specific objective and a specific time span (Corallo et al., 2013; Ogonowski et al., 2013). In Living Lab research, users might share experiences, provide insights into unexpected ICT use, co-create new IT solutions based upon their requirements and iteratively evaluate prototypes in long-term research initiatives. It can be argued that, in such a real-world experiment, participants are more willing to overcome

established attitudes by encouraging a critical attitude and being positively motivated in the search for creative solution options (Higgins & Klein, 2011). Stakeholder participation in these innovation infrastructures comes with various benefits and helps to trigger the process of co-creation of products and services by forming “value networks” (Corallo et al., 2013). Living Lab infrastructures can foster the development of competences of stakeholder groups (Liedtke et al., 2012), support mutual learning and can thus be understood as ‘networks of excellence’ (Ståhlbröst, 2013). In sum, the potential for the exchange of knowledge and experience over time and participation in change management processes (technical and otherwise) offers an unique opportunity (Almirall & Wareham, 2008; Schaffers et al., 2008).

5.2.3 Participatory Action Research as Methodology in Living Labs

From a methodological point of view Living Lab research is usually connected to methods from ethnography, (Participatory) Action Research, user-centered design and, especially, Participatory Design (PD) and appropriation studies (Dell’Era & Landoni, 2014; Ehn, 1993). Higgins & Klein (2011) argue that Living Labs can be understood to build upon and extend the traditions of Action Research (AR). AR itself developed a history within ICT (Baskerville, 1999) and PD is arguably inspired by AR as well (Foth & Axup, 2006). While both AR and Living Labs are user-centric, AR is more rooted in social research contexts while the latter since their emergence have been linked to the development of IT artefacts (2016). Although e.g. Schaffers et al. also understand Living Labs as “experimentation and validation environments of ICT-based innovation activities” (Schaffers et al., 2008, p. 617) they describe how an AR paradigm provides guidance for setting up a lab (Schaffers et al., 2008). The authors define their approach as a method to stimulate openness as well as systemic innovation and learning in order to create qualitative change in the existing system and improve economic as well as social conditions.

AR is regarded as a valuable method if some sort of change should be brought into a community because it “aims to transform both theory and practice by finding a mutual relationship between the two and establishing how this relationship may help to shape the life and work of a particular setting” (Creswell et al., 2007, p. 257). Originally defined by Kurt Lewin (1946), AR developed into an established post-positivist social scientific research method in the social and medical sciences (Baskerville & Wood-Harper, 1996). One major characteristic of AR is that theory is linked to practice respectively theory interacts with practice (Susman, 1983). The main purpose

of AR is to simultaneously solve the practical concerns of people in an immediate problematic situation as well as expanding scientific knowledge (Rapoport, 1970; Susman & Evered, 1978). Action Researchers strive to understand complex human environments and processes, obtain information about particular situations, introduce changes, observe the effects of their intervention and enhance scientific knowledge by developing models and theories (Baskerville, 1999; Baskerville & Wood-Harper, 1996). This is done in “joint collaboration within a mutually acceptable ethical framework” (Rapoport, 1970, p. 499). Collaboration is an important characteristic of AR as the connection between theory and practice requires it (Baskerville, 1999). In AR researchers bring their theoretical knowledge and practitioners their situated, practical key knowledge into the research process and the latter is often “critical to the discovery of important aspects of the theory under test” (Baskerville & Wood-Harper, 1996, p. 243). An ‘Action Research Cycle’ normally consists of four (e.g. Rohde, 2007) or five cyclical phases (e.g. Susman, 1983; Susman & Evered, 1978):

1. Diagnosing (Identifying or defining a problem)
2. Action planning (Considering actions for solution)
3. Action taking (Selection of adequate actions)
4. Evaluating (Studying the consequences of an action)
5. Specifying learning (Identifying general findings)

We should point out that the terms Action Research, Participatory Action Research (PAR) and Participatory Research (PR) are often used interchangeably. We use the term Participatory Action Research because, we believe, it puts even more focus on the collaborative aspects by empowering people to create their own solutions (Whyte, 1991). Our focus, then, is on support for active and collaborative participation in the research process in a Living Lab environment.

PAR paradigms have been used in the past in Feminism and gender studies (e.g. Gatenby & Humphries, 2000; J. Williams & Lykes, 2003). In this context, Maguire (1987) has argued that ‘feminist Participatory Research’ is a way forward. Creswell et al. (2007) furthermore explain that the choice of PAR in this field seems natural as PAR and feminism both aim for social justice and equality by helping individuals to liberate themselves through an emphasis on humanistic, democratic and emancipatory understanding. Living Labs, building upon similar believes, thus can lead to yet undiscovered insights for gender research. Although Living Lab research tended to focus on technical innovation in the past we see a potential beyond that. In our opinion, reducing the definition of a Living Lab to the design of artefacts limits potential.

The introduction and exploration of ideas is as important as the introduction and testing of technologies. Living Lab research as a strategic position can be understood as “(reaching) ... a deep level of understanding and insights based on real-world experiences, and when a changed behavior is a desired outcome, a living lab approach is useful” (Ståhlbröst & Holst, 2017, p. 31) on a regional, national or international scale. The choice of a research method *inter alia* depends on its potential to answer overarching research question as well as paying respect to research ethics and pragmatic factors (Denscombe, 2010).

This also shows, that the establishment of a Living Lab brings added values compared to simple PAR in organizations respectively communities. Living Lab research does not isolate findings; the associated setup of a network of excellence among heterogeneous stakeholders broadens the view of all participants. This fosters knowledge as all parties can share and discuss experiences as well as reflect and debate on different ways of work procedures in a ‘safe place.’ Such reflections from different perspectives can hopefully drive socio-economic impact in this area, especially as all participants of the lab share the goal of enhancing the conditions for young female professionals in IT. In this context, the lab offers an infrastructure to *inter alia* understand how organizations deal with gender topics. Furthermore, organizations receive access to value networks and knowledge which they otherwise could not afford because of time and monetary constraints. It also helps researchers to understand how different circumstances in reality have an impact on gender issues, such as the mentioned (cultural) contexts which involve people with a multiplicity of identities. As can be seen from the above, the establishment of a Living Lab following a PAR paradigm has not yet occurred in the gender and IT context. Thus, our project aims to fill this gap. We will lay out our efforts below.

5.3 Methodology

A Living Lab addressing gender and IT comes along with several potential benefits: It allows research in a more or less naturalistic setting where empirical data can be collected. Furthermore, practical benefit of existing scientific knowledge can be tested in a long term and iterative process. Success however will depend on the creation of a suitable setting where the interests of all stakeholders can be represented (Schaffers et al., 2008). This *inter alia* includes tailoring the social and political context, recognizing the different aims of several stakeholders, building trustful relationships and managing (cyclic) research and action processes. Providing an adequate infrastructure is thus one of the main challenges. There is no ‘blueprint’

(Schuurman et al., 2015) for setting up a Living Lab and the approach leaves space for flexibility and adaptability (Ley et al., 2015). The diverse phases of Living Lab research furthermore comprise many possible methods and tools (Ogonowski et al., 2018). In chapter 5.3.1, we place our lab into context. Chapter 5.3.2 introduces the PRAXLAB framework as a guideline that leaves space for such flexibility. We explain the different dimensions of the framework and lay out our proposals for establishing the Living Lab in the gender and IT context.

5.3.1 Setting

Our research project is a joint initiative consisting of two universities and a non-profit organization located in Germany. The latter develops activities which exploit the potential of both sexes in an information- and knowledge-based society. Members consist of multidisciplinary researchers with expertise in gender and computer sciences. Research transfer is at the core of the project as knowledge will be developed in a dialogue with industrial actors. Over the course of three years, researchers and study participants become fully acquainted with the context, the culture, language and the basic structure of the field (Fetterman, 2010).

In literature a ‘young professional’ has been ascribed to aspects like a specific age range, a tertiary education degree, profession as expert labor (working as a specialist in a certain field) and work experience (e.g. Lattuch & Young, 2011). In the context of this research, a young female professional is to be understood inclusively. She is someone who has career ambitions, is highly educated, professionally competent and sees herself as being on a career path in an IT context.

5.3.2 Establishing a Living Lab for Gender and IT

Over the course of several projects, Ogonowski et al. (2018) developed the PRAXLABS framework which serves both as an infrastructural as well as a methodological framework. PRAXLABS offers suggestions concerning the organization of a Living Lab project, proposes research methods and also serves as a hook for analysis. It encompasses four essential spaces:

1. User space
2. Methodological space
3. Management space and
4. Creative space

We utilize PRAXLABS as a framework for our own Living Lab but adapt elements of the framework slightly. In the following we will describe the four spaces and also discuss the changes we undertook.

5.3.2.1 User Space

User space means a physical (regional) network of contacts. For reasons of clarity we classify the processes of acquiring and selecting participants this way as well. The group of relevant stakeholders *inter alia* consists of company representatives responsible for diversity, (female) students and trainees from IT-related areas and (gender and/or IT) researchers (including us, see figure 4). One major part of the user space is represented by several participating organizations. In March of 2017 we started to find institutions interested in collaborating with us. To get in touch with organizations in the IT sector we published and spread a call for participation. Additionally, we searched for and then ‘cold called’ (in this sense understood as a phone call to organizations who have previously not expressed an interest in our research project (Investopedia, 2018), probably because of a lack of knowledge about it) around 100 potentially fitting companies as well as pressure groups. Organizations with a concrete interest in collaboration invited us for a first meeting where we presented the research project in more detail and discussed potential research topics. We encouraged organizations to define their own research questions, based upon real life company situations. Each organization deals with an individual gender and IT related research question that has its roots in the respective everyday working context. With this approach we gain knowledge about institutional context. Such research should offer valuable insights and a basis for discussion for the whole Living Lab. Topics are diverse and deal with all types of themes in the area of gender and IT. The focus of each company was discussed and finalized in a ‘kick-off meeting’ in the organizations with members of their staff. Here, our approach was laid out in detail to the participating staff of the organizations and situated in the overall Living Lab context.

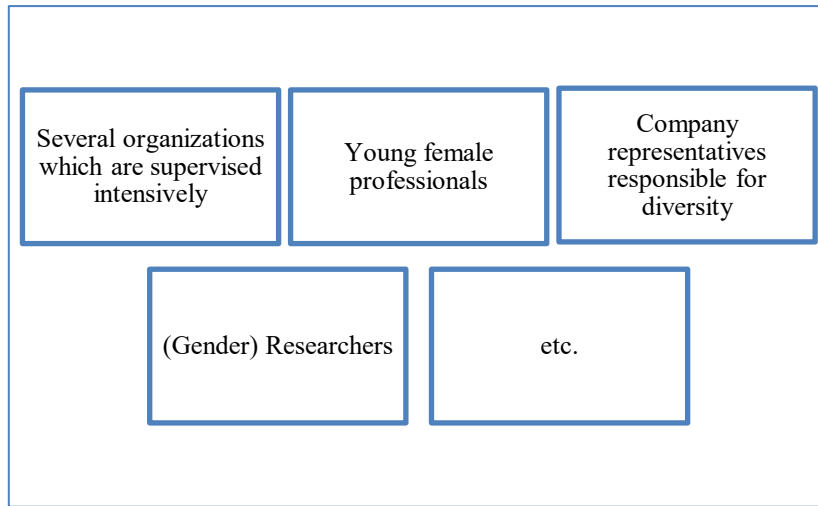


Figure 4. Stakeholders of the Gender & IT Living Lab

Small and medium-sized enterprises (SME) are facing problems of initiating change like fostering innovation because they lack certain resources, including human resources (Van de Vrande et al., 2009). Getting access to value networks is difficult for these institutions but Living Labs are an option to overcome such limits (Corallo et al., 2013; Santoro & Conte, 2009; Ståhlbröst, 2013). For reasons of diversity we strived to have a mix of SME as well as large companies from different locations.

Six organizations (four companies, one fabrication laboratory (a so called ‘FabLab’) and a center for information and media technology at a German university) have confirmed their participation in the project. These organizations are all located in the area of North Rhine-Westphalia. As described before, in this federal state women’s participation in the IT sector is below the nationwide average. The following table presents a short description of the companies as well as the already confirmed research topic.

Table 2. Organizations and research topics

Organization	Sector	Research topic
A	Gaming	Talent development
B	Nano optic and sensor technology	Gender as a factor considering the development of IT-artefacts
C1	IT services for local government	Creation of a gender sensitive organizational environment

C2	Manufacturing of vehicle registration marks	Creation of a gender sensitive organizational environment
D	Digital fabrication in a scientific context	Gender sensitive development of community innovation/fabrication hubs
E	Scientific data management	Stereotypical distribution of roles

The table shows two ‘C-companies’, C1 and C2. These are two different companies which are however dealing with the same research question and are comparable in terms of company size, regional location etc. Thus, with these two companies we hope to find additional interesting insights via comparative analysis.

Other stakeholders like young female professionals and researchers have either also been acquired via cold call techniques such as spreading e-mail newsletters or by visiting topic related events and getting in touch with respective persons. A steering committee furthermore consists of a network of company representatives. By now we have acquired a pool of stakeholders and are building a constantly growing base of potential partners in the different spaces of our Living Lab in the gender and IT context. Offering these stakeholders a creative space to make full use of the Living Lab’s potential is the next essential component and will be explained below.

5.3.2.2 Creative Space

The creative space comprises stakeholder interactions. This issue is addressed by offering several physical events as well as online resources where ideas can be shared and solutions developed collaboratively. Over the course of the project period we organize five one-day symposia (in German with approximately 50 participants) as well as one scientific conference (in English and German with 150 researchers of e.g. science and technology studies, gender studies and computer science) in different cities in Germany to foster networking and personal exchange among relevant stakeholders.

This provides a platform for exchange between researchers and practitioners. Each symposium deals with a specific gender and IT related topic and presents talks and workshops. It offers a ‘safe’ environment where young female professionals can share their experience and the participating organizations can reflect on their practices to enter a discussion with other companies. The research experiences in the organizations as well as results from the symposia

and the conference are made public on a designated website. The creative space we offer allows for the negotiation of different stakeholder viewpoints, epistemological ‘worlds’ and other boundaries.

In conceptualizing the creative space we draw on ideas about boundary objects as vehicles for communication as suggested by Susan Leigh Star and colleagues (2010; 1989; 1996). The topics of the symposia overlap with the topics of the organizations, yet both the topics and the symposia themselves offer a chance to negotiate areas of overlap between the social worlds of the different stakeholders. For the researchers, the symposia are an important ground for receiving empirical data as each symposium can be understood as a very large focus group. For the young professionals attending the symposia, they offer insights into the topic of the symposium and networking opportunities; the presenters have yet another understanding that frames their participation in the symposium. The symposia, the conference and the organizations all link communities together as they allow different stakeholders to collaborate on a common task. Conceptualizing them as boundary objects implies an egalitarian mode of intergroup communication, which Star & Griesemer contrast to “imperialist imposition of representations, coercion, silencing and fragmentation” (Star & Griesemer, 1989, p. 413). In line with approaches by feminist techno-science researchers Donna Haraway (1988, 1997) and Lucy Suchman (1987, 2002a, 2007), we assume that knowing is relative to and limited by the locations that the stakeholders inhabit – and that this does not in any sense relieve us from the responsibility for it. Rather, the fact that our vision of the world is based in an embodied perspective makes us personally responsible for it. The creative space in our Living Lab offers the room to reflect on practices, the situatedness of knowledge, and chances and limitations of inter- and transdisciplinary.

5.3.2.3 Methodological Space

Research done in the organizations follows the concept of Organization Development (OD) which is understood as a long-term organization-wide change in terms of e.g. behavior, attitudes and abilities of its members and the companies’ structures and processes (Rohde, 2007). Like AR, its ideas have been developed by Lewin, accordingly AR is an established method in OD (e.g. McArdle & Reason, 2008; Rohde, 2007; Van Eynde & Bledsoe, 1990) and most OD projects follow the AR cycle. The link between AR and OD becomes particularly obvious in the idea that researchers usually understand themselves as “external change agents” and the

organization's members are actively involved in the change process, which emphasizes the participatory aspects.

All of our research activities, the research work in the organizations as well as in terms of the symposia, are following four iterative phases. Figure 5 shows the proposed phases of our interpretation of the PRAXLABS framework which again share similarities with classical AR-cycles described earlier. PAR studies typically involve qualitative methods although a mixed-methods approach is possible (Creswell et al., 2007). Ogonowski et al. developed a methodological toolbox consisting of several (mainly qualitative) methods for each phase to gain empirical insights. Those include diary studies, observations, (semi-structured) interviews, focus groups, cultural probes, technology probes, usability tests and online questionnaires among others. In terms of data collection, we mainly focus on qualitative research methods such as observation techniques and taking field notes as well as semi-structured interviews.

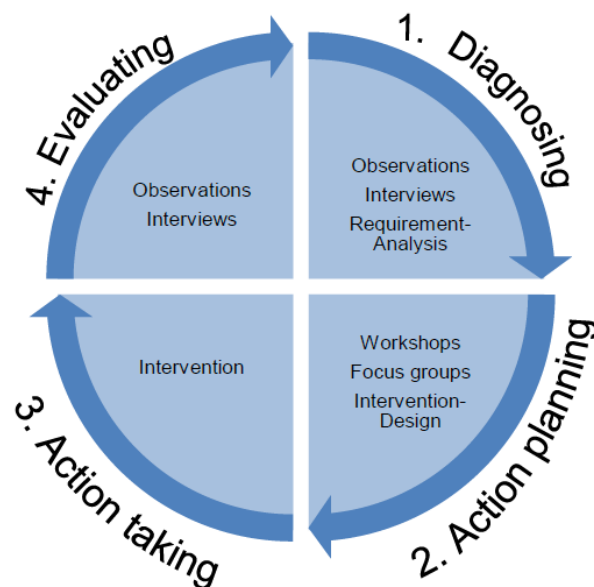


Figure 5. Research process in the Living Lab

As a first step the status quo will be evaluated by trying to understand the practice context and construct a common understanding for all stakeholders involved, followed by reflection in relation to theoretical knowledge and current practice. The researchers present their ideas to the companies to discuss which of the proposed solutions are adaptable to given conditions. The aim is to develop an action plan at this point (Stringer, 2013). After agreeing on the solutions

in phase three according actions are implemented in collaboration with the companies only to evaluate the changes in phase 4. The same self-referential cycle will be applied to the symposia. Over the course of the five symposia there exists the opportunity to collect data, reflect on it and plan for upcoming symposia where further actions can be undertaken.

One dilemma of AR is its difficulty to determine the cause of a particular effect (Baskerville & Wood-Harper, 1996). Organizational environments are complex and the reasons for change are difficult to identify. Therefore, careful description of social practices before and after an intervention is of great importance to retrace effects to specific interventions. This challenge should be tackled by careful documentation in the form of case studies which are a way to structure and document established practices and ‘storyboard’ the impact of interventions (Yin, 2014). For the analysis of our empirical data we apply a Grounded Theory oriented approach insofar as “theoretical sampling” and “constant comparison” are utilized (Glaser & Strauss, 1967) and our research insights are then documented and finally described in case studies. In terms of documentation, we build upon the techniques of ‘Design Case Studies’ (Wulf et al., 2011). As we collect different cases for each organization, cross-cutting issues and common themes should allow us to build concepts which can again be tested in cyclical processes.

5.3.2.4 Management Space

The management space deals with the topic of coordinating stakeholders and projects. Previous Living Lab research found that successful collaboration among stakeholders is a challenging task as needs and requirements of companies, research institutes, public institutions etc. have to be analyzed and addressed (e.g. Ley et al., 2015; Ogonowski et al., 2018). Thus, we expect the management of stakeholder activities from different locations and with different backgrounds to be especially challenging.

Ogonowski et al. propose (2018) regular meetings before and during projects. Furthermore, a mediator who bridges stakeholder groups, ‘translates’ information and manages potential conflict is suggested. Finally, trust building is an important issue in AR respectively qualitative research (e.g. Christopher et al., 2008; Foth & Axup, 2006; Mauthner et al., 2012). This is also true when doing research in organizations and with communities (e.g. Coghlan & Brannick, 2014; J. Cummings & Kiesler, 2005; Newell & Swan, 2000), especially when practicing research in sensitive areas (e.g. Acker et al., 1983).

Milestones are basically determined by the research question (e.g. how to acquire a young female professional until the end of year 3). As research activities in the organizations are cyclic, the fulfillment of each cycle can be understood as the achievement of a minor milestone contributing to the overall goal. Those ‘intermediate steps’ are individually negotiated with the organizations before the start of each cycle.

Being aware of the above-mentioned issues we address them from the very beginning. As a first initiative we appointed one researcher from our team to be in charge of managing communication with one assigned company. Thus, every organization had one constant contact person and we also asked the company to name a contact person from their organization as well. We furthermore installed a contact person for the symposia and the international conference.

When doing AR, a condition for success is held to be the specification of an agreement on basic conditions when setting up the research environment. This includes aspects of legitimation and sanction, the boundaries of the research domain, the authority of each party, the handling of sensitive data and the rights of the researchers to use the collected data for scientific publications among others (Denscombe, 2010; Susman & Evered, 1978). ‘Doing no harm’ is an important issue, especially in this sensitive context. Letting both sides sign a ‘non-disclosure agreement’ (NDA) and showing the cooperation partners research related publications before releasing them enhances trust building and provides legal cover (Baskerville & Wood-Harper, 1996).

Sustainability is a further issue: maintaining interest and motivation over the lifetime of the project (and beyond) requires commitment. Firstly, regular meetings of our research team, normally once or twice a month, will take place. Here, methodological issues, aspects of comparability and current developments of the overall research process as well as future appointments are discussed and planned. The steering committee also meets twice a year. Secondly, there are regular meetings and appointments for research activities with the organizations. The frequency of those depends on the research topic, the research progress but also on the resources of the respective company. There is no ‘master plan’ on how often a visit in the companies might occur. This matter has to be decided on a case-by-case basis. Finally, considering the symposia which take place roughly each half a year, it is not only important to acquire competent speakers, workshop organizers and plan an attractive program but it is also

vital to make all (potential) stakeholders aware of the event and especially convince the organizations to participate.

5.4 Challenges and Lessons Learned

Albeit our research project is still in its initial phase we already gained insights considering the potential and challenges of initializing a Living Lab in the gender and IT context. In this chapter we lay out first experiences and reflect on aspects we want to tackle in the future. For doing so, we once again draw on the four dimensions of the PRAXLAB framework.

5.4.1 User Space: Patience is Key

Considering the buildup of our Living Lab network, spreading a call for participation as well as ‘cold calls’ to acquire participating organizations turned out to be an adequate way of getting in touch. From the roughly 100 companies we contacted only a few were negative about our research proposal. Most of the companies understood the aim of our project and saw the necessity of enhancing their efforts in this area. Showing general interest and making necessary efforts to become a participating organization turned out to be a different matter however. As Baskerville and Wood-Harper (Baskerville & Wood-Harper, 1996) described in regard to AR, practitioners usually strive for commercial success on a low cost basis, while researchers have an interest in creating scientific knowledge which can be used for publications. Research projects, in consequence, do not always have a high priority (Dachtera et al., 2014) for some project partners, e.g. companies who are busy enough with their daily operative business routines. We experienced that decision making processes, especially in larger and/or internationally operating companies, can take months. Here, a conflict arises between the organizations’ demands and the researcher’s orientation to a fixed-term project period. Researchers have hence to be patient about aspects which are beyond their control.

In terms of potential research questions, we observed a preponderance of interest for human resource reasons. Almost all the organizations (arguably surprisingly) we contacted recognized their own interest in pursuing these questions, which suggests that companies are facing challenges in this area. For the sake of diverse questions, we tackled this issue by putting different foci in each organization (except for companies C1 and C2) as already laid out in table 2.

In terms of acquiring other stakeholders, like young female professionals and company representatives we had positive experiences at different subject-related events, symposia and conventions and found it quite easy to build a satisfactory network or, in other words, a community of interest. We strive to integrate more stakeholders into our Living Lab and plan to interview students pursuing a degree in computer science to understand better their self-concept as well as their attitudes towards their future work possibilities (Cheryan et al., 2015). These insights can then be cross-referenced with data from the organizations.

Paying respect to scalability, we believe that in principle our Living Lab's infrastructure leaves capacity to integrate new stakeholders seamlessly. Although this would mean an increased organizational effort, companies from federal states apart from North Rhine-Westphalia could be added. As the symposia are already staged at several cities across Germany, there exists diversity in terms of participants. As a future project, enhancing the lab throughout Europe may be an option, too. In addition, we strive to make an impact with our Living Lab already at a university level. As mentioned, we interview students from our faculty to receive knowledge about their attitudes as well as expectations of the field and future working conditions. Furthermore, we bring them in touch with the organizations of our Living Lab. Besides, two organizations of the Living Lab are situated in an academic context.

5.4.2 Creative Space: Reflection is Demanding

In terms of the symposia, choosing different cities in Germany as venues is a good option for attracting more and diverse stakeholders. During our first symposium in Berlin, the concept has proven to be an adequate ground for fostering knowledge exchange, building a competence network, and enabling an egalitarian mode of intergroup communication. Feedback from participants was positive and confirmed this expectation. Many participants mentioned, that the participation in the symposium had broadened and sensitized their view on gender aspects in organizations and especially women were pleased to have a 'safe' space to discuss and reflect on their experiences. Also, the constructive overall atmosphere was lauded.

Facilitating the overlap between the stakeholders' worlds while fulfilling the multitude of expectations that come with these different communities will nonetheless remain challenging. Initiating reflection in the different groups will be demanding, especially when their primary expectations are to receive information on a topic (e.g. young professionals attending a symposium to learn about agile software development) or to get help solving a specific problem

(e.g. the organizations participating to develop their talent development). As part of this process, we have to evaluate the frequency of visits in the organizations and the hosting of symposia. Identifying the ‘right’ frequency of meetings means balancing time and other constraints against the maintenance of interest and motivation. Finding the right balance is a challenge that has to be evaluated in the future. We will be able to draw on further experiences soon.

5.4.3 Methodology Space: Context Determines the Methods

Our approach means reflectively questioning our own approach and constantly evaluating it. While generally content with initial observational experiences, we are nonetheless aware that there might be skepticism or a lack of motivation from the employees’ side as OD processes are usually established by the management (McArdle & Reason, 2008; Rohde, 2007; Van Eynde & Bledsoe, 1990). In some organizations, we were indeed confronted with some reluctance when using observation techniques to gain data. Again, it is to be hoped that a long-term relationship will enable trustful working. Even so, we approach the problem of obtaining data with an attitude of methodological pluralism.

Reflecting on methodology also means understanding ethical dimensions. For future research, this means e.g. reflection on the responsibilities of researchers when doing Action Research in organizational life (Emery, 1976) and the impact on the research process when researchers of different sexes are involved. Considering the above-mentioned topics, we can draw further on implications of previous works about feminist research (e.g. R. Edwards & Mauthner, 2002) and additionally on feminist Participatory Research as introduced by Maguire (1987) and discussed later by other authors (e.g. Gatenby & Humphries, 2000; J. Williams & Lykes, 2003).

5.4.4 Management Space: Motivation and Trust are Crucial

As several authors already concluded (e.g. Logghe et al., 2014; Ogonowski et al., 2018), keeping users motivated to participate in research actions is vital for the success of a Living Lab project but a difficult task. In this context, the symbolic meaning of a Living Lab could help in terms of motivation as the participation in such a lab can be a signal of commitment to other participating members (Higgins & Klein, 2011). Nonetheless, we expected that getting all relevant stakeholders together would prove to be problematic. As it turned out, attracting

participants for the first symposium was a laborious task and involved an understanding of the different scheduling demands of both organizations and individuals.

Furthermore, the focus on organizations located in North-Rhine Westphalia allows for an intensive attendance. At the same time, it is ensured that the locations, foci and contexts of the individual organizations reflect the country's diversity and overall spectrum of gender-related research topics.

As mentioned, we thought carefully about relevant tasks to build trust with organizations. Letting all parties sign a NDA was a necessary but effective method in this case. We were however facing more difficulties at the beginning with building trust among us and the employees. While there are distinct differences between the Action Researcher and the consultant (also from a methodological perspective, Baskerville & Wood-Harper, 1996), employees of a company may confuse our role. As our first contact usually emerged from human resources departments and/or the management level we were committed to present our research project to a larger group of employees to make our intentions and the goals of the projects clear to all levels in the organization, especially emphasizing the participative aspect of our research project.

5.5 Conclusion

This paper presents our first experiences from establishing a Living Lab in the gender and IT context in Germany and explains the opportunities and challenges we are facing using such an approach in this sensitive context. To our knowledge, a Living Lab approach has not been utilized in gender studies yet and we believe that by doing so we are able to get unique, relevant insights which otherwise would be 'hidden.' The PRAXLABS framework proved to be useful for structuring our approach and to analyze our progress. While Living Labs have in the past been understood as an infrastructure for innovative technology development, we follow a PAR paradigm to facilitate knowledge exchange and development. We enter new ground with our research endeavor and the project is still in an early state. That is why we will have to, inter alia, analyze how well the Living Lab approach can be adapted to gender studies overall, to what extent and to what effect the interventions create changes in the social system and which new insights for gender studies such a lab can create. As Ståhlbröst and Holst (2017) mention, processes in a Living Lab are complex and dynamic, so a Living Lab should be flexible and adaptable during the research process. That is why there is the need for permanent reflection.

By making the necessary efforts we strive to make our Gender and IT Living Lab flourish so that it can make a positive impact on the situation of young female professionals and organizations in the German IT sector.

6 Designing for Openness in Making: Lessons Learned From a Digital Project Week

Abstract

Placing an emphasis on openness with regard to learning styles, idea generation and participation, maker culture can potentially appeal to many people. However, many makerspaces are struggling to attract representatively diverse groups of participants. In response to this observation, this qualitative study of a digital project week in a mid-size town in Germany explores constituents of openness with a focus on the gendered nature of computing. The degree to which makerspaces can or cannot transcend boundaries and impart openness for female participants and others remains vibrant, especially as gender is a construct that intersects with others demographic variables. We conducted several gender-related workshops and examined the local maker context through an intersectional lens, identifying four themes, which were consequential for openness in the context of the digital project week. Managing these themes, we suggest, can improve maker awareness of diversity issues but does not necessarily provide for a sustainable approach.

6.1 Introduction

Openness is a frequently evoked concept in HCI and related disciplines. It applies to both software and hardware development, where customizability and accessibility are discussed as opportunities (S. Fox et al., 2015). While some scholars advocate a rather utopian vision of technology production as a democratic solution to complex social problems and hence argue that they foster openness (Richard et al., 2015), others critically discuss it as “technosolutionism” (Lindtner et al., 2016). Openness, we might note, applies also to concepts of innovation (e.g. H. W. Chesbrough, 2003) and design (Gaver et al., 2010), e.g. when matters of re-appropriation are explored (Wakkary & Tanenbaum, 2009; Wash et al., 2005).

With regard to technology appropriation in various contexts of learning, openness is used rhetorically to welcome all, regardless of factors such as age, culture, gender, education and level of expertise. However, despite good intentions, computer science and information and communication technologies (ICT) largely remain a field for white and educated males. This is especially true for the engagement of women in the industry. In this context, hacking and

making have received special attention in research as a potential means to broaden and open up participation in STEAM (Science, Technology, Engineering, Arts and Math) (e.g. Ames et al., 2014; Tanenbaum et al., 2013). Previous work has inter alia focused on 1) the inclusive or exclusive nature of hacker and maker practices (Buchholz et al., 2014; Riley et al., 2017), 2) local conditions in which hacking and making takes place (Toombs et al., 2015), 3) sociotechnical identity building through making and hacking (e.g. Marshall & Rode, 2018) and 4) effects on engineering and innovation practices (J. Bardzell et al., 2014; Lindtner et al., 2014). Two things can be learned from those studies: For one, openness is always situated: initiatives, systems and designs labeled as open are always grounded in a specific setting and come with specific conditions and constraints. Secondly, openness is multi-dimensional – and its constituents need to be carefully balanced. Hence, investigating factors relating to openness in a local maker setting requires us to “not only to look closer at the materials, techniques, and activities that constitute making, but also the social context that surrounds participation in and exclusion from maker culture” (Alper, 2013). Here, it is important to consider that makerspaces “exist in specific social, political and economic contexts that shape their use” (N. Taylor et al., 2016, p. 1417).

To explore the dimensions of openness in a situated local context, and with a view to identifying policy and practice that might facilitate awareness, we conducted a qualitative study of a digital project week in a mid-size town in Germany. We focused on respective constituents by paying special attention to the gendered nature of computing while reminding ourselves that intersectionality matters. The degree to which makerspaces can foster openness for female participants remains vibrant, especially as gender is a construct that intersects with others demographic variables (e.g. ethnicity or socioeconomic status). Hence, we examined the issue through an intersectional lens to contribute our understanding of the barriers to inclusivity.

6.2 Related Work

6.2.1 Making, Hacking and Fabrication Labs

Maker culture as a social movement emphasizes learning-by-doing as well as trial-and-error approaches and informal, peer-led learning. It tries to trigger students’ interest in STEAM fields via the ‘tangible’ experiences (Rode et al., 2015) associated with constructionism and objects-to-think-with (Papert, 1980). Along with the development of individual creativity, skills and

abilities (including playful use of materials and tools as well as problem solving techniques among others), the development of a local community and collaboration are central aspects of maker enthusiasm (Kafai et al., 2011; Tanenbaum et al., 2013; N. Taylor et al., 2016). Recently, innovation hubs, fabrication labs, co-working and makerspaces have played an increasingly important role as mediators of digitization (Lindtner et al., 2014, 2016). When costs of equipment such as laser cutters and 3D printers dropped at the beginning of the century, the maker movement gained momentum, leading to the democratization of related tasks and skills which became open to not only experts (Blikstein, 2013). Maker environments are platforms for the creation and production of technical innovations and interaction spaces for communities. They create access to technology and enable dialogue between different actors in society. Here, people can, in principle, become co-creators of work and life in their area in an open, digitally supported and participatory manner. Thus, makerspaces have enormous potential for individual, social and corporate development and qualification, while functioning also as infrastructures of civic involvement (Lindtner et al., 2016). The democratization and open sharing of technology enables and simultaneously is an inherent feature of making, especially since emerging platforms for sharing designs online have turned the hobbyist notion of ‘Do It Yourself’ (DIY) into a ‘Do-It-Together’ (DIT) approach (e.g. Honma, 2017; Lovell & Buechley, 2010). As laid out in detail by e.g. (Okerlund et al., 2018), the maker, hacker, and FabLab movements are related and their overlapping terms sometimes used interchangeably. They are all regarded as “peer-production communities” (Moilanen, 2012) where digital fabrication takes place. Makerspaces are informal shared spaces located in communal, educational and increasingly also commercial settings, which provide their members with access to technologies, resources and most importantly a community of peer learners for making (Ames et al., 2014; Dousay, 2017; Green & Kirk, 2018; Lindtner et al., 2016). Hackerspaces or hackerspaces, although still community spaces, tend to be more individualistic and hackers often give new or additional use to existing things by ‘hacking’ them (Moilanen, 2012; Toombs, 2017). In addition to autonomous local hacker- and makerspaces, FabLabs are standardized low-cost equipped labs (Blikstein, 2013) and have grown into a global network with currently over 1,200 labs (Gershenfeld, 2012). For the purpose of this paper, we are building upon those definitions and define making or hacking as social activities with a DIY stance which encompass digital fabrication. Apart from such definitional nuances, makers all over the world define themselves through a feeling of belonging to a Maker Movement which shares basic values and practices, such as “You cannot make and not share” (Hatch, 2014). These values are interpreted

differently in different local contexts by different communities, and are constantly discussed and developed further (e.g. Hertz, 2018). However, this general and globally agreed sharing imperative means that co-creation processes are the norm, not the exception in makerspaces. At its best, a makerspace is able to provide a “community of creators to share their ideas and combine their various areas of expertise in order to create in new ways (V. Bean et al., 2015, p. 63).” One basic requirement for the full realization of such co-creation processes to making is diversity.

6.2.2 Diversity in Maker Culture

Commitment to openness ought to mean that maker culture can be a vehicle to foster diversity in HCI (Tanenbaum et al., 2013) since it provides space for the construction of a multitude of sociotechnical identities (Marshall & Rode, 2018; Weibert et al., 2014). However, many makerspaces have yet to live up to that potential and are struggling to attract diverse groups. As the founders and participants of such spaces often have a creative or technological background and consist of white, college-educated, middle class men (J. Bean & Rosner, 2014), exclusion processes in maker environments can occur in terms of gender, ethnicity, age, socioeconomic status etc. (Britton, 2015; Cuartielles et al., 2015; Lewis, 2015). This results in a ‘white, masculine maker culture’ which is less open and innovative, where e.g. women, people of color or migrants remain a minority and where power structures are unequally distributed. Whether such inequalities are features of wider societal structures (e.g. Cockburn, 1997; Turkle, 1988) or specifically reflect constituents of maker culture remains an open question. Nevertheless there is well documented evidence that makerspaces are masculinist constructions (S. Fox et al., 2015; Lewis, 2015; Toupin, 2014) resulting in environments where masculine approaches to making activities are perceived as normative. Also, despite their democratic appeal, maker practices for people from a low socioeconomic communities (J. L. Taylor et al., 2017), with special needs (Rajapakse et al., 2014) or in developing countries (Somanath et al., 2017) often entail additional challenges, hence reinforcing these gaps. Such (often implicit) manifestations not only lead to the (unintentional) exclusion of marginalized groups but also result in a lack of role models who are able to reflect and promote diversity (Lewis, 2015). Thus, the DIY ethos which might provide opportunities for multiple sociotechnical identities to emerge in a playful way (e.g. Tanenbaum et al., 2013; Toombs, 2017; Toupin, 2014) is not, as yet, doing so. Such dynamics are undermined by the absence of a communal sense of belonging for marginalized groups (Lewis, 2015). Individuals may become invisible in such a maker culture and hence the

ambition of open door policies and openness for ‘everybody’ remains under-realized (Toombs et al., 2015). In terms of diversity, several studies have shown how makerspaces are lacking: Taylor et al. (2016) visited 15 UK makerspaces and found that “even in the smallest of spaces, there was an expressed desire to be more inclusive” (N. Taylor et al., 2016, p. 1421). Here, widening access was regarded as being problematic: Although e.g. disabled people benefit in making activities in terms of empowerment, it is difficult for other members of the space to deal with the potential need for extra consideration. In this context, Alper (2013) proposes the notion of a “mixed-ability maker culture” that calls for a co-existence of people with and without disabilities in makerspaces (see also Rajapakse et al., 2014). Cultural factors may also play a role, as language barriers, for instance, could lead to a sense of not belonging (N. Taylor et al., 2016). Riley et al. (2017) describe several diversity practices in different makerspaces which *inter alia* try to include people of color, migrants, poor and trans folks, queer identities, women, youth, sportive people, military veterans etc. The authors found common themes across several or all spaces as well as particular strategies adopted by individual organizations.

A special focus has been on the lack of female participation in makerspaces. Overall, it has been found that, with regard to technology usage, women have lower self-efficacy and self-confidence compared to men (He & Freeman, 2009). As a result, qualified women are often hesitant to express cognitive agency and expertise in computer science fields because of pressure to conform to socially constructed roles (Lewis, 2015; Turkle & Papert, 1992). To investigate and work against the imbalance in the maker culture, there exist several studies that deal with gender aspects considering making activities such as e-textiles. The e-textile-community has been described by Buchholz et al. (2014, p. 278) as “the first female-dominated computing community.” Buechley et al.(2008) conducted a study with primary female participants and encouraged them to explore e-textiles using LilyPad technology. Weibert et al. (2014) led a number of similar workshops with children age 8-12. Both studies showed that e-textiles are a way to trigger interest for both boys and girls by giving them the chance to express their feminine and masculine maker identities. Okerlund and colleagues (2018) describe efforts to diversify their university’s maker community by initiating a ‘Maker Fashion Show.’ Holbert’s study (2016) confirms that making activities associated with ‘feminine’ interests can trigger the interests of women and girls in making. Furthermore, the study indicates that women and girls are more drawn to making when their acts are supportive of the community. Marshall and Rode (2018) describe how children engaging in various degrees of

sociotechnical identity formation are still influenced by socially constructed gender stereotypes. Despite encouraging experiences, using feminist or ‘girly’ frames as ways to include women into makerspaces have been critically regarded as reinforcing gender stereotypes (e.g. Holbert, 2016; Kafai et al., 2014; Lewis, 2015).

In a focus group study with 8 female makers, Bean et al. (2015) found that those women indeed value the social aspects of the community most. They participate primarily to get access to tools, showcase their work, network with others and receive encouragement as well as mentorship to finish a task. However, said women actually do not perceive gender barriers in general although they admit that such places can nonetheless be intimidating because of potential fears of failure or criticism resulting from the gender imbalance. The authors hint that one has to acknowledge that the interviewed women can be regarded as “pioneers” who have already transcended the barriers. High barriers for women in makerspaces have then led to the establishment of ‘feminist makerspaces’ (e.g. S. Fox et al., 2015; Lewis, 2015; Toupin, 2014). Such spaces, inter alia, include women who identify themselves in a variety of ways: as feminist, queer, non-binary, or as mothers, and hence have to tackle binary gender or other stereotypical classifications. These studies offer valuable insights. Taylor et al. (2016) discuss roles that makerspaces play in civic life but recognize that most of the makerspaces they studied do not meet their own ambition of accessibility for everybody. A notion of inclusivity and openness implies that anyone can be a maker but subtle forms of exclusivity and exclusion still hinder diversity (Green & Kirk, 2018). Hence, “future work might focus on the barriers that prevent individuals who might otherwise be interested in utilizing the spaces (...)” (N. Taylor et al., 2016, p. 1424). Our review of the literature makes it clear that barriers to openness remain, despite attempts to be more inclusive. This is especially true for female participation in makerspaces; hence the focus of this paper is put on the gendered constructions in such environments. Put simply, openness and inclusivity are policy objectives, which are yet not necessarily implemented in practice. The previous descriptions show that making takes place in a specific setting and is subject to a multiplicity of influences. Both aspects shape our understanding of openness which is why we regard 1) situatedness and 2) multi-dimensionality as two important factors contributing to an inclusive making environment. One of the most important influences is that of identity and, in turn, identity is constructed out of the intersection of gender and other social constructs. Hence, ‘intersectionality’ in the context of feminism has become a preferred term (McCall, 2005). The concept describes the interrelation of several

aspects of diversity such as class, ethnicity, sexual orientation, age, religion, disability and, of course, gender. Seen as a step forward from the ideas which aroused from the second wave of feminism (e.g. hooks, 1981), intersectionality overcomes limitations of gender as a single analytical category (Brah & Phoenix, 2004) and has to be considered when analyzing oppression (McCall, 2005). It is obvious, then, that we need to foreground intersectionality as a feature of our study, though gender remains the primary motivation of the workshops. Following this perspective, our qualitative study hence contributes to the discourse, examining the local maker context through an intersectional lens by constructing gender-relevant workshops.

6.3 Methods and Data

To engage diverse groups in making activities and explore dimensions of openness in maker culture, we conducted a qualitative study of a digital project week in a mid-size town in Germany. During this week we organized several making-related workshops which were free of charge for the participants. Workshops have been proven as good ways to trigger interest of people not familiar with the field (Mellis et al., 2016; N. Taylor et al., 2016). As a research instrument, they offer a possibility of “observation, participation and design” (Rosner et al., 2016, p. 1139), hence engaging participants in a fun way to experience making environments while at the same time collecting data to expand scientific knowledge (Mellis et al., 2016).

6.3.1 Setting, Study Setup and Participants

The workshops were part of a ‘Digital Project Week’ held at a pop-up gallery in the inner city as well as at the local FabLab. The latter is also a stakeholder with an ongoing commitment to a Gender and IT Living Lab project aiming at the intersection of gender studies and IT practice (Ahmadi et al., 2018). The Living Lab follows a Participatory Action Research (PAR) paradigm to enhance female participation in the IT landscape. The motivation for participating in said project had to do with the FabLab’s ambition of being attractive for everyone and to integrate especially women, people of color and migrants into the community. The FabLab and the gallery were situated in a small city in the North Rhine-Westphalian Siegerland area. This city is formed by its small- and medium-size businesses in the metal and automotive industries. Migration has shaped the local communities in subsequent phases, with ‘guest workers’ during the 1960s and 1970s and in more recent years with refugees mainly from the Middle East. Also,

the university, with more and more international students, contributes to the diversity of this town. The situation in the local FabLab is similar that found in makerspaces around the world: Once a week the FabLab hosts ‘open lab’ sessions which are open to the public. Participation of women and other marginalized groups, however, remains low.

For the purpose of this paper we focused on three workshops that were part of the digital project week. In terms of study design and based upon the considerations laid out in chapter 6.2 we deliberately made some key decisions with regard to workshop setup: In terms of lowering the barriers, we found it useful to target workshops towards specific groups of participants (Okerlund et al., 2018; Weibert et al., 2014). In support of female role models in makerspace (Lewis, 2015) we had a gender mixed tutor group. If participants were underage, we ensured parents’/guardians’ presence or written consent. One workshop was targeted towards a mixed gender group of primary school children. The second one addressed crafting tasks arguably associated with ‘female’ interests. Despite their focus, both workshops were open to everyone. The last workshop was exclusively open to primary and high school girls. We prepared prototypes to explain the desired outcome for each workshop. The workshops are described in detail in the following.

6.3.1.1 Workshop 1 – Sparkly Faces

This workshop was the ‘opener’ of the digital project week. It was held at the gallery and mainly directed towards younger children. The workshop was conducted in the context from a local computer club initiative (Weibert et al., 2018), and one of these clubs formed the majority of the participants: a mixed group of children (9 boys and 2 girls) aged 8-10 of different cultural and migration backgrounds participated together with their teacher. Also, one boy with no connection to the computer club initiative joined. The tutor team consisted of three female and one male tutor. The task of this workshop was to build cardboard ‘Sparkly Faces’ (figure 6), attached with LEDs. The finalized faces were assembled on one of the walls in the gallery as dots on a large computer-style map of the city and surrounding area (figure 6).



Figure 6. Left: Sparkly Face. Right: City map

6.3.1.2 Workshop 2 – LED Earrings

The aim of this workshop held at the gallery was to build LED earrings (figure 7). The task involved first making a choice on the overall shape and materials. One of the tutors explained the general layout of the circuit, which then needed to be adapted and built into the previously chosen design. This time, the workshop team consisted of two female and one male tutor; eight females (age 11-25) participated.



Figure 7. Left: LED earring. Right: Workbench

6.3.1.3 Workshop 3 – LED Lamps

In this workshop, we focused on female participants age 10-14, because this is arguably a critical time when girls often lose interest in computing (Krendl et al., 1989; Margolis & Fisher, 2003). It was attended by 8 middle school girls and two female accompanying adults. According to their own statements, they did not participate in making activities and never visited a maker space/Fabrication Lab before. However, four of them had experienced coding in school while

four had never coded in the past. The objective was to craft or ‘hack’ one out of three kinds of lamps (figure 8) and enriching them with LED technology. The making activities centered around soldering, flashing a microprocessor, laser cutting and crafting at the workbench. We provided source code for the microcontroller which the girls were able to edit in limited ways by changing values. For this workshop, we established a mixed tutor group of six male and two female tutors. The latter offered guidance with soldering and coding tasks (figure 11).



Figure 8. The lamps

6.3.2 Data Collection and Analysis

Our approach to the fieldwork was an ethnographic study in the anthropological tradition (Dourish, 2006) and followed the principles of Participatory Action Research (PAR) (Whyte, 1991). As a method for data collection we chose participatory observation which is an established ethnographic method within HCI, being both reflexive and qualitative (Rode, 2011b; Weibert et al., 2014). This allowed us to better understand the participants’ approaches to making. During the workshop we took observational notes and notes of informal talks which later were expanded to detailed fieldnotes (Lofland & Lofland, 1995). In addition, we took photos of the making activities and the artefacts created by the participants. The qualitative data was analyzed using a thematic analysis approach (Braun & Clarke, 2006). Codes were created via inductive analysis using the software application MAXQDA resulting in four main topic areas. To maximize reliability of the results, we pursued a triangulation strategy as the analysis was conducted by several authors. Here, we analyzed the data through an intersectional lens predicated on the broad assumption that 1) Openness is situated and 2) Openness is multi-

dimensional. The themes were hence the result of an iterative process of coding and discussion. We present the four themes in the following.

6.4 Findings

6.4.1 Raising Awareness



In the past, scholars (e.g. Lewis, 2015) showed that it is often unclear to the public what makerspaces and FabLabs are offering, hence creating the impression of maker culture as a closed circle. This is why it was not only important for us at the outset to raise awareness for our workshops but also to try to make people understand what makerspaces are for: this entailed encouraging entry to potential makers who had not experienced making activities before or who had been confronted with barriers (e.g. S. Fox et al., 2015; Mellis et al., 2016) in the past. For this purpose, we followed a threefold recruitment strategy: Sending out flyers, profiting from existing connections and using the exterior of our venues to our advantage. At the beginning, we prepared information flyer in four languages (German, English, Farsi and Arabic), shared those on all involved parties' social media channels (Facebook, Twitter, Instagram, email newsletters) and delivered them in person to youth clubs, schools as well as public spaces (such as bookstores and cafés). We were eager to use simple language and short sentences to avoid overwhelming potential participants (Lewis, 2015). As there is evidence that women's and girls' motivation to participate in maker activities is largely influenced by social aspects (Holbert, 2016), we emphasized in our flyer that "joint activities create new friendships, cultures and generations meet, get to know and understand each other." This recruitment strategy turned out to be rather successful as several women with different backgrounds (e.g. German as well as Iranian or Arabic) reported to us that they took notice of our initiative via the flyer and visited our Gallery, especially as they were interested in the combination of offered crafting *and* social making activities. Considering workshop 3 a member of our research team had existing connections to a youth initiative targeted exclusively towards girls which helped us to find a pool of adequate participants and prepare the workshop according to the respective group. Finally, we tried to trigger the interest of passersby or 'casual customers' using the exterior of our venues: Arguably, the more visible and accessible the facilities, the higher are the chances to attract diverse makers. Both our venues, the Gallery as well as the FabLab, are located in the inner city near restaurants and

shops where many people walk by every day. The large and visible window facades displayed the program of the project week as well as exemplary maker artifacts, fabrication equipment etc. (figure 9). Our analysis was concerned with the degree to which the ambition of raising awareness was realized and demonstrated some outcomes which related to this. Specific decisions were crucial to attracting different people: An elderly woman entered the gallery because she saw a knitting machine from outside which caught her interest. Several boys came in as they were caught by the 3D prints displayed in the window. This way we were also able to attract several new participants to workshop 1 and 2 as well and able to raise awareness of our making activities to people who were not even familiar with making itself. In terms of workshop 2, a young teacher trainee age 20-25 joined our workshop as she serendipitously walked by the gallery and saw a sign outside promoting our activities. She explained that the LED earrings would prove as a nice accessory when visiting music festivals.

Our descriptions showed that the location of the venue and especially the design of the exterior are already able to foster openness. However, there are more considerations to be regarded in terms of space (and the interior) which we will discuss in the following.

6.4.2 Matters of Space



Making can take place in a lot of spaces such as home studios, industrial parks and educational facilities etc. (Green & Kirk, 2018) and the locations of makerspaces can have a symbolic meaning; an example being those established in libraries or schools as the latter have historically made knowledge resources available to the public (N. Taylor et al., 2016; Toombs, 2017). As described before, locating our venues in the inner city already led to some awareness. In addition, we found that creating a welcoming atmosphere was key as well: A table and flowers were placed outside whenever the gallery was open. Colorful post-its forming the logo of our computer clubs were hung at the window. A cozy corner with a desk, a laptop and headphones to explore audio plays that had been previously produced by children and youth from the local computer club initiative was located in the gallery as well (figure 9). We furthermore built a ‘music wall’, a BareConductive (Arduino-based) Touch Board² which was screwed to a wall and connected to an external speaker. The painted ‘instruments’ functioned as buttons, triggering predefined sound on the

² <https://www.youtube.com/watch?v=dKFRweXei90>

board when touched (figure 9). Whenever the gallery was open, the music wall was available to everyone. Our data identified several participants who reported to us that they liked this welcoming atmosphere, which was contradictory to their associations with other places where technology is used. Hence, we suggest that ‘atmosphere’, an indefinable but nonetheless significant boundary feature, can make considerable difference to initial decision-making.



Figure 9. Above: A welcoming atmosphere
Below: Music station

Creating a welcoming atmosphere also entailed offering a feeling of safety. Makerspaces and FabLabs can be intimidating venues for outsiders, e.g. because of a masculine atmosphere (Marshall & Rode, 2018) (even leading to discomfort, oppression and/or harassment (S. Faulkner & McClard, 2014; S. Fox et al., 2015; Lewis, 2015; Toupin, 2014)) or potential security concerns regarding technology and dangerous machinery like laser cutters (Herrick & Klein, 2016). At workshop 3, some girls were indeed worried about several security aspects which we tried to tackle by pointing out that the FabLab is a safe space to tinker. As a lack of self-efficacy in making has been observed in terms of amateurs (Mellis et al., 2016) and especially female participants (e.g. Lewis, 2015), we decided to let the girls try out things which might otherwise seem intimidating to them (‘leaving the comfort zone’). While some of the girls were reluctant in tinkering with the code at the beginning because they thought they could

'break' it, they quickly realized that their reservations were unnecessary. When one girl e.g. received an error message she called a tutor for support, thinking that she had done something wrong. The reason for the error message was a missing bracket at a specific position. The tutor explained that the program gives the user feedback by pointing to the reason for the occurred error and highlighted that she hadn't destroyed anything. The girl understood this quickly and was able to correct the code in no time. Furthermore, while being fascinated by the laser cutter, the girls were at the same time a bit intimidated, repeatedly asking if working with it is secure (one girl e.g. asked "*Is it secure for the eyes?*"). The tutor introducing the girls to the cutter explained the safety features and told them to test said function. The testing function obviously helped in decreasing their reluctance as they became more confident in using the cutter during the course. They seemed to understand that given that they followed the (security) instructions, they were not in danger. This indicates that careful guidance in combination with explicit instructions (hence reducing intimidation and increasing a feeling of safety), might lead to a more self-confident approach in technology usage.

6.4.3 Shared Language



We already knew that cultural background was important. Different groups have distinct languages which can lead to inclusion and exclusion processes (e.g. Hitlan et al., 2006). While on the one hand, language in such a context can represent a "shared set of ideals" and fosters inclusion (S. Fox et al., 2015, p. 64), technical jargon not understandable to outsiders might lead to exclusion (Lewis, 2015; Maric, 2018). Furthermore, we had to pay respect to people for whom German is not their native language. Our data provided specific examples of how this manifested. Language barriers occurred during our workshops several times. At workshop 1, a father with Arab migration background came to pick up his daughter and found himself in unknown territory. Still not being too familiar with the German language, he was obviously overwhelmed by the new stimuli. We anticipated such situations and asked student assistants from diverse cultural backgrounds to be present at the workshops. Fortunately, an Arabic speaking student assistant was then able to explain to said man the situation at hand. Workshop 2 showed how participants were bringing in different perspectives on technology, sometimes controversial, sometimes eye-opening, but always interesting and thought-provoking. Via discussions, the crafters negotiated meaning and found a common understanding. An interesting discussion about what technology actually means and

how ubiquitous technology became, aroused between a female crafter and a male attendant. The woman brushed nail polish on her earrings and the man started a conversation:

Man: "It always amazes me how much technology is in cosmetics."

Woman: "No, it's art!"

Man: "No, it's science!"

He justified his opinion by explaining that touchscreens of smartphones and artificial nails are quite similar in terms of their "*same chemical reactions*", hence making both them "*bombproof*." Thus, our workshop offered triggers to discuss gender stereotypes as well as the notion of feminine and masculine tasks. At workshop 3 (the most challenging one in terms of technology use) we tried to explain technical aspects in a vernacular way, using the lamps, the technology embedded and the whole Lab environment as a tangible frame. This way, we e.g. explained terms like 'prototype' or 'library' related directly to the objects at hand. We often were successful but sometimes found it difficult to find a common language with the girls. Confusion occurred when a tutor asked some girls about the "*language*" they coded in at school. Two girls both replied "*English*" and the tutor then explained the concept of programming languages (stating C++, Java etc. as examples). Despite their previous experiences this was obviously a new phenomenon to the girls.

The more open and diverse a maker community becomes, the more important it is to recognize that there may be barriers hindering access, if openness is taken across cultures. Making as a social activity can give entry to a social circle in a safe environment, hence adding to wellbeing and sociability of people (N. Taylor et al., 2016). This may be especially true for marginalized groups such as migrants or refugees who are struggling to enter a community, a fact which became apparent during one of our workshops, where a young man from Iran entered the Gallery. He reported that he had heard about the project week via an email newsletter, which immediately caught his attention. Having lived in the town for two years, he still struggled to meet other people, which is why he had rarely left his apartment. After he introduced himself, a female tutor welcomed him by telling him her name and stretching out her hand towards him to accompany the introduction with a handshake. The young man however, obviously in conflict with his cultural values, just folded his hands in front of his chest, bowed his head and said his name as a greeting. Later, when the man said goodbye, he shook the hand of the male attendants but did not do so with the female ones. Some of the females present pointed to the

conflicting cultural values inherent in something as simple as a handshake, and asked how one can secure openness, if such diverging views about the roles of participating people are present.

6.4.4 Co-Production of Different Makers



Makers express their sociotechnical identities (Marshall & Rode, 2018) via their design choices and different approaches to making. As such practices are embedded in a social context, participants furthermore help and learn from each other, hence refining their own identities as well as shaping and respectively influencing those of their co-crafters in the process. We noticed several times that the participants were not only learning from the tutors but were also helping each other to achieve the desired outcome. Such ‘observational learning’ (Bandura et al., 1966) was very fruitful and sometimes even lead to a reversal in the tutor-student relationship. Furthermore, it became obvious that participants relied on the expertise of all tutors, regardless of their gender, age or background. In the following we will describe the individual tasks as well as social dynamics evolving during our workshops.

At workshop 1, the mixed gender workshop, we observed differences in the behavior of boys and girls. The separation between them became visible from the very beginning as both parties decided to sit apart from each other. When a young boy from outside the group arrived to participate in the workshop (see 6.4.1), a female tutor grabbed a chair and placed it next to the girls, asking the boy: “*Would you like to sit here?*” The boy shyly shook his head and pointed to the opposite corner of the table where the boys were sitting. Furthermore, while the boys were vividly discussing with the tutor during the introduction, the two girls barely paid attention. In the end all participants successfully crafted their pieces and were clearly happy when seeing the results of their work, smiling about their customized cardboard faces which were then pinned to the wall. However, to succeed, the girls needed a lot of encouragement from the tutors and often asked the female ones for help. They however never asked the boys to assist them.

Workshop 2 saw different dynamics. An eleven-year-old girl crafted earrings and faced several difficulties in the process. While she lost patience from time to time, she did not give up and finally exclaimed jubilantly: “*I thought that would never work!*” During her task she asked the tutors for help when she was not aware of the next step but worked independently most of the time. Working with a driller seemed, however, too intimidating to her and she preferred to ask a tutor to assist her. After this, however, she guided the sole male tutor who was crafting his

earrings in the process as she was already aware of the necessary steps after working on her own ones. When her mother picked her up, she explained the principles of the LED circuit to her. During the course of the workshop, more women with different cultural backgrounds joined (among them two students from Iran and one from China). The participants were helping each other and the atmosphere was very pleasant and productive. When the male tutor wanted to paint the shell of the battery with nail polish, he asked the women at the table: *“Do I have to pay attention to something when I use nail polish?”* which made everybody laugh. Apart from him, no man was interested in the activity however. When a young male student came to the table and said male tutor asked him if he would want to join, the student laughingly answered: *“No, I’m waiting for the real stuff!”* Also, a couple with two elementary school-aged children came and showed interest. When it turned out they would not have time to stay, they asked for detailed instructions and even took some materials with them, so they would be able to sit down at home and design something there.

At workshop 3, despite the quite high age range (10-14 years) of the participants and different previous experiences with technology, the workshop engaged all the girls. The girls who have coded at school reported that our approach was far more interesting and understandable in comparison to school. Indeed, all girls showed enthusiasm about the project and the FabLab environment, probably because the prospect of crafting a lamp for their bedroom was an incentive. They expressed themselves via the design of their lamps: One girl e.g. decided to cut the logo of her favorite band (figure 10) into her wooden lantern. Furthermore, the girls tinkered with the LED animation code until they were satisfied with the results. We emphasized several times that even with such an abstract thing as a code they created something by themselves that was unique. Tutors and girls or girls among each other often tinkered together, resulting in co-production processes. This way, several girls observed the results of their peers and followed their examples. While the workshop progressed, we not only observed that the older girls started to act as role models to the younger ones but, again, that a reversal of the tutor-student relationship took place.



Figure 10. Left: Tour through the FabLab.
Right: Re-creating the logo of the favorite band.

One girl (figure 11) was described by a tutor later as “one for the future,” recognizing her considerable potential. Although she did not laser cut for herself she overheard the announcements, and was thus able to give security instructions to the others later. She also quickly flashed two microcontrollers for her peers independently, having rapidly developed confidence in using the program. When she was facing difficulties, she did not give up and still tinkered with the code while some of the other participants were already leaving the FabLab. Showing perseverance, she was finally successful.



Figure 11. Left: Female role models at work.
Right: One girl confidently using the program.

6.5 Lessons Learned

The results of our workshops indicate that awareness of the specificities of the setting and the multi-dimensional nature of the factors contributing to openness are critical to successful policy. We have argued that this general argument can be decomposed into four more specific themes (figure 12). In each case, openness in makerspaces can be managed to a degree although trade-offs may be necessary in some cases. We acknowledge that as a university organization,

our FabLab has options that others do not have, e.g. regarding funding, finding a location etc. As e.g. many makerspaces fund themselves via membership fees (Lewis, 2015; Riley et al., 2017), monetary issues might already lead to a barrier for participants. As a university organization we are quite privileged in terms of funding for our FabLab and are eager to make our resources attractive for many otherwise marginalized groups. Having said that, we believe that our workshops were able to contribute to mitigate gender stereotypes and raise awareness of other influences and our lessons learned could be helpful for makerspace organizers who want to foster openness. We will discuss our results in more detail in the following, mainly drawing on the themes we identified. This is done, again, recognising how situatedness and multi-dimensionality played a role during our digital project week.

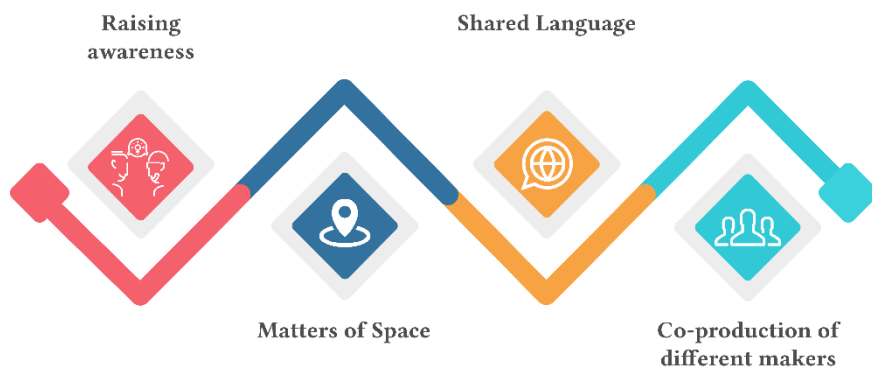


Figure 12. Four themes of openness

6.5.1 Accessibility and Interior

During the course of our project week it quickly became apparent that location played an important role: Our venues could easily be reached and were visible to passers-by, engendering considerable curiosity. We however acknowledge that inner city venues with big window facades are a luxury not every makerspace is able to provide (N. Taylor et al., 2016) (while some makerspaces may deliberately choose to be less visible as a filter mechanism to exclude unwanted members (S. Fox et al., 2015; Lewis, 2015; Toupin, 2014). Also, a central urban location surrounded by shops and restaurants is exclusionary in another way since they are almost by definition the province of the middle classes. In addition, mobility is a geographical as much as a social matter: In the Siegerland area, the public transportation system is not as

conveniently available as in larger cities which might already lead to high barrier for potential participants.

Being accessible and visible is not enough; as other scholars have pointed out, the interior of makerspaces should be a comfortable space that radiates welcome and safety (Toupin, 2014), which is a fundamental issue for all potential members (Lewis, 2015). Previous literature has showed that especially women and girls (arguably because of pressure to conform to roles constructed by society) feel less confident to express their ‘digital agency’ (Lewis, 2015; Turkle & Papert, 1992) (although this arguably may also be true for amateurs in general (Mellis et al., 2016)). However, in comparison to school, out-of-the-box thinking and trial-and-error approaches are not only encouraged in general in FabLabs and makerspaces, the creative environment itself actually fuels them (Blikstein, 2013). Our observations make us confident that the workshops offered a structure which allowed most of the girls and women to tinker and perform with technology. Hence, our results are consistent with a study by Bean et al. (2015) who interviewed female makers that regard the makerspace they participate in as a ‘safe escape’ respectively a ‘getaway’ for creativity – if the infrastructure offers appropriate conditions.

To increase the feeling of safety, a code of conduct or safe space policy might be helpful in further enhancing a feeling of safety (S. Fox et al., 2015; Toombs, 2017; Toupin, 2014) in the future, providing “institutional safeguards against harassment and opportunities for those marginalized in high-tech contexts to feel support“ (S. Fox et al., 2015, p. 60). Although such policies might conflict with the more or less anarchist appeal and rebellious spirit of hacking and making (Lindtner et al., 2014; Toombs, 2017), they can be seen as a step towards openness and may sensitize members at the same time. Such a policy should then, in intersection with 6.5.2, be presented in different languages.

6.5.2 Address Makers with Different Backgrounds

Language barriers might diminish a sense of belonging to a maker environment (N. Taylor et al., 2016). Firstly, to overcome those issues, we offered linguistic diversity, although we acknowledge that especially smaller makerspaces do not have the resources to follow this example. Secondly, another challenge was to find an adequate ‘tonality’ to communicate our efforts, such as using easy language and emphasizing the social aspects of making. In this context, it is furthermore important to acknowledge how people want to identify themselves and their role in the maker community. The term ‘hacker’ is loaded with ambiguities (S. Fox et

al., 2015; Green & Kirk, 2018) and identifying oneself as a ‘maker’, ‘geek’ or ‘crafter’ might be more appealing to some people, especially women (S. Fox et al., 2015; Green & Kirk, 2018; Toupin, 2014). This became obvious during a discussion about said terms with the girls at workshop 3 when a tutor asked what the term ‘hacker’ means. One of the girls responded that those are “*people who invade computer programs.*”

We furthermore discovered that our will to foster openness was by times challenged when our activities were taken across cultures as the example of the young man from Iran showed. The entry to a social circle can increase wellbeing and sociability of people (N. Taylor et al., 2016; Toombs, 2017) and it became clear to us that said migrant was desperate to find entry to a community. However, his behavior towards women, despite culturally conventional in his country of origin, turned problematic with the assumptions of our makerspace. Makers in a community usually share similar ethics and beliefs (N. Taylor et al., 2016) and the values of the majority thus shape the self-concept of the space itself. This anecdote shows not only how situated and multi-dimensional openness can be but also that managing cultural diversity in such a community setting remains a challenge. Undoubtedly, in such a context with a multiplicity of cultural influences it is very difficult to determine ‘right’ and ‘wrong’ values. As our makerspace is situated in Germany, we as organizers are taking ‘European values’ for granted although the desire for openness also means to create a sense of belonging for people from different cultures.

6.5.3 Embrace Diverse Sociotechnical Identities

As other studies found, previous knowledge in maker environments is of secondary importance as students often start with their own experiences and knowledge which are then augmented by working with maker tools (Blikstein, 2013). In this context, offering ‘tangible’ and meaningful experiences (Papert, 1980; Rode et al., 2015) was an important incentive to foster motivation and participation. What is meaningful turned out to be very different for each participant. The children at workshop 1 all designed their cardboard faces differently and according to their individual taste. The young woman in workshop 2 joined because she believed the LED-earrings were a nice accessory for her next festival attendance. One girl at workshop 3 decided to cut the logo of her favorite band (figure 10) into her wooden lantern, hence creating a meaningful artefact that displayed her personal interests. Such activities increased identification with their work, arguably leading to a positive impression of making. Hence, even when

workshops are targeted towards rather homogenous groups, it is important to acknowledge that many sociotechnical identities might co-exist in such formats (Green & Kirk, 2018; Marshall & Rode, 2018). At workshop 1, the self-efficacy of the attending girls was observably low (although it demanded the arguably easiest tasks) and they needed a lot of guidance. While this observation does not necessarily reflect gender differences, there is evidence that boys and girls approach maker tasks differently and that they benefit from mixed gender groups (Weibert et al., 2014). Thus, we could have encouraged co-production more from the very beginning, e.g. by dividing them into mixed groups. Our experiences with deliberately establishing female role models to address the requests of scholars like (Lewis, 2015) were encouraging; arguably so fruitful that at the end of workshop 1 one of the girls, who was obviously so impressed by the skills of a female tutor, took a look at the room which had several crafted pieces displayed and asked the tutor: “*Did you do all this by yourself?*” The tutor smilingly denied and emphasized that the pieces were results of several makers combining their efforts. With regard to workshop 3, the attendance of female role models showed the girls that women are ‘natural’ in such an (potentially intimidating) environment. It is questionable if a tutor team composed of just men would have produced the same effects. Unfortunately, there was no female tutor available to introduce the girls to the laser cutter which means that we need more female role models who can work with the ‘heavy machines.’ We do acknowledge that workshops targeted towards specific groups, especially girls-only activities and an emphasis on female role models, always walk a fine line: On the one hand they might make gender or other marginalization factors salient and thus run the risk of creating reaction since they are perceived as lacking openness. On the other hand, they might create an environment in which the reification of e.g. gender roles by ascribing technical competence to one gender can be alleviated (Holbert, 2016; Lewis, 2015; C. L. Martin & Ruble, 2004). That many makers obviously still divide between feminine and masculine maker skills (e.g. Marshall & Rode, 2018) was shown by the comment from the young male student from workshop 2 who said that crafting LED earrings is not “*the real stuff.*” As a result of such statements, women (and other makers) might get the impression that their tasks are undervalued or misunderstood (S. Faulkner & McClard, 2014). To counter the common misconception that activities like knitting, sewing, painting and sculpting are not part of the maker culture (V. Bean et al., 2015) hence seems like a step forward towards openness and our positive experiences with our workshops lead us to advocate our approach.

An additional barrier for participation (especially for women) might be family obligations (S. Faulkner & McClard, 2014). For this workshop we followed the suggestions of Bean et al. (2015) and provided opportunities to family oriented tasks. Indeed, several families and especially mothers with their children visited our venues.

6.5.4 Sustainability Remains a Challenge

Our workshops were geared to a short-term assessment of the factors which might inhibit or encourage female participation. It remains the case, however, that individual continuity in making or, put differently, makerspace sustainability has been identified as a significant issue before (Han et al., 2017). Disappointingly, in our case, and after what seemed to us to be some encouraging findings, participants did not return to the open lab sessions despite the fact that they seemingly enjoyed our workshops. Although we e.g. repeatedly stressed to the girls at workshop 3 that they could return to continue hacking their lamps (e.g. expanding their functionalities or re-adjusting the LED animation) and one girl mentioned: *“I think I’ll come back again. It was so much fun!”*, none have yet returned. Why is this so? Undoubtedly, research activities are limited by aspects such as time, budget, ethics and other factors (Aarseth et al., 2017; Fiesler et al., 2018) which have an impact on their sustainability. This phenomenon is even more true for Action Research endeavors (N. Taylor et al., 2013; Woollorton et al., 2015). In this context and considering HCI in particular, Taylor et al. (2013) show which problems arise when researchers are “leaving the wild” while Nunamaker Jr. et al. (2015) make the call for walking “the last research mile” to achieve sustainable results. These authors report on said issues in relation to long term projects which arguably intensify in our context: While the build-up of a community is a long-term task, workshops are time-delimited and short-term solutions. This is a dilemma, as Participatory Action Research projects in principal are considered to be a suitable method to build sustainable collaborations and evoke enduring social change (N. Taylor et al., 2013). If maintaining sustainable outcomes in PAR projects is already a tough challenge in long term projects, then we are confronted with a stark challenge, since we see similar lack of effect. As Blikstein (2013) lays out, simple digital fabrication projects are a good way to trigger interest and generate results that are aesthetically pleasing, but there exists a need to push students towards more complex projects. The latter demand conflicts with research results which indicate that women “exploit the space for particular tasks related to individual projects, and tend not to return once those projects are complete (Lewis, 2015).” It is clear to us is that efforts of the kind we advocate need to be sustained. Our lessons learned

leave us with implications which are surely also relevant to fostering a long term perspective, have to do with embedding into the daily routines of makerspace and require us to reflect carefully on what is known about community building: As already laid out, makerspaces can represent a focal point of community life in the sense of what Oldenburg (1999) famously called ‘third spaces’ (see also Moilanen, 2012; N. Taylor et al., 2016): neutral, accessible grounds which foster conversation among regular participants, offer a playful mood and feel like a ‘home away from home.’ Our lab has an ‘open’ ideology but is confronted by challenges. These reflect cultural specificities, small group dynamics and lack of an outreach program which systematically facilitates follow-up. Intrinsic motivation in participation has been recognized as a driver of makerspace continuity, but only if the spaces are able to match the needs of their makers (Han et al., 2017). While the project week with its guided workshops served as a door opener, the unstructured open lab session can still be intimidating, or at least overwhelming, for newly arrived parties (Lewis, 2015; Mellis et al., 2016). One of the things that we failed to consider was that group activities bring a level of social support which arguably pre-existed the projects. Expecting re-engagement by individuals, rather than by small groups with ongoing interests, was naïve, especially given the age of our participants. Insights from other scholars with respect to the materials provided (Petersen et al., 2015), the task given (de Valk et al., 2013) or factors that lead individuals to adopt a maker identity (Moilanen, 2012; Toombs, 2017; Toombs et al., 2015) surely serve as good sources for inspiration here.

In terms of research pragmatism, most makerspaces are arguably too understaffed to be able to deliver extensive (research) activities in the form of regular workshops. From an openness perspective this cannot be the goal anyway as regular and ongoing initiatives are the heart of maker culture (Lindtner et al., 2014). Nonetheless, in respect of future work it will be interesting to organize more workshops, perhaps on an annual basis, and carefully investigate their long-term-impact on community building to sharpen our insights. We hope to get in contact with our participants again and perhaps even engage some in a mentor role for new workshop projects. Additionally, taking further diversity aspects into account, e.g. people with disabilities (Alper, 2013; N. Taylor et al., 2016) (who we, admittedly, did not address explicitly yet) will be inevitable if our desire is to foster openness. Furthermore, as makerspaces and FabLabs have proven to be beneficial for local industry (e.g. Lewis, 2015; Lindtner et al., 2016, 2014) and can foster local economic development, sustainability can also be achieved via industry

cooperation. Such endeavors might also help to attract the ‘wider public’ (N. Taylor et al., 2016, 2017).

6.6 Conclusion

This paper presents our experiences from a digital project week in a mid-size town in Germany, which aimed to explore constituents of openness in the maker culture. As making is regarded to be a driver for economic and social change (Lindtner et al., 2014), creating an open maker culture seems essential in a time that holds manifold challenges in terms of dealing with migration and diversity. We contribute to existing knowledge by examining the local maker context through an intersectional lens, constructing gender-relevant workshops and describing factors supporting diversity in our setting. More specifically, we highlight a difficulty in work of this kind, which has to do with the gap between immediate results (which, in our case, were largely positive) and the issue of sustainable futures. In the short term; various factors influenced engagement, including social, cultural and spatial organization. As regards sustainability, however, it seems that different factors apply. Our paper highlights how short term and immediate benefits to learning were not translated into sustainable outcomes and led us to question our own assumptions. We discover that short-term, project-based approaches to inclusivity do not, in and of themselves, result in any significant shifts in behavior. Why this might be remains unclear and in future work, we hope to address this issue.

7 Hacking Masculine Cultures – Career Ambitions of Female Young Professionals in a Video Game Company

Abstract

Women employed in video game companies are facing several barriers regarding equality and career chances. Scholars argue that career development of women is at times hindered because of hegemonic masculinity in organizations, with networks and other social factors playing a more important role than qualifications. This means that women miss out on career opportunities in a thriving and future driving industry. Yet, as gendered working environments are considered to be the result of social construction, they can also be restructured. To explore the drivers of these aspects, we conducted a qualitative field study in a video game company in a large city in Germany to understand what challenges regarding masculinity exist and how they are dealt with. Our lessons learned contribute to the realization of more gender-sensitive working environments in the video game sector and, as a result, of more diverse video games as well.

7.1 Introduction

The IT sector is dominated by men and the video game industry is no exception, with the number of women employed in the workforce estimated at about 15% (Chess & Shaw, 2015; Prescott & Bogg, 2014). Masculinities in the gaming culture are widely discussed (Paaßen et al., 2017) and working as a non-man in the field remains a challenge at various levels: Several factors like cultural stereotypes, sexism, disadvantages in pay, a lack of advancement or access to networks as well as missing role models and peers have been identified as barriers in video gaming and the gaming industry (e.g. Paaßen et al., 2017; Prescott & Bogg, 2014; Weststar & Legault, 2018). This leads to a rather androcentric environment where the corporate culture remains largely constant and a gender-sensitive perspective is often left out. “It seems women have to fit in with existing systems rather than the industry looking to understand different workplace practices and cultures (...) (and) addressing the issues which result in the gendered inequalities” (Prescott & Bogg, 2013, p. 56).

The low participation of women in IT industries is problematic since there is evidence that a lack of diversity in technology production leads to fundamental design flaws (e.g. Criado Perez,

2019; D'Ignazio et al., 2016; Hankerson et al., 2016), reducing usability or even excluding user groups. In terms of video game production, this is equally true as games that include female participation during the development process might reduce stereotypes embedded into game mechanics and character design (Cassell, 2003; Kafai et al., 2008). Scholars have argued that career development for women is often hindered by masculinity in organizations and that career development does not solely depend on qualifications but on networks as well as other social factors (e.g. Acker, 2006). Men who represent a certain heteronormative masculinity (Connell & Messerschmidt, 2005) are those who benefit most from masculine corporate structures (Collinson & Hearn, 2005). As a result, women in video game companies are confronted with dominant 'male perspectives', struggling to be heard (Cox, 2018). To cope with masculine work environments in IT, women often develop strategies which challenge their gender identity, such as adopting a masculine or androgynous identity (Prescott & Bogg, 2013). From this perspective, it seems reasonable that the realization of more gender-sensitive working environments (and in this way increasing career development chances of women) might result in more gender-sensitive video games.

Masculine working environments are, in our view, the result of social constructions because of gender performativity (West & Zimmerman, 1987) or 'doing gender' in everyday interactions and, if so, they can be restructured via 'undoing gender' (Butler, 2004). In this sense, sensitizing people to reflect on their own behavior to 'undo', tackle and break up gender stereotypes seems like a step forward. This might be the case in terms of organization processes (Kelan, 2010; Tyler & Cohen, 2010) but also for technology (e.g. Vorvoreanu et al., 2019) and, again, games design (Cassell, 2003; Dickey, 2006; Kafai et al., 2008).

Scientific discourse has evolved around the situation of women in IT environments (e.g. Holtzblatt & Marsden, 2018) or the motivation of women to enter the field (e.g. Margolis & Fisher, 2003). Yet, little attention has been paid to the question of how women in video game companies deal with the subtle notions of masculinity which disadvantage them in terms of their career development and how this might in turn influence game design. The gaming industry benefits from a 'halo' effect whereby positive experience of gaming culture leads one to expect a similar culture in a gaming company. This allows for a pool of personnel with high intrinsic motivation. Making sure there is diversity in the personnel hired into the company is critical to bringing multiple perspectives to bear in product design, affecting revenue and profit (Herring, 2009). Beyond higher business opportunities and considerations of justice, there is a

moral responsibility to diverse perspectives in game design in a culturally influential industry. As organizational structures play a major role in the reproduction of male power and masculinities (Collinson & Hearn, 2005), our ethnographic study aims to contribute to the discussion. For this purpose, we conceptualize masculinity in organizations as historically established, taken-for-granted structures, embedded in power relations (Maguire, 2001). Focusing on the workplace environment in a video game company in a large city in Germany, our study seeks to understand how young female professionals realize their career ambitions, which barriers they face, which strategies they use to deal with the masculinity environment, and how those aspects influence video game design. This way, we propose ways to undo gender in such organizations and contribute to a growing interest in feminist research in the field of HCI (S. Bardzell, 2010).

7.2 State of the Art

7.2.1 Gender and the Video Game Culture

Gendered assumptions in society have been identified as the main reason for the low participation of women in computing, starting from childhood and enduring into adulthood (e.g. Cheryan et al., 2015). Linked to this is a lower self-confidence and, respectively, self-efficacy of women compared to men in technical occupations in general and IT occupations in particular (Busch, 1995). At first sight, the video game culture offers a different picture: While diversity is underrepresented within games (Shaw, 2012), women are not necessarily a minority in gaming: The number of male and female gamers is nearly equal (Paaßen et al., 2017) and in some fields of game-playing female users even form a majority (e.g. Kirriemuir & McFarlane, 2004). Yet, video gaming is still strongly associated with masculinity and there exist tacit signals concerning who is a ‘real gamer’ and which games matter (e.g. Cassell, 2003; Shaw, 2012; Vermeulen et al., 2016). Evidence shows that the video game culture can entail a rather ‘toxic gamer culture’ for female gamers as a result (e.g. Consalvo, 2012). Although the stereotype of the ‘male geek gamer’ is less valid today, identifying as a gamer or being identified as a gamer might still be loaded with negative stereotypes such as being an unpopular, unattractive, asocial geek (Kowert et al., 2012, 2014). Thus, women often struggle to identify as ‘real gamers’ whereas “men perceive a stronger overlap between their gendered identity and their gamer identity” (Paaßen et al., 2017, p. 426). A lack of visible female role models

increases the impact on gendered gaming behavior even more (Paaßen et al., 2017). While the passion for games is developed through gameplay, construction processes put barriers against women in terms of access to gameplay as video games are considered to be a ‘boys’ thing’ (C. Martin & Rafalow, 2015; Natale, 2002; Thornham, 2008; Weststar & Legault, 2018) which is why many girls and women do not consider a career in gaming to be a serious option (Prescott & Bogg, 2014). The industry adopts and reinforces those cultural notions by having a tendency to market their products towards young, male, heterosexual ‘hardcore gamers’ (Cassell, 2003; Consalvo, 2012; Shaw, 2012). The video game sector as an employer can be described as part of the entertainment, cultural and creative industry (Prescott & Bogg, 2014) and a passion for games is often stated as a job requirement (Schmalz, 2015). It involves the project-based development routines which often include long working hours and crunch times (Weststar & Legault, 2018) as well as informal and relaxed environments where e.g. people tend to be hired due to interpersonal fit (Kerr, 2006) and a high degree of self-organization of employees is needed. So while this creative and culturally influencing industry might be in need of diversity, it still puts subtle yet massive obstacles to the career ambitions of women.

7.2.2 Gender and the Video Game Industry

Like other tech fields, the video game industry is dominated by men (Prescott & Bogg, 2014). The few women in the industry tend to be employed in non-technical areas, such as project management, human resources, or journalism (Prescott & Bogg, 2014; Weststar & Legault, 2018) and just like video game culture itself, masculinity in the industry (Chess & Shaw, 2015) is a matter of concern. Hostile environments, disadvantages in pay, barriers to career advancement, missing role models etc. have been documented in numerous reports (e.g. Paaßen et al., 2017; Prescott & Bogg, 2014; Weststar & Legault, 2018). The situation is exacerbated further by a low number of women in senior roles (Prescott & Bogg, 2014; Weststar & Legault, 2018). With the majority of domestic labor still being done by women, the low number of women game developers with children also reflects a limiting factor. An image of sexism in the workforce decreases success chances for women (Prescott & Bogg, 2014) eminently visible during public discussion of the ‘gamergate’ controversy (Todd, 2015).

While organizations might present themselves as gender-neutral, assumptions regarding gender influence them throughout, including structure, advancement options, and job roles (Acker, 2006): Hierarchical structures of companies are typically associated with men's bodies and

masculinities being more highly valued than women's at all levels (Acker, 2006). Feminist research (R. Edwards & Mauthner, 2002) has examined the various forms of oppression and exploitation resulting from this inequality (Lorber, 2011). The main reasons are seen in established, taken-for-granted practices legitimizing men's dominant position in society (Maguire, 2001). Here, a subordination of women, non 'alpha men' and minorities as well as marginalized groups (Connell, 1995) takes place with masculinity being expressed symbolically (Gherardi, 1995). 'Hegemonic masculinity' as coined by Connell (Connell & Messerschmidt, 2005) has since been used to describe how men who represent a certain heteronormative masculinity maintain dominant social roles (gendered order (Acker, 2006) and power relations) over people who are perceived as 'feminine' or do not represent a certain type of masculinity (Connell, 1995). A wealth of literature deals with the constructions of masculinity and their impacts on social and working life (Cheng, 1996) across different academic fields. For brief mention, those include health (Courtenay, 2000), sports (Schacht, 1996), military (Hinojosa, 2010), and prisons (Kupers, 2005) among others. It was shown that at its worst, masculinity is expressed in socially regressive male traits, especially when it involves competition and domination, devaluation of women, homophobia, and wanton violence (Kupers, 2005), honoring the 'survival of the fittest.'

These hegemonic masculinities have also been shown in IT in different variations (Ensmenger, 2012), such as the predominant and highly valued technical expert (Comeau & Kemp, 2007). Boosted through a particular kind of geek/nerd culture (T. L. Taylor, 2012; Varma, 2007), this culture still creates an occupational space dominated by men (Alfrey & Twine, 2017). Berger et al. (2015) showed how gendered networking in tech collaboration projects was practiced in everyday situations with symbolic gender orders becoming apparent (Gherardi, 1995): Through allegedly trivial activities such as pouring coffee, but also in critical activities, e.g. when filling positions, inequalities in networks were reproduced (or countered) through largely unreflective activities. It is hence unsurprising that a retention problem of female personnel exists (Tapia & Kvasny, 2004). Masculine environments in IT thus tend to value qualities typically associated with men and that are alienating to women (Chess & Shaw, 2015; Prescott & Bogg, 2014; Weststar & Legault, 2018).

7.2.3 (Un-)Doing Gender in Video Game Production

The domination of masculine views within a video game company might then impact the way games are designed. Indifference to diversity aspects leads to fundamental design flaws in technology production (Cassell, 2003; Dickey, 2006; D’Ignazio et al., 2016; Hankerson et al., 2016; Kafai et al., 2008). The notions of ‘doing’ (West & Zimmerman, 1987) and ‘undoing gender’ (Butler, 2004) have been proposed by scholars as ways to reflect on gender performativity in everyday life. Undoing gender involves breaking up socially constructed gender identities, gender roles (Lindsey, 2015), as well as masculinities crafted in everyday interactions. The concepts can be used to analyze and propose change processes (Cassell, 2003; Criado Perez, 2019, 2019; Dickey, 2006; Kelan, 2010; Tyler & Cohen, 2010) and would seem to have potential for improving inclusiveness (Marsden & Pröbster, 2019; Metaxa-Kakavouli et al., 2018; Van der Velden & Mörtberg, 2012; Vorvoreanu et al., 2019). Analyzing gendered processes in video game production thus seems to be a fruitful approach to shed light on such mechanisms and foster inclusiveness in multiple ways.

Simply including more women in a given environment may not necessarily change the dynamics within the field (Hirshfield, 2010), but undoing gender within the companies might. The literature offers a range of guidelines (e.g. Hazzan & Dubinsky, 2006; Holtzblatt & Marsden, 2018) to foster gender sensitive approaches in IT workspaces in general but we still lack *contextualized* knowledge of how women are actually coping with the challenges of masculinity in video game companies in terms of their career development and how such barriers might influence video game design. To shed light to such questions, we conducted our ‘on the ground’ (Wulf et al., 2013) study which we will describe in detail in the following.

7.3 Methods

This study is part of a larger, ongoing Gender and IT Living Lab project which integrates stakeholders from different IT fields and aims at transdisciplinary research at the intersection of gender studies and IT (Ahmadi et al., 2018). Our approach to the fieldwork at an internationally operating video game company was a study in the anthropological tradition of ‘institutional ethnography’ as proposed by Smith (1987), which aimed “to make the viewpoint of the researched women central to the research” (McDonald, 2005, p. 465) and, equally importantly, focused on ‘everyday experience.’ From a methodological stance, our approach was informed by feminist Participatory Action Research (FPAR) (Maguire, 2001). The

connection between Participatory Action Research and feminism appears natural as both aim for social justice, equality, liberation of individuals and share a humanistic, democratic, and emancipatory understanding (Creswell et al., 2007). FPAR gives marginalized groups voices and empowers them by starting from their everyday experiences. Collaboratively, change actions are established and interventions tested. Offering participants a ‘safe space’ to speak up seems essential in such sensitive research settings, especially when people might fear consequences, such as hurting their career (DeVault & Ingraham, 1999).

7.3.1 Study Setup, Setting and Participants

During our first visit we collaboratively decided with company representatives (Human resources (HR) and several employees from other departments) that, from a gender perspective, the research collaboration should focus on ways to foster processes of talent acquisition and talent development. The company has successfully been developing games since the early 90s and is now embedded in a larger nationally and internationally operating corporate network. German or English are the languages used and the background of the employees is quite mixed with 19 nationalities. Roughly 60% are from Germany while 40% come from other countries. The company is located in the Western federal state of North Rhine-Westphalia where female participation in IT, at 14.22%, is low compared to other states in Germany (Statistik der Bundesagentur für Arbeit, 2017). In line with these numbers, by April 2018 the proportion of women employed in this company was about 16%.

In March of 2017 we started to find institutions interested in collaborating with us and acquired the video game company through a cold call asking whether they would be interested in working with us at the intersection of gender studies and IT. During a kick-off-meeting, we encouraged the company to define their own research question, based upon real life working situations (Ahmadi et al., 2018). The head of HR then sent an email to the staff asking about potential interest in the project. Seven participants emerged from this process with whom we collaborated closely over the course of eight months. In terms of background, duration in the company, tasks, and responsibility we were able to achieve a quite diverse mix (table 3). Four women are from Germany and one is from a German speaking neighbor country while two women have East-European (PN3) respectively Mediterranean (PN4) heritage (thus being not yet fluent in German, preferring English to communicate). Additionally, two women (both

tester/QA) as well as two men (HR and communications department) in their 20s to 30s participated (exclusively, thus not being listed in table 3) in a focus group discussion.

Table 3. Participants information at the start of the study

PN1	Age	Duration in company	Task
1	29	6 years	Producer
2	30	3 years	Producer
3	30	5 years	Concept artist
4	25	2 months	Game tester (QA)
5	38	5 years	Head of HR
6	29	2.5 years	Public Relations
7	39	11 years	Game design

PN1 and PN2 both work as producers and project managers (budget, strategy) with lead responsibility. PN3 is a senior concept artist, creating art works and sketches for games. PN4 works as a game tester in quality assurance (QA, mainly testing newest versions). PN5 is head of HR and responsible for tasks ranging from talent acquisition to talent development. PN6 started in QA, then switched to communications, being now responsible for public relations. Later she additionally took duty of diversity and inclusion management. PN7 is responsible for game design with a focus on user experience (UX).

7.3.2 Data Collection and Analysis

For data collection and analysis, we chose a mixture of qualitative methods (figure 13): Firstly, we conducted semi-structured interviews with all of the participants listed in table 3. Interviews lasted from 18 minutes to one hour (length usually corresponding to the women's length of employment in the company) with a mean of 46 minutes. The interviews were conducted by the first and second author together except for the interview with PN7, which was a single researcher interview (first author). The interview guide encompassed questions inter alia aiming at the women's childhood and adolescence (trigger for interest in tech and games), education and entrance to the field, previous and current experiences in business life, perception of the

corporate culture and career opportunities, etc. Secondly, we used observation, more precisely shadowing, as a method to collect data (McDonald, 2005). Here two researchers (first and second author) visited PN3 and PN4 (in comparison, a long- as well as a short-term employee) twice a month on ‘ordinary’ working days over the course of a quarter year. Both methods are well suited for acquiring knowledge about daily business routines and language, different roles, delegation of tasks, and corporate culture (McDonald & Simpson, 2014). Shadowing as an addition to interviews can add to “individual’s account of their role in an organization” and “produce (...) detailed data that gives the organizational researcher access to both the trivial or mundane and the difficult to articulate. These aspects of organizational life are the hardest to research and shadowing can make an important contribution in this respect” (McDonald, 2005, p. 457). The interviews were recorded and transcribed. During the shadowing process we took notes which later were expanded to detailed fieldnotes (Lofland & Lofland, 1995). The qualitative data then was analyzed using thematic analysis (Braun & Clarke, 2006) while codes were created via inductive analysis using the software application MAXQDA. To maximize reliability of the results, we pursued a triangulation strategy as the analysis was conducted by several authors. The result of this coding process was to create thematic narratives (Czarniawska, 1997) exploring individual sentiments shaped by their environment. Narratives describe perceived, personal experiences over time, considering the relationship between individual experience and cultural context (Clandinin & Connelly, 2000). Since narrative stories are usually negotiated between the people involved in the research process (Etherington, 2004), we invited all interviewed women plus the four additionally interested employees mentioned above (two male, two female) to a focus group (that lasted about 4 hours), where we presented our preliminary results which served as anchor points for group discussions.

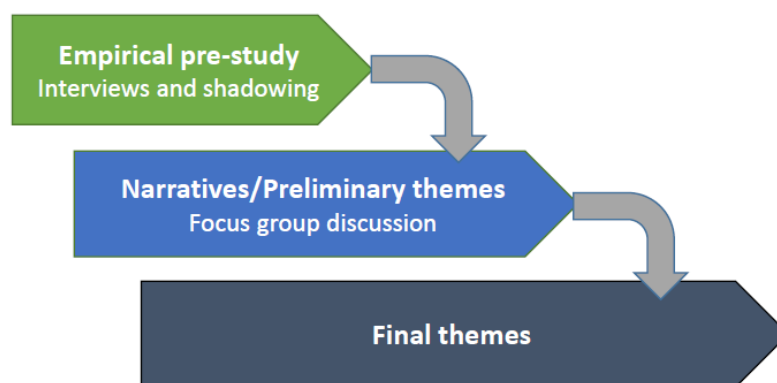


Figure 13. Data collection and data analysis process.

The focus group was intended to provide the participants with a sense of belonging and empowerment by giving them the opportunity to speak (Farquhar & Das, 1999). Both methods are consistent with feminist approaches (Olsson, 2000) and have been used in studies about gender in organizations (e.g. Czarniawska, 1997). With two exceptions (PN5 and PN6 because of sick leave) all women interviewed in the study were present. The discussion was recorded and we additionally took notes. This sharpened our themes which we present in the following.

7.4 Findings

Our findings suggest that the women of our study enjoy working in the company and yet they are confronted with subtle notions of masculinity. The latter are not the result of malicious intent but rather of unreflective, established taken-for granted structures, which affect women throughout their chronological progress within the company: 1) The process of onboarding and getting familiar with the corporate culture, 2) putting the existing skills to use during daily work, and 3) raising the company ladder by developing the skills and taking responsibility.

7.4.1 Onboarding into the Corporate Culture

For most of the women, joining the company was either the result of having a strong desire to work in the industry or specifically at that company, often both. Some women left their former (non-gaming related) companies and accepted lower salaries to land their ‘dream job.’ During an interview, PN3 revealed that: *“I was very happy, because (...) they created my favorite games here. (...) I was like jumping with full of joy. (...) This is... My dream is coming true! (laughing).”* The onboarding process, feeling welcomed, receiving an introduction, getting to know the corporate culture, and being able to start with new tasks directly, is a very important part of entering an organization (Graybill et al., 2013). This has been confirmed by PN1 who said: *“There is nothing worse than a bad first day.”* Generally, from the very beginning the women felt a fit because of the rather ‘geeky’ corporate culture, which is considered to be a strength of the company. During the observation phase, the researchers saw that the company adopts the gaming culture as their corporate culture as the interior of the company reflects this ‘geeky’ attitude (e.g. game related posters hung on walls etc.) In addition, there is no dress code; while some employees are dressed more casually, others are dressed in their own version of casual, wearing tattoos as well as piercings. Apart from PN5 (HR) all women consider themselves as gamers and most described themselves as ‘geeks’ as well. PN5 stated that HR

are encouraging such a mentality as it helps to maintain an open mindset and keep up with the state of the art of the field. This is why the atmosphere has been described by participants as being “*very special, in a positive way*”, a feeling one conceives from the first work day. Several times, the term “*family*” was even used to describe the personal interactions. People are engaged to make the first weeks within the company easier, inviting newcomers for lunch, a beer in the evening etc. PN2, who is a career changer (having studied English literature before), described her co-workers as being open and helpful. Knowledge exchange helped her to acclimatize quickly. This is in line with other interview statements of PN3 and PN4, both from abroad, who felt appreciated by their team. Despite this, onboarding processes are considered to be rather unstructured with several women at the focus group mentioning that the onboarding process respectively the first months in the job were quite tough. Getting “*your desk and your PC, and (...) start working*”, being “*on your own*” as well as feeling “*swallowed by the team*” have been statements to describe this situation. This puts an even bigger challenge to especially women entering a male-dominated field with men who have already established themselves in the company. Participants hence see the need to re-structure the onboarding process. Yet, at the focus group discussion, special initiatives for newcomers were also discussed critically as they run the risk of making being a female newcomer a salient characteristic. In this context, PN2 said during her interview: “*That I am a woman (...), that this is something special, I actually only noticed this when I started here.*”

Some of the women reported negative experiences in their previous companies during the interviews, mentioning gender stereotypes, harassment, bad climates, unprofessionalism, conflict etc. They emphasized that by comparison they, in the main, value their current experience. Despite this, there were occasional reports of subtle forms of harassment. PN7, for instance, describes herself as bisexual and although she feels generally accepted, she has been told of remarks ‘behind her back’. As best we can tell, however, such incidents are uncommon. Nevertheless, these subtle notions of a masculine environment exist that are difficult to handle for the women from time to time. During the observation phase at the company, the researchers identified kinds of loudness and teasing amongst men one could conceive as signs of a ‘man cave’ (Ruder et al., 2018). Asserting oneself in such environments as well as building bonds with other (female) co-workers right from the start might thus be an important task for women to not only foster the own career ambitions but also to ensure that the own perspective into game design is not lost. PN7, who was the second woman to ever enter the company, said

(during the focus group discussion) that she envies her younger colleagues for the conditions that are now more common: *“I missed female co-workers a lot!”* During the interview she additionally told us that she did not dare to raise her opinion when she started, less because she was a woman, but because she was a newcomer: *“I just had a different view of some things (...) but I did not say that often (...) because you do not have a standing yet.”* In the focus group discussion, one participant mentioned how bringing along a certain *“stubbornness in doing something”* is a good definition for what is needed to succeed as a woman within the company.

The shadowing of PN4, who was a newcomer at the time, revealed some interesting insights into processes of bonding and asserting oneself between her and her two female-coworkers (who as well were quite new to the company): *“We were on our own. All in the same boat.”* Not only did they support each other but they also found strategies to cope with the subtle masculine notions around them. An anecdote that has later been described as the ‘coffee situation’ was observed by one of the researchers: Repeatedly, the three women felt that their colleagues (arguably intentionally) leave a last sip of coffee in the coffee pot which lead PN4’s co-worker to exclaim: *“It feels like we are the only ones in this company brewing coffee!”* Indeed, once the first author also wanted to grab a cup, he saw two men standing in the kitchen, drinking coffee despite the pot being empty. Although there was also a second coffee machine with coffee beans in the room there did seem to be a pattern here with employees, mostly men, passing on the responsibility for brewing coffee to the next person who wanted a cup. The three women felt the obligation to constantly undertake this duty then (probably also because they were rather new to the company), so they decided for a self-confident approach by creating and printing a ‘meme’ (figure 14) which was then hung at the cupboard of the coffee kitchen. Later that day, PN4 remarked that someone brewed new coffee with the researcher responding that their *“meme is working.”* PN4’s co-worker replied: *“It was a group effort.”*

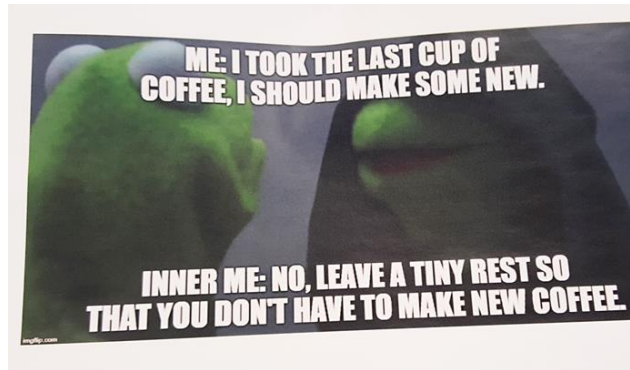


Figure 14. Humor as a tool to raise awareness for uncooperative behavior

Although this is, on the face of it, a fairly trivial example, it does indicate the way in which women need symbolic support in order to assert a position, support which becomes more available with increasing numbers. Weeks later, the poster not only still hung in the kitchen, it even survived when the QA-team switched floors within the building. However, when the team moved to different rooms, the first author also observed a decline of these dynamics as the three women sat more separated from each other. Even physical proximity seems to matter.

7.4.2 Perceptions on Talents, Skills and Self-Efficacy

“If there is any skill that says something about the talent, it’s persistence. How persistent people are not giving up doing what they love. And yeah, that’s the only skill that is really important (...).”

This was the answer of PN3 when asked during the interview which ‘talents’ are needed to fulfill her duties. Her response reflects an important aspect that the participants agreed on: Talent is a rather loaded term and creates the impression that someone needs ‘inborn talents’ to succeed while skills are something that can be achieved via hard work and diligence. The latter was, however, sometimes perceived as ‘intimidating.’ In both instances, what is striking is the women’s sense of being ‘measured against’ something intangible. It became apparent that to follow a successful career path in the company, one does not necessarily need to be an IT specialist (although during the observation phase it became clear that the tasks of PN3 and PN4 require above average computer skills which is arguably true for all the women). Yet, most women expressed the view that men usually have a higher degree of self-confidence and self-

efficacy (Bandura, 1982) in both non-technical and especially in technical areas: In this context, PN1 stated:

“Men (...) are more likely saying: ‘Yes I can do that!’, even though they probably aren't the best in the field, (...). And a woman (...) says: ‘Hmm, well, I'm not so sure if that's enough’ and then she doesn't dare.”

As a result, and despite being proud of their skills, several women reported being in conflict with the expected gender roles, and the linked notions of femininity, which might be undervalued in a masculine environment. PN5 admits that such socially constructed perceptions of gender roles have manifested within the company although HR is trying to work against this (see next section). This might lead to a feeling that one's skills and perspectives are valued less within company. PN7 described that her emphasis on emotionality (considered as a ‘feminine’ take) creates backlashes at times when discussing UX design aspects of games: *“When I argue this way, I sometimes feel a bit alone because of strong counter-arguments that are more of a technical nature.”* This is an indicator of how masculine values can dominate the outcome of design processes. Despite feeling more confident after some time, she still feels her opinions sometimes go unheard. Expressing agency in a self-confident way and voicing contrary opinions might be more difficult than for men. The narrative of PN2 revealed similar dilemmas: Now being a lead herself, she told us that at the beginning she thought it was expected from a lead to be commanding and dominant (arguably traits linked to masculinity), as this is what she experienced from previous male executives. At her current company however, having had a female executive for the first time, she got a different perspective on leading employees:

“She was also rather someone who was super balanced, who didn't profile the ego so much, a super good listener and managed everything in a more calm, more subtle (...) way. And that felt really good.”

Such positive experiences with female role models reflect different conceptions of what it is to be effective. There has been an increase in women executives in the company in the last years which also fosters the acceptance of more diverse leadership styles, thus tackling stereotypical gender notions. This in turn benefits diverse perspectives in games production and raises the chances of voices other than those ‘shouting loudest’ to be heard.

7.4.3 Career Development and Retention

Participants universally agree that there are numerous opportunities for career development offered by the company and promotion is not uncommon. Talent for open positions is usually searched for internally and applying for open positions is favored and well-received. To follow a career path, employees get motivated to apply to courses and the company tries to offer a contact person, either a representative from HR or an employee in a leadership position (*“There is always a person you can speak to”*). Yet project restrictions create barriers in terms of career development because of a ‘project first’ mentality: While in principle every employee is allowed to take some hours off each month for training purposes, time as well as the ‘moral implicature’ of so doing, might lead to reluctance to do so. The case of PN7 indicates this: During the interview and at the focus group, she talked very positively about the support she received from HR and her colleagues when she decided to reduce her hours and start studying psychology (a lifelong desire which also increases her qualifications to design games) next to work but she *“always felt bad.”* Our data does not suggest that the women have been expressly blamed by their male co-workers and managing the time might generally be equally severe for men. Nonetheless, our female participants feel especially disadvantaged when coping with such dilemmas compared to their male peers because of tacit signals and gender role conflicts, fearing they are stigmatized as being *“pushy”* or *“bitchy”* when voicing their opinion, showing agency or fostering the own ambitions. During the interview PN5 from HR blamed the social construction of gender roles in our society which have in turn manifested into the corporate culture: According to her, many women within in the company fear being perceived as a *“women’s libber.”* They *“find it very difficult to verbalize where they want to go, and they want to be given a bit of support. Pro-actively.”* Our observations and informal conversations demonstrated that PN3 is highly regarded by her male boss and seems to have a very good relationship with him. When the second author was able to talk to him, he spoke very enthusiastically about her qualifications and the way she substitutes for him when he is not present at the company, highlighting quite clearly that he trusts her. Nevertheless, PN3 was prone to downplay her own achievements even though she did not lack overall confidence. She was very keen not to ascribe her performance to ‘talent’ but rather to emphasize how she had developed the requisite skills through hard work. When the first author said during the observation phase how impressed he was, she replied *“Thanks. It’s years of training”* in a very modest tone. Yet during a stand-up meeting she was perfectly capable of directing the meeting

competently in the eyes of her colleagues. During the focus group discussion, she also mentioned being “*happy to present*” herself as a speaker at events, to act as a potential role model, and feeling “*brave enough to do it!*” Still, at least to a degree, it seems that by times women within the company are subject to a certain ‘imposter syndrome’ in relation to their own assessments of their abilities.

In this context, the company’s ‘push strategy’ might be beneficial as the women universally mentioned that they were handed huge responsibility from the very beginning which was challenging but helped them to grow and gain self-confidence. It also increases identification with the project as well as with the company. At the focus group, the more experienced PN7 pointed to the importance of ownership of projects: “*I take ownership of it (the project/the task). Ownership is a strong term at (company name)!*” Some women climbed the ladder by having worked in positions directly reporting to a male executive and then taking over their projects when he switched projects or left the company. However, it was admitted by PN7 in the focus group that not everyone is willing to take so much responsibility, which “*is totally okay.*” This is line with PN5’s statement that developing talent does not only mean supporting the extroverts but also embracing the power, strengths, and skills of introverts. This seems especially important considering female employees who tend to ‘hide’ in masculine environments, thus running the risk of losing valuable perspectives for game design.

These gender role conflicts are obviously even more severe for female executives who have responsibility to foster talents. PN1 explained during the interview that being a female executive might create additional stress when having the ambition to be a mentor, a role model, and an equitable lead. At the focus group she expressed:

“There is so much work to do. It disrupts the work flow. When you are connected to the project it is even worse. You feel like letting your colleagues down. (...) Whenever I go to a training, I feel guilty.”

As a response to this, she was asked if she believes that co-workers perceive it as selfish when she enrolls on courses, especially when she at times has to deny others the permission to do so. Her answer was evasive, replying that fostering skills, also for the purpose of the company, should be considered admirable. In this context, the focus group discussion also revealed that a lack of female companions with whom one can attend the (in terms of numbers men dominated) courses decreases the feeling of ‘legitimization.’ Consensus was found in the statement that ‘official time’ for learning or training has to be communicated as a valuable thing, bringing

benefits to individuals as well as the company. As long as one is handling the project duties, one should not feel guilty about taking courses.

The participants' discussion of job security revealed that gender roles are also an issue in terms of retaining female professionals (Weststar & Legault, 2018). One participant at the focus group said that *"women shy back from one-year contracts; they look more for safety than maybe men would do, who think they have all the time in the world."* The other participants agreed, stating that the company is actually *"really good here compared to others in the sector"* (because it is embedded into a larger, internationally acting company network that operates in a financially successful way) and *"you can stay amazingly long here."* However, this has not always been the case: During the focus group, PN7 reported permanent stress because of job uncertainty during her early years. Now, the situation had improved drastically. She and PN5 also revealed during the interviews that family friendliness had changed for the better with part-time options, the establishment of a break room for pregnant women, covering expenses for kindergarten, possibilities of home office, etc. all having been established in the company. Flexibility towards family life has improved a lot and the numbers of fathers taking the part-time option is rising. Those efforts are an indicator of the way in which gender can be 'undone.' PN7 (being employed longest) stated to her colleagues during the focus group discussion that she feels slightly envious about the current conditions and praised the efforts of HR during the interview.

7.5 Discussion

The women in our study represent a huge resource in terms of human capital for the company. They show a high intrinsic motivation to work in the field in general and at this organization in particular (despite being aware that the salary in the industry is not luxurious). Retaining such motivated young professionals highlights the necessity to create a gender-sensitive working environment. A major challenge here is walking the fine line between creating reactance by making gender or other marginalization topics salient and creating an environment in which the reification of gender topics can be alleviated (PN5): *"If we take action, then (...) we have to be careful not to have such negative discrimination (...) If we offer something (...) there must be access for everyone. (...)"* With this in mind, we discuss possibilities for video game companies to reconstruct masculine working environments by undoing gender and lay out how this in turn might influence video game design.

7.5.1 Adopting the Gaming Culture as Corporate Culture

It might seem peculiar that video game companies are still struggling to integrate young female professionals when there is evidence that a lack of diversity and inclusive workforces leads to decreased market chances (Cassell, 2003; Kafai et al., 2008) (although simply including more women may not necessarily change the dynamics within the environment (Hirshfield, 2010)). One might assume that a creative, ‘geeky’, and anarchist environment like the one we found at the company must provide a good infrastructure for dissolving gender biases and signal openness. Yet research has shown that the opposite is often the case with hackspaces being examples (e.g. S. Fox et al., 2015). Our study demonstrates that policy initiatives can have unintended impact. Thus, the adoption of a gamer mentality is highly encouraged here, which runs the risk of reinforcing a masculine, taken-for granted corporate culture. On the one hand, the culture is the first and best-selling point itself. On the other hand, the roots of the hardcore gamer identity are found within the definition of geek masculinity (T. L. Taylor, 2012). Masculine definitions of ‘true gamers’ (Paaßen et al., 2017) can create barriers for women who wish to feel a stronger bond with the gaming culture (Consalvo & Paul, 2013; T. L. Taylor, 2012; Vermeulen et al., 2016) as people do not necessarily identify as gamers just because they are playing games or are targeted as gamers (Shaw, 2012). This might also explain why many companies seem to be blind towards market opportunities apart from the regular ones. Video game companies are organizations with financial interests that are bound to certain market conditions. The meshing of gamer and corporate culture is not well-understood and has been under-researched. In our study, choice of words has proven to be a non-trivial factor, as it can be vehicle of gender bias. This is in line with previous research showing that occupations in the computer industry are not uncommonly believed to require ‘brilliant genius’ (Leslie et al., 2015) and are mainly thought to be masculine traits. Given that, in our study, women sometimes were reluctant to perform this ‘genius’ and were more comfortable with modesty, this may be a factor in career development (e.g. Margolis & Fisher, 2003). As a result, female gamers might not consider a career in game production as a serious option.

7.5.2 ‘Hacking’ the Masculine Culture

The gaming culture is defined as offering a rather informal and relaxed environment and a certain style of ‘geeky’ humor, which was also observable in our case. Still, the industry is showing a tendency to favor men (Prescott & Bogg, 2014; Weststar & Legault, 2018). With a

lack of access to (in)formal networks (Acker, 2006; Berger et al., 2015), women run a higher risk of being excluded in the process. That is why PN5 from HR acknowledges the need to actively work against networks, which is not an uncommon phenomenon within the industry (Kerr, 2006): *“All I care about is (...) fairness. (...) Equal opportunities for all. And that's not just buddyism. No, that you don't promote people because you are cool with them.”* As the study by Berger et al. (2015) showed, gendered networking in tech collaboration projects was practiced in everyday situations with symbolic interactions (Evans et al., 1998) such as, in our case, allowing others to make the coffee. Furthermore, there is a tendency that women are volunteering unrecognized social tasks to a higher degree than men (Ruder et al., 2018), which might reinforce such problems. Thus, to assert oneself seems an important task in such environments, especially when being a newcomer. The ‘coffee situation’ from our fieldwork showed how the three women, all rather new to the company, not only formed their own network but also found strategies to adapt to masculine conformity. They used humor as a way to speak against uncooperative behavior and advocate a more social working environment without pointing the moral finger. This is remarkable for two reasons: First, there is evidence that women might struggle choosing the ‘right’ balance between a conciliatory and a self-confident behavior (Rudman & Phelan, 2008). Second, humor in workplaces is a tricky field. Literature shows that despite being used by both genders, it is commonly associated with ‘masculine speech styles.’ Women tend to go along with this to gain acceptance among their male peers, albeit this way reinforcing gender stereotypes and manifesting heteronormative masculinity (e.g. Schnurr & Holmes, 2009). Certainly, our small example of behavior which can be considered as harassment indicates that standards of acceptability remain the province of men. The interweaving of the gaming culture into the corporate culture may reinforce this. In our case however, humor served as a tool for gender deconstruction (Crawford, 2003). With humor being a powerful instrument and despite PN7 (the long-term employee) mentioning that speaking English became more common compared to when she started, the inability of the foreign employees (PN3 and PN4) to make jokes in German restricted, from an intersectional perspective, such possibilities (at least to a certain degree).

As PN7 told us, she did not dare to raise her voice at the beginning because of being a newcomer. Being a minority within the company might increase such feelings. With regard to the coffee incident, it can be tempting to think that letting female newcomers work closely together encourages them to create their own bonds and social networks within the company,

thus finding their ways to ‘hack the culture.’ Yet, in the sense of undoing gender, companies have to walk the fine line between encouraging women to form their own networks without making gender too much of a topic. This is a function of more than the number of women. Spatial separation matters, as we saw. A recognition that the ‘skills’ entailed in organizational working are more than simply the technical is also important. Confidence, the willingness to speak, and so on are arguably gendered but are not explicitly recognized as such. Certainly, an organizational appreciation of different kinds of team membership, not to mention different kinds of leadership, might encourage (female) employees to become more confident, bring in their opinions right from the beginning and nurture their talents within the company, hence decreasing the risk of (unintentionally) favoring ‘male perspectives’ in video game design (Cox, 2018).

7.5.3 Managing Conflicts with Gender Roles

We found that women are confronted with a multitude of conflicting gender roles. As laid out, HR is encouraging employees to identify as gamers and geeks, which might be beneficial in terms of game design and loyalty to the company. Yet it appears that women “can only embrace either a gamer identity or a gender identity (Paaßen et al., 2017, p. 424)” and to add to this, ‘geek girls’ often do not display traditional forms of femininity (T. L. Taylor, 2012). Therefore, women in IT environments often adopt a masculine or androgynous identity (Prescott & Bogg, 2013) and yet research (Rudman & Phelan, 2008) suggests that qualified women are often hesitant to express agency because of social pressure to conform to expected roles. In addition, mastery of technology is coded as a masculine trait within gaming (T. L. Taylor, 2012) and feminine perspectives are undervalued because of a gendering of work tasks (e.g. Gorbacheva et al., 2019). We found those patterns with our participants as well: PN7 described that her emphasis on emotionality when creating games by times clashes with more ‘technical’ counter arguments by men although her takes would, from an UX perspective, surely benefit the end result. Important perspectives for game design might hence be lost. Furthermore, women with family obligations often feel judged and motherhood is still regarded differently compared to fatherhood (Ruder et al., 2018). This also includes the need to manage trade-offs in terms of work-life balance, as the industry is known for long working hours, crunch times, and job insecurity (Weststar & Legault, 2018). Yet, “trends toward improved hours of work will benefit all developers and in particular ease additional burdens that may be faced by women (Weststar & Legault, 2018, p. 117).” Supporting women to overcome role ambiguities by offering more

structures that allow 'nonjudgmental flexibility' (Holtzblatt & Marsden, 2018) might be helpful for companies to dissolve gender stereotypes. This can ensure game design that does not make gender a salient category such as the 'girl games' movement' (Cassell, 2003) but rather ensure a 'healthy' degree of integrating diverse perspectives. Ideas were sketched at the focus group discussion: Firstly, the video game company in our study seeks to break up gender roles, encouraging men to take parental leave, but participants acknowledge that such processes take time to become standardized practice. Secondly, the company has to highlight that diverse perspectives apart from heteronormative masculine ones are valued (Prescott & Bogg, 2013). The importance of the latter e.g. becomes obvious with the narrative of PN2, who said she learned that being a good leader and showing a certain degree of femininity is not necessarily a contradiction.

7.5.4 Support, Mentors, and Role Models

Research showed that push and support to challenges, stimulating projects, and the work experience within the team are important factors in terms of career development of young female professionals in tech companies (Tapia & Kvasny, 2004). With the company in our study delegating responsibility right from the start, they already offer adequate preconditions. Yet, research also indicates that the support needed to take on responsibilities comes more naturally to men while women may encounter ambient cues that represent their workplace as masculine (Cheryan et al., 2009). This can make what is perceived as a welcomed challenge by men be more taxing for women. A major concern was fears of being stigmatized as 'pushy' or 'bitchy' (see previous section). Our results show that the need for support to take on difficult tasks in a complex company environment might be more self-evident to men than for women, especially newcomers. Here, leaders within the company play a vital part in developing talents (aspects of the much-praised leadership training) and ensuring that all voices are heard when discussing game design with the team. Literature offers evidence that support by mentors and role models is crucial considering the advancement of young professionals (Holtzblatt & Marsden, 2018; Tapia & Kvasny, 2004; Von Hellens et al., 2001). As shown with PN3, she shares a fruitful relationship with her male executive. Being his proxy helps her advance her career. This might also have to do with the fact that the perception of women's behavior as 'assertive' or otherwise depends on who benefits: Being pushy on someone else's behalf or for the good of the company is viewed as consistent with women's caring gender role. It is not subject to backlash in the same way that being assertive for oneself is, which is seen as

demanding or selfish (Bowles, 2013). Hence this behavior might come more easily to our participant, an evidently decisive and confident woman. Although this hierarchical order has few direct references to gender (more to age and experience) it is important to acknowledge that gender, age, and experience intersect here (Acker, 2006), as became obvious when PN2 reported how her female executive was an inspiration.

This shows how women in leadership positions especially have responsibility to act as role models. The number of women in senior roles within the company is constantly growing (albeit in less technical areas, a common pattern, Prescott & Bogg, 2011) which is a step towards ensuring diversity. Employees can relate to such role models (which do not necessarily display heteronormative masculine behavior) in executive positions and take action to follow their examples. Yet people in a leadership role have to deal with several trade-offs and as shown with PN1, this might come with increased stress for women. Acting as a role model, managing a project successfully, being a fair lead, being confronted with gender role ambiguities, and having the will to foster one's own skills are aspects that often clash with each other. The company thus has to assist executives managing these dilemmas, e.g. by communicating more clearly the importance of training courses, emphasizing that skill development of individuals comes with benefits for the whole organization, and embracing diverse perspectives for game design and leadership styles.

7.5.5 Epistemological Considerations and Limitations

We argue that our 'on the ground approach' (Wulf et al., 2013) revealed insights that would otherwise have been hidden, especially exposing subtler forms of masculine and feminine performativity. Trust building and offering a safe space for participants to speak seems particularly important in such sensitive research settings (Farquhar & Das, 1999). We believe we have successfully managed this and over time our respondents have been forthcoming and reflective about the various issues that confront them. Personal bonding of this kind also facilitated our own understanding of the viewpoints of participants better (Maguire, 1987). The openness of the corporate culture and a similar age-range between researchers and participants surely aided creating these bonds. Also, our research was much supported by HR. The fact that participants are quite homogenous and showed an intrinsic motivation for the topic was undoubtedly useful as well. The focus group design may have limitations in the form we used it, as integrating representatives from HR could have created hierarchies. However, we saw no

evidence of reluctance by participants to express viewpoints. Discussions appeared not to be restricted and sentiments resembled views from the interviews. This may be linked to the company's 'familial' atmosphere and participants acknowledging the efforts of HR. In other organizations of our Living Lab (Ahmadi et al., 2018), we found more 'hostile' environments in which a focus group approach would not have worked as well (a topic for cross-comparison research in the future).

Conducting this practical work comes with constraints and affordances: Action research's aim of solving practical concerns creates tensions with regard to generalizability and it can involve ethical dilemmas, especially from a feminist perspective. This is problematic when research follows an activist stance "that seems to privilege the social values of the designer (S. Bardzell, 2010, p. 1304)." How one gives voice to the sometimes conflicting demands and observes the resulting effects of our interventions continues to be a matter of concern to us. The 'male perspective' (apart from the first author) was ensured at the focus group discussion. The rational of our research methods and the role of the (male) feminist researcher needs further reflection which goes beyond scope here and will be reflected elsewhere. This also includes a reflection of our Living Lab approach (Ahmadi et al., 2018), as well as possible constraints resulting from non-disclosure agreements (NDAs) etc. Furthermore, the data offers more topics: *External* perspectives were brought up, e.g. tackling gender awareness in 'employer branding' (Lundkvist, 2015). Also, no developer was involved in the study: Although roles such as UX or communication can allow entrance to the industry, these occupations "do not sit at the core of game development in terms of compensation or influence on the medium" (Weststar & Legault, 2018, p. 117).

7.6 Conclusion

We have shown how gender is 'done' in a video game company which shapes women's experiences and influences game design. We contextualized hegemonic masculinity as opportunities to reconstruct "workplace power relations as well as the practices through which they are reproduced (Collinson & Hearn, 2005, p. 304)" and found a corporate environment that generally offers flexible structures and a welcoming corporate climate with people who made their passion a profession. Even so, subtle notions of masculinity and ambiguities of gender roles shaped by elements of the video game culture remain. Companies have to carefully reflect on the effects of interweaving the masculine gaming culture into the corporate

environment and support strategies for challenging symbols of gendered orders and stereotypes. Our lessons learned from a video game company provide a case study for consideration by other game companies and the tech industry.

8 “We want to push the industry via communication”... Designing Communication Measures to Foster Gender Diversity in a Video Game Company

Abstract

Participation of women in IT is still low and companies wonder which external communication measures are necessary to attract more female personnel. To gain a richer understanding of adequate gender sensitive ways of communicating towards girls and women, one needs to take into account contextual challenges. Following a Participatory Action Research approach, we conducted a qualitative field study in a video game company in a large city in Germany, identified areas of concern, and sketched out implications for gender-sensitive communication measures together with our participants. Findings show that addressing gender stereotypes, making role models visible, and using adequate channels is relevant. Some problems might be solved via short-term solutions, but the majority require a long-term perspective. Our lessons learned leave implications for companies in the IT sector who want to foster gender sensitive external communication measures and can contribute to the realization of more gender balanced working environments.

8.1 Introduction

The IT sector is the providence of men with the video game industry being no exception as women employed in the workforce just estimate about 15% (Chess & Shaw, 2015; Prescott & Bogg, 2014). The low female involvement level in these sectors is problematic as there is proof that a lack of diversity in technology production leads to fundamental design flaws (e.g. Criado Perez, 2019; D’Ignazio et al., 2016; Hankerson et al., 2016) which reduce usability or even exclude user groups. In terms of video game production, this is equally true (Cassell, 2003) yet in an increasingly culturally influential industry, displaying diversity in game design and ensuring justice is an important social imperative for video game companies (Paaßen et al., 2017).

A multitude of studies deal with the situation of women *within* IT organizations in general (e.g. Marsden & Holtzblatt, 2018; Merrills, 2016) and video game companies in particular (e.g. Prescott & Bogg, 2014). Those state inter alia cultural stereotypes, sexism, disadvantages in

pay, a lack of advancement or access to networks as well as missing role models and peers as reasons for the low number of women employed in the tech sector. Such findings arguably correspond with the public perception of IT companies as 'men caves' (Ruder et al., 2018) with less appeal to women. Based upon social constructions and stereotypes in our society, girls from young age are then perceiving those cultural notions which is why they are less likely than their male peers to enter the computer science field later (e.g. Cheryan et al., 2015).

While studies that focus on the *internal* situation of women in such companies help us to understand which factors shape the industry's image, little attention has yet been paid to the aspects of *external* communication measures of companies to attract more women towards IT. This is surprising given that the way an organization presents itself seems to be an important element in the drive to attract diverse personnel and hence foster diversity and inclusion within the organization. In a time of shortage of skilled labor, researchers and practitioners alike are debating the importance of *employer branding*, a concept which subsumes initiatives to attract, engage and retain employees (Ambler & Barrow, 1996; Barrow & Mosley, 2011). Studies exist which investigate the connection between diversity and employer branding (e.g. M. R. Edwards & Kelan, 2011), gender sensitive approaches to retaining women within organizations in general (e.g. Welle & Heilman, 2007) and IT organizations (e.g. Holtzblatt & Marsden, 2018) in particular, or that focus on gender differences considering the perception of job advertisements, especially in terms of visuals and wording (e.g. Schuth et al., 2018). However, apart from a few exceptions (e.g. Alniaçık & Alniaçık, 2012; Jonsen et al., 2019; Lundkvist, 2015; Tanwar & Prasad, 2016), research papers discussing the factor of gender in terms of employer branding explicitly are rare. Despite those efforts, in gender-unbalanced workforces such as IT, little has changed over the years. It seems plausible that if a company wants to create a diverse corporate environment, the essential external aspect of employer branding must be acknowledged in a gender sensitive way. This gender perspective has often been left out of such discussions and thus little is known about how IT companies can position themselves in terms of external communication to present themselves or the industry as an attractive employer for women. Furthermore, one must acknowledge the contexts (Maguire, 1996) that shape the required efforts, which is why many guidelines often fail. Hence, an 'organizational blindness' about adequate ways to communicate towards girls and women continues to operate, as the following quote demonstrates (member of Human Resources department):

“We do not know exactly, is it because we are so unattractive or because there are not enough women on the job market or because of the (...) communication channels, (...) do we advertise in the wrong job portals or at the wrong fairs? (...)” (PN5)

The company we worked with shows an insecurity about the issue, and yet has a commitment to ‘doing better’ through their contribution. With rare exceptions, studies in the HCI community dealt with topics of employer branding or external communication only obliquely and, if so, they focused on very specific aspects such as the usage of social network services (Brecht et al., 2012). Our contribution to the debate lies in the following:

1. We have undertaken empirical investigation of the daily practices, attitudes and values of members of a gaming company with the aim of developing gender sensitive branding policies
2. presented our findings to a representative group in the gaming industry,
3. provided a vehicle for reflection on experience, and
4. afforded opportunities for participants to identify possible policy.

In doing so, we paint a fuller picture which takes contextual factors into account so that an organization can adequately design their communication processes to foster diversity (in our case with a focus on gender). This is critical in an industry which seems to lag behind many others. The reasons for this may include that the video game industry is an industry that reflects the wider gaming culture insofar as ‘intrinsic motivation’ is seen as central to the recruitment process. Certainly, it has been argued that cultural standards shape definitions of ‘real’ games and gamer identities (Paaßen et al., 2017; Vermeulen et al., 2016) – perspectives which often exclude women and deny them gaming expertise. Hence, we are dealing with a field which shares similarities with other IT workforces, and seems worth to investigate. To date, we have not found any publication in the above mentioned context which follows a more qualitative, ‘on the ground’ approach (Wulf et al., 2013). Therefore, we conducted a qualitative field study in a video game company in a large city in Germany. To collect data, we interviewed women employed in the field and furthermore organized one focus group as well as one workshop to discuss change actions. The study at hand is part of a larger Living Lab project aimed at the intersection of Gender and IT, and with a view to enabling a shift in organizational cultures. Our overall objective was, and remains, the encouraging of reflective practices to enact change through a feminist Participatory Action Research (FPAR) approach (Ahmadi et al., 2018). Our lab, then, was set up with an explicitly transformative stance in mind and the data we had

collected and analyzed were an equally explicit resource for participant reflections. In this paper we will present our findings from the first iterative phase of this endeavor with strategies that are grounded in our participants' perceptions, reflecting their perspectives on existing practices and how to transform them. We believe that our lessons learned should contribute to the realization of more gender sensitive working environments. Analyzing our data through a gender lens, we found that addressing gender stereotypes, fostering the visibility of role models, using adequate channels and 'selling' the benefits of the industry in general as well as the company in particular is important in this context. Our findings further show that while some problems might be solved via short-term solutions, the majority of the problems require a long-term approach.

8.2 Related Work

8.2.1 Employer Branding and Gender

In a time of shortage of skilled labor companies are facing increased challenges recruiting skilled personnel. Employer branding (respectively employer brand), a relatively young notion introduced in the mid-1990s by Ambler and Barrow (1996; 2011), has established itself as a concept beneficial for organizations enhancing their competitiveness in the "War for Talent" (Michaels et al., 2001). It is defined as "the process of building an identifiable and unique employer identity, and the employer brand as a concept of the firm that differentiates it from its competitors" (Backhaus & Tikoo, 2004) with the aim of becoming an "employer of choice" (Branham, 2005). This includes "the package of functional, economic and psychological benefits provided by employment and identified with the employing company" (Ambler & Barrow, 1996) or, put differently, a package of value propositions to the current and potential future employees. While in the beginning employer branding was associated with the communication departments it developed into an overarching concept nowadays popular within human resources (HR) (Backhaus & Tikoo, 2004; Kunerth & Mosley, 2011). Recruitment communication of a coherent employer brand yet remains a major part of employer branding.

As laid out in detail by Lundkvist (2015), a literature review about gender sensitive employer branding (and related concepts and keywords) results in a low number of articles. There exist some articles which deal with aspects that one might associate with the concept of employer branding in the context of gender, e.g. flexible hours, work-life balance, company culture,

equality in terms of career opportunities and advancement, mentorship and (a lack of) role models etc. (e.g. Saraswathy & Balakrishnan, 2017; Shapiro et al., 2009). Research about gender differences considering the ‘employer of choice’ shows that women value the quality of workplace relationships, working prerequisites, internal customer orientation, employee growth and development opportunities, participative decision making as well as social responsibility compared to their male counterparts (Bellou et al., 2015). These differences in job attribute preferences can be seen as an outcome of a gendered upbringing – for millennials, a generational cohort that has been identified as distinct from their parents, these forms of gender typing seem to be changing in IT (E. M. Trauth et al., 2010). It seems plausible then that, from a gender perspective, an employer brand should adopt a positive stance. Lundkvist (2015) furthermore found the most important aspects (or common denominators) of gender sensitive employer branding to be 1) relations (culture) 2) interaction 3) career opportunities and 4) work-life balance. This seems consistent with studies dealing with topics which are related to gender sensitive employer branding in terms of IT (e.g. Marsden & Holtzblatt, 2018; Merrills, 2016) or the video game industry specifically (e.g. Prescott & Bogg, 2014; Weststar & Legault, 2018) (including our own within the video game company (Ahmadi et al., 2019)) about women’s situation within IT organizations. Those studies proclaim that the main problems within those organizations are stereotypes, biases and socially constructed gender roles which put a barrier to women in terms of entering a field, making progress within the company or leaving the company more frequently. Identified factors *inter alia* included the following: Overall experience, team, projects, push & support, role models, attractiveness of becoming a manager, nonjudgmental flexibility, personal power and fair evaluation criteria. Other studies identified similar factors and showed that gender differences in the perception of job advertisements in general (Konrad et al., 2000) as well as in the IT field in particular (Schuth et al., 2018) indeed exist.

Additional investigations propose that gender sensitive wording and visuals are significant factors to attract female personnel (e.g. Born & Taris, 2010; Gaucher et al., 2011). In the mentioned studies, the term employer branding is not mentioned *expressis verbis*. Yet, the connection seems natural; those internal factors have a direct influence on the external communication of a company and the way it is regarded publicly. The low attention for external perspective of gender sensitive employer branding in academia seems surprising given that a raising number of companies is willed to foster diversity and that the visibility of gender equal

workplaces might be a competitive advantage (Fogelberg Eriksson, 2014; Herring, 2009). After all, the desired image of the employer brand has to be communicated to specific target groups via certain channels (Backhaus & Tikoo, 2004). Social Media, just to state an example, has proven to be a crucial channel to reach young professionals nowadays (Brecht et al., 2012). The results of this paper will show that the internal and external aspects of employer branding are inseparable. Yet, we will focus on the external perspective of employer branding in the means of communication measures as this field seems under researched. The internal perspective about women's situation within the company that serves as a cooperation partner in the study at hand has been debated in a different publication (Ahmadi et al., 2019).

8.2.2 Gender and the Video Game Culture

While there exists a missing representation of diversity within games (Shaw, 2012), the number of male and female gamers is nearly balanced (Paaßen et al., 2017). Considering some genres, female gamers are even a majority (e.g. Kirriemuir & McFarlane, 2004) and yet, the video game culture shows strong, tacit signals of masculinity which define who a 'real gamer' is and which games represent 'real games' (e.g. Cassell, 2003; Shaw, 2012; Vermeulen et al., 2016). This creates a rather 'toxic gamer culture' for female gamers (e.g. Consalvo, 2012), which is why girls and women struggle to adopt a gamer identity, possibly associating it with the cliché of unpopular, unattractive, asocial geeks (Kowert et al., 2012, 2014; Paaßen et al., 2017). While the passion for games is usually developed through domestic gameplay, this already puts barriers to women in terms of access to it (C. Martin & Rafalow, 2015; Natale, 2002; Weststar & Legault, 2018). As a result of all those social construction processes, many girls and women do not consider a career in video game development as a serious option (Prescott & Bogg, 2014) which is severed by the lack of visible female role models (Paaßen et al., 2017).

The industry, with its tendency to market their products towards young, male, heterosexual 'hardcore gamers', reinforces such notions which is a reason why many games lack diverse content (Cassell, 2003; Consalvo, 2012; Shaw, 2012). The video game sector then, as an entertainment-, cultural- and creative industry, is heavily influenced by the gaming culture. It is characterized by employees who made their passion a profession (Schmalz, 2015) and who work in rather informal and relaxed environments with a high degree of networking (Kerr, 2006; Prescott & Bogg, 2014). Also, the industry is known for low salary, though project deadlines and, as a result, long working hours as well as crunch times (Weststar & Legault,

2018). Although being in need of diversity, it is putting barriers to career ambitions of women as we will lay out in the following.

8.2.3 Women in the Video Game Industry

The video game industry is ruled by men (Prescott & Bogg, 2014) and masculinity (Chess & Shaw, 2015). The few women employed in the industry can be found in rather non-technical areas of the field, such as project management, human resources or journalism (Prescott & Bogg, 2014) which however do not sit at the core of game design (Weststar & Legault, 2018). This is problematic, as evidence shows that the development process benefits from diverse perspective, reducing stereotypes embedded into game mechanics and character design as a result (Cassell, 2003; Kafai et al., 2008).

The same considerations mentioned above about the situation for women in IT companies, such as hostile environments, disadvantages in pay, barriers to career advancement, subtle notions of masculinity, missing role models etc. can be related to the video game industry (Paaßen et al., 2017; Prescott & Bogg, 2014; Weststar & Legault, 2018). Restraining factors for women to work in the industry are for example work-family-conflicts which is shown in the few female game developers with children or women in senior roles (Prescott & Bogg, 2014; Weststar & Legault, 2018). Sexism and ‘bro culture’ in the workforce is a matter of concern and decreases success chances of women (Prescott & Bogg, 2014) which was publicly visible during the #gamergate controversy (Todd, 2015) and by reports about incidents at Riot Games (D’Anastasio, 2018). Thus, horizontal as well as vertical gender segregation is considered a problem (Prescott & Bogg, 2014). In order to cope in such masculine environments, women employed in the field tend to find strategies and workarounds to adapt to or ‘hack’ the masculine culture (Ahmadi et al., 2019) although this situation is surely less than ideal.

The literature review showed that gender diversity in the video game industry is still low, mainly because, at a generic level, of the socially constructed image of video game culture and industry which might be off-putting to girls and women. Yet, it is intuitively apparent that there are also many benefits of working in this industry, such as relaxed environments, creative tasks and making the passion of gaming a profession (Kerr, 2006; Prescott & Bogg, 2014). This makes it clear that video game companies must not only battle in ‘the war of talent’ against competitors but also have a clear interest in maximizing the size of the talent pool, and an obvious way of doing this is to focus on gender issues. While including more women in a given

environment may not necessarily change the dynamics within the field (Hirshfield, 2010), video game production would surely benefit in a variety of ways from more diversity and the integration of ‘female perspectives’ (Cassell, 2003). In the specific context of employer branding – our concern here – and its relationship to gender issues, particularly those of external communication, relatively little work has been done. This is even more the case in the context of the IT-sector in general and its associated industries like the video game industry (the focus of our study). Where guidelines exist, they have tended to be of a generic character (e.g. National Center for Women and Information Technology (NCWIT), 2015) and pay little attention to the specific context. ‘Situativeness’ or contextual relevance (Maguire, 1996) has not been significantly considered in this area, somewhat surprisingly, given that this is a substantial element of feminist standpoint theory. Of particular importance is ‘situated knowledge’ (Haraway, 1988; Suchman, 1987) which emphasizes the importance of accounts of female experience and how they reflect wider structures. Put simply, existing accounts of female experience in the gaming industry ought to tell us something about the structural barriers to participation and, equally, much about how such barriers may be overcome (to an extent) via branding exercises. The concept of employer branding seems especially helpful, as it takes a holistic view of the way in which various factors, including advertisement, support, recruitment policy, mentoring and so on might play into ameliorating what is currently a predominantly masculine environment. The point we want to stress here is that this shapes not only internal features of the organization but, just as much, its external relationships and the contingencies which affect them. It seems, for instance, important to consider which stakeholders (such as parents) are influential in the decision making of (potential) young female professionals. We currently lack exactly this clearer, more holistic picture. We argue that an ‘on the ground’ (Wulf et al., 2013), (feminist) Participatory Action Research oriented qualitative approach seems to offer potential to answer the above raised question in a real-life environment. This way, we contribute to a growing interest in feminist research in the field of HCI (S. Bardzell, 2010). Since the social construction of gender as binary permeates the IT workforce, we use this binary division of gender as orientation. Also, we should note here that we are very much aware of the issue of intersectionality (Shaw, 2012) but have too little information to make a serious contribution to that debate at present. Our focus here is, perforce, on gender experiences *tout court* for the simple reason that we did not have a level of participation from different intersectional interests to allow us a significant accounting of those issues. In the following, we will describe our methods in detail and will also lay out our feminist research stance.

8.3 Methods

As mentioned, the study at hand is part of a larger, still ongoing Gender and IT Living Lab project which follows a feminist Participatory Action Research (FPAR) (Maguire, 1996) approach (with a transformative stance) that aims at the intersection of gender studies and IT practice (Ahmadi et al., 2018). As Gatenby and Humphries put it (citing Reason, 1994): “Reason (1994) describes three key features of PAR: first, a commitment to liberationist movements; second, a commitment to honouring the lived experience and knowledge of the people involved, often people from oppressed groups; third, a commitment to “genuine collaboration” in the research. Reason (1994) also notes the significance of PAR in emphasizing the “political aspects of knowledge production” (p. 328). He describes a double aim: One aim is to produce knowledge and action directly useful to a group of people – through research, adult education, and sociopolitical action. The second aim is to empower people at a second and deeper level through the process of constructing and using their own language...” (Gatenby & Humphries, 2000, p. 90). The connection between feminist research and PAR is hence a natural fit when considering that feminist theories help to “unmask taken-for-granted social practices that reinforce hierarchies and exclusions, while revealing new social change strategies that can directly contribute to the transformative aims of action research” (Frisby et al., 2009, p. 25). Furthermore, participation of current employees is regarded as crucial when building an authentic employer brand (M. R. Edwards & Kelan, 2011). In this paper, we report from our first eight months in the field and present the results from the first iterative phase of this Action Research endeavor. Our approach to the fieldwork at a gaming company of an international nature then followed notions of ‘institutional ethnography’ (D. E. Smith, 1987) which aims “to make the viewpoint of the researched women central to the research” (McDonald, 2005, p. 465).

8.3.1 Study Setup, Setting and Participants

The company at hand were pioneers of the German video game industry and have successfully been developing games since the early 90s. Today, it is embedded in a larger, internationally operating corporate network. Primarily, the company develops real-time strategy as well as action adventure games. The heritage of employees is quite mixed with 19 nationalities (60% from Germany and 40% foreigners) making German or English the daily business languages. By April 2018 the proportion of women employed in this company was estimated to be about 16%.

At the beginning of the research collaboration, we decided together with representatives from the company that, predicated on our interest in a gender perspective, the research collaboration should primarily focus on ways to foster processes of talent acquisition, development and retention. With this focus, during our first months in the field we were able to identify four chronological phases covering the ‘lifetime’ of an employee (figure 15). Throughout those phases, women are frequently confronted with gendered inequalities. In this paper we focus on the first ‘step’ of this process, which has to do with how women might become aware of the company via external communication measures.



Figure 15. Lifetime of an employee

The female participants (7 in total) we mainly collaborated with within the company represented a diverse mix in terms of heritage, duration in the company, tasks and responsibility (table 4). With those participants, we collaborated intensively, doing lengthy interviews (see next section). While 4 women are from Germany and one is from a German speaking neighbor country, two women have Easter-European (PN3) and Mediterranean (PN4) heritage. The latter are not yet fluent in German and prefer English to communicate.

Table 4. Participants of our study

PN1	Age	Duration in company	Task
1	29	6 years	Project manager / Producer
2	30	3 years	Project manager / Producer
3	30	5 years	Senior concept artist
4	25	2 months	Game Tester / Quality Assurance (QA)
5	38	5 years	Senior Talent Development Manager (HR)

6	29	2.5 years	Public Affairs (later additionally diversity and inclusion management)
7	39	11 years	Game design

PN1 and PN2 both work as producers respectively project managers with lead responsibility, having to take care of budgeting and strategy. PN3 is a senior concept artist who creates art works and sketches for games. PN4 works as a game tester in quality assurance (QA), mainly testing newest versions, identifying bugs etc. PN5 from HR is Senior Talent Development Manager and hence responsible for tasks ranging from talent acquisition to talent development. PN6 started in QA, then switched to public affairs, being responsible for corporate social responsibility (CSR) and education matters. Her duty also involves diversity and inclusion management. PN7 is responsible for game design, mainly in terms of user experience (UX).

Additionally, we invited two additional women (both tester/QA) to a focus group discussion (see next section). Two men were present at this focus group discussion as well (from HR and the communications department). These participants were in their 20s to 30s. As these four attendees of the focus group participated rather sporadically, they are not listed at table 4. Furthermore, PN5 and PN6 were not present at the focus group because of sick leave.

Being a stakeholder in said larger Gender and IT Living Lab project (Ahmadi et al., 2019, 2018), the video game company also had access to the resources the Lab offers. In the wider Living Lab context, several symposia are organized, each dealing with a specific topic related to gender and IT and where knowledge exchange takes place amongst stakeholders. At a symposium which dealt with the theme of HR and gender, the first author co-organized a workshop together with PN1 and PN5. At this stage, there were additional inputs from other stakeholders (e.g. researchers and professionals) interested in the topic but having no connection to the company. There, approximately 20 people (with the majority being female) were present, representing a diverse group in terms of the sectors they are working in.

8.3.2 Data Collection and Data Analysis

We employed multiple, qualitative methods (figure 16): Firstly, we conducted semi-structured interviews with the participants listed in table 4. The interviews lasted from approximately 20

minutes to an hour (mean 46 minutes). The interview guide aimed at creating narratives about the women's childhood and adolescence, how their interest in tech and games emerged, education, entrance to the field, previous and current work experiences, their perception of the corporate culture as well as career opportunities etc. The interviews were recorded and transcribed. Secondly, we used observation, more precisely shadowing, as a method to collect data (McDonald, 2005). Over the course of a quarter year, the first and second authors visited PN3 and PN4 twice a month and observed their 'ordinary' working days. This way, we gained knowledge about daily business routines, interaction amongst people, subtle notions of masculinity as well as the corporate culture. The observational notes and notes of informal talks which were taken during the shadowing process were later expanded to detailed fieldnotes (Lofland & Lofland, 1995). Considering the analysis, we adopted a thematic analysis approach (Braun & Clarke, 2006) where codes were created via inductive analysis using the software application MAXQDA. To maximize reliability, the analysis was discussed by several authors. This way, we collected stories of lived experiences, individual sentiments shaped by an environment, in the tradition of 'narratives' (Czarniawska, 1997). As narrative stories are usually negotiated between the people involved in the research process (Etherington, 2004), we invited the employees mentioned above to a focus group discussion (that lasted about 4 hours), where we used our themes as hooks for group discussions.

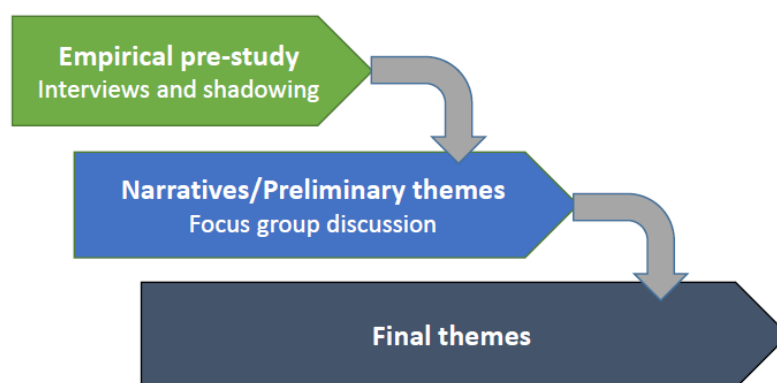


Figure 16. Data collection and data analysis process

A larger part of the discussion tackled issues of reasons why there are so few women in the industry and, based upon this, adequate ways (in terms of content, tonality and channels) to foster external communication measures to enhance the situation were sketched. Data from this focus group discussion then sharpened our themes. Furthermore (as described above), we held

the workshop at the symposium together with additional stakeholders (approximately 20 participants). The workshop (figure 17) was dealing with the question of how to design job advertisements in a gender sensitive or gender neutral way to mitigate gender stereotypes and address potential female personnel more adequately. The participants were divided into three groups and each group was asked to develop suggestions on how the job advertisements should look like if they are intentionally addressed either towards men, women or if an advertisement was deliberately designed as gender-neutral.



Figure 17. Impressions from the workshop

8.4 Findings

“If you don’t have enough women in the company, then (...) the pool from which one can draw is too small. And that’s why I think it’s important to hire enough women. Developing enough women (...).” (PN5, HR)

This quote shows the importance for the company of increasing ‘the pool’ of female personnel as well as the need to identify areas of concern and consequently develop appropriate change actions. Our participants confirmed this on a number of occasions and, perhaps more importantly, were clear that doing so was a non-trivial aspect of external communication. It was argued that paying attention to gender aspects in terms of channels, tonality and content are hence ‘adjusting screws’ which can make a major difference to attract young female professionals. The data collected led us to four themes which we collaboratively identified as being important. We will present those findings in the following.

8.4.1 Breaking up Stereotypes

Participants agreed that breaking up stereotypes and raising awareness for the different kind of talents required in the company is important when communicating in a gender sensitive way. To make the industry more attractive to women, it was considered vital to communicate more flexible and creative concepts, separate from those commonly associated with gaming and masculinity. Most of the interviewed women reported that they have played video games since childhood. They define themselves as gamers as well as ‘geeks’ and had a strong desire to work in the industry or specifically at that company. Yet, in most cases the ambition of entering the video game industry came into focus towards at the end of the educational path. This was mainly because little attention was paid by them to the fact that 1) taking part in the development of games can actually prove to lead to quality employment and 2) the shared prejudice that developing games requires high skills in coding (the latter perceived as a more ‘masculine’ task). This includes low awareness that tasks such as design, project management etc. are needed in game development as well. PN2, despite having a passion for games since childhood, e.g. stated:

“I never had it on my radar that the video game industry is a possibility for me. I always thought ‘Okay I’m not so great at math, I certainly can’t code.’ Game design, hmmm... I’m also not good with numbers and Excel and I am also not artistically gifted.’ That’s why I thought, ‘Okay, that’s probably nothing were I fit in’.”

This pattern was similar for many women we interviewed who believed that for this reason they had not been ‘suited’ to work in the video game industry. Nevertheless, the company is in need of personnel able to fill occupations which are less ‘coding-centric’. PN6 described her duties the following way: *“One thing is this computer job, this tech job, when you sit here. Yet, I am for example half the time in the house and half the time out on business trips.”* She added that society needs to get rid of the cliché of the male coder who is sitting in a chamber. Indeed, as figure 15 shows, the range of tasks is diverse and several women emphasized the social aspects of their job. PN2 reported that, as a project manager, communication is her main duty and PN7 said that working with potential future users is an important part of her daily work.

Apart from that, the focus group revealed that it is important to break up stereotypes about the values of games. In this context, one participant mentioned that society does not pay respect to artistic and educational values of games and thus the company has to raise the image of games by communicating to all relevant stakeholders. Furthermore, participants are aware that a

majority of girls might still believe that gaming is a ‘boys thing’ which is hampered by the fact that most lead characters in video games are male. To break up the stereotype of ‘true gamers’, addressing young children and taking girls especially into account was identified as a main requirement. In this context, and to influence the public view considering the value of games, it is important to address children’s relatives as well. The participants reported that their family members had an influence and either encouraged or discouraged them during childhood in terms of access to video games, or later in life when choosing an occupation (see also 8.4.2 for the latter). To state examples, PN2 was introduced to gaming by her grandfather and PN1’s family used to play video games together.

The participants of the focus group furthermore discussed if ‘talent’ is an appropriate term to use for external communication as it might create the wrong impression that someone needs ‘inborn talents’ to succeed within the company. Indeed, terminology in this context was considered to be far from trivial and while ‘talent development’ is a technical term from HR, participants perceive it as problematic as it might be off-putting to women. Avoiding such terminology and using e.g. ‘skills’ instead was discussed as an option when communicating to the public. Yet, there were also some critical voices stating that talent can also be perceived as a softer term while skill is harder and, most notably, measurable, thus being more “*intimidating.*” As a compromise, participants agreed that using “*talent and skill development*” together is appropriate for dealing with this dilemma. This imperative, of course, is true for both the internal and external aspects of employer branding: HR emphasized that talent may be understood as an affinity but you need the right environment to make it flourish. Discussions about such terminology also took place at the symposium workshop, especially in terms of traits associated with masculinity and femininity. Schein (1973) showed that feminine traits in organizational life are usually connoted with aspects such as empathy, helpfulness, neatness, and selflessness while masculine traits encompass e.g. aggressiveness and directness, leadership ability, self-reliance and self-confidence as well as vigor. The workshop deliberately invited participants to ‘tinker’ with such connotations and stereotypes and also to break them up. We however did not attempt to influence participants by prescribing traits but rather asked them to come up with their own associations based upon their business life experiences. The attendees discussed their preferences until consensus was found. Their awareness of the specificities of organizational context very much informed their observations. For instance, this can be seen in the context of familiarity and group size: It seems that people behave more

in line with gender stereotypes when they are less familiar with the people around them and when the groups are larger (Deaux & Major, 1987). This is particularly relevant in organizational environments and our participants often made reference to the fact that those who ‘shout loudest’ are those who are the most heard and thus visible (Acker, 2006) which is e.g. why ‘communicative’, used pejoratively, was connoted with masculinity in business life.

Participants agreed that different genders generally might need to be addressed differently and yet favored what they saw as ‘gender neutral’ job advertisements. They saw this as an elegant way to solve this problem and avoid the exclusion of any gender group. In this sense, the design of job advertisements, they felt, should pay special attention to exclusive formulations in terms of wording and graphical elements. This is in line with existing research (e.g. Schuth et al., 2018). In an industry which is dominated by such manifestations of masculinity, avoiding ‘visuals’ and buzzwords that the participants identified as masculine such as “*communicative*”, “*strong in leadership*”, “*extroverted*” was seen as important. Rather, job advertisements, they thought, should include gender neutral terms like “*share your ideas!*”, “*passion*” and “*enthusiasm.*” Buzzwords like “*creativity*” and “*profession*” were additionally suggested as possibly attracting women in particular.

8.4.2 Understanding and Addressing the Struggles

Several women reported that it took courage to pursue their dream of working in a video game company. Some women e.g. mentioned that their parents were reluctant when they were told about their daughters’ wish to pursue a career in gaming. PN4 told about clashes with her parents when she decided to quit her law studies to switch to game development: “*I had to work for myself. (...) They always said working in video games is not really a real work.*” PN6 described that, based upon her own experiences and her duties in the communication team, when getting in touch with parents, they are often skeptical about video game development as a ‘suitable’ future profession for their children. According to her, this is because parents often have limited knowledge about the topic. In this context, PN2 fittingly said:

“That's still often the case, even today, when you talk to people who don't get in touch with video games so much. Or maybe even those who play some but don't even know how those are developed. They don't really understand what you actually do as a video game producer.”

Yet, she reported further that when her friends asked more concretely about her job, they were quite open and “*cool*” with it. Nonetheless, these vignettes show that high barriers to women

interested in pursuing a career in video game development still exist. Based upon their own experiences, participants felt the need to communicate more clearly the work processes of the video game company.

Courage was not only needed when telling relatives about the wish to pursue a career in gaming but also when deciding to quit previous, rather secure and often better paid jobs. PN3 reported that she perceived her previous working environment (a company developing mobile games) in her native Eastern-European country as toxic which made her decide to apply for a job abroad:

”When there is no other way out, is like you're so scared, that you are just becoming courage (sic!). (...) I wanted to just like cut away with all the contacts with this environment that I thought, it was like toxic, and affected me in this negative way. So yeah, this was already a courage thing. And later (...) moving again to a different city (...) I just pushed forward.”

PN6 additionally told us, that she decided to apply to a job abroad as opportunities to pursue a career in video game development were rare in her native country:

“That was a big step to decide 'Yes, I'm going abroad now'. Because I actually applied in Ireland, in the UK, in all kinds of countries. (...) I literally slept on a friend's couch for 4 months (...). Yes, that was intense. But it was worth it. (...) I won't leave anymore.”

This shows how eager highly motivated personnel is to pursue a certain career wish. Both, PN3 and PN6 told us that the company was very supportive, e.g. in moving to the new city and finding an apartment. Thus, communicating this support might help people in overcoming reluctance to apply. Although this might not necessarily be a gender problem, the barriers are arguably even higher for women finding said courage because they are breaking up socially constructed gender roles this way. Job advertisements are an obvious channel to promote this. From the perspective of job advertisements, another aspect in terms of courage might lead to a reluctance to apply: According to the participants' experience, job advertisements tend to contain an unrealistic set of requirements. PN1 believes that men are less hesitant and more self-confident when applying while women often doubt that they have the ability to fulfill the requirements. The results of the workshop at the symposium revealed that a more realistic, less 'all-inclusive' set of requirements is thus needed in advertisements. The principle should be *“as little as possible, as much as necessary.”* It became apparent that it is very difficult for the company to assess whether potential applicants are put off by such advertisements as they will

not apply in the first place and the company will receive no feedback. Hence, we had to rely on the experiences of our participants to gain data on this.

8.4.3 Making Role Models Visible at Adequate Contact Points

Not only the tonality and the content of the message is important in terms of gender sensitive external communication. Choosing adequate channels to reach the intended audience is vital as well (Leekha Chhabra & Sharma, 2014), especially with the increasing importance of social media (Harris & Rae, 2011). Online media are unsurprisingly considered important channels to attract young people in general and young professionals in particular (Brecht et al., 2012). Next to their website, which also features a dedicated section to career, the company has active social media profiles (e.g. YouTube, Facebook, Instagram etc.). The participants agreed that “*We are doing much online*” and that the online presence is “*already quite nice*”. When wanting to break up stereotypes (see 8.4.1), participants believe that it remains important to make role models (Cheryan et al., 2011; Marsden & Holtzblatt, 2018) from the company more visible. This has to be done either via the mentioned online channels or, arguably more importantly, via physical contact. The latter is considered as vital for getting in contact with children, their parents, students and young professionals. PN6 told us that in her role as diversity and inclusion manager, she is involved in initiatives that foster cooperation with universities. Student groups are e.g. invited to the company and project collaborations with such groups are supported. Sending female company representatives into universities, schools and recruiting fairs to hold talks and get in touch with potential future employees has been proven to be a successful way to attract female personnel in the past. This e.g. became apparent in PN2’s case. Being actually a career jumper, she achieved a degree in English literature before starting working in the company. She never considered a career in the industry until during her master studies when a (male) producer from the company visited her university to hold a workshop:

“He told us what he was doing, and at that time I already knew that management was a lot of fun for me (...). And he sat there and told me how he combines all this project management with the video game industry. And I thought ‘Oh, what’s that all about? That’s possible?’ At first I thought, okay, you must have studied (...) economics or (...) management, you can’t get in there that easily. (...) He just (...) said ‘Well no, it’s not that difficult, I studied history before’.”

She continued to explain that an internship at the company followed and she then pushed forward to make a career in gaming: Next to her master studies in English literature, she gained knowledge in project management by visiting workshops. In addition, she attended events dealing with the video game industry seeing them as an opportunity to network. After her studies she got in contact with the company again by meeting a company representative at a conference and was finally hired as a project manager. Personal contacts at adequate contact points, it is clear, can be vital in attracting female personal, especially (although not being the case with this example) when female role models are the contact persons.

PN2's case also shows that the educational degree or background is not particularly important in the company, a pattern which we discovered several times: PN3, held the position of a senior concept artist despite having quit her studies. She mentioned that she received the required art skills auto-didactically. Hence, compared to other companies (especially in Germany, where a compelling CV and an educational degree are usually a requirement) the company puts focus on the actual abilities and ambitions of people, which PN5 from HR confirmed: *"As long as they're super in their field, we don't look at what degree they have."* Making such examples of female employees more visible might further encourage women to consider a career in video game development.

Many women expressed their willingness to act as a role model, willing to hold talks at events. PN7 e.g. said: *"In meetings with students, I can turn a group who is not interested in applying into a group who is very interested"* and PN3 mentioned that she would be *"happy to present"* herself as a speaker at events. Yet, PN7 who has the most experience within the company raised the issue that installing female role models treads a fine line, because, *"At the beginning, I received requests for talks because I am a female. That was annoying, because it made me feel like an exotic animal."* Thus, participants of the focus group advocated that the content of talks has to be the focus point, not the gender of the speaker. This way, one can elegantly display both that women work naturally in such an environment and at the same time show that a variety of different occupations are needed within the company (see 8.4.1).

8.4.4 'Selling' the Industry and the Company with Women as a Target Group

During the focus group discussion, a man from the communications department told the group:

“We want to push the industry via communication (...). I can say that our company is aware that we need more women and we want to hire them. (...) So we also have initiatives running to do so.”

The themes discussed in the previous sections shape the content of how to ‘sell’ the benefits of the industry in general as well as the company in particular to all relevant stakeholders (ranging from girls, female young professionals to parents and others). At the focus group discussion one participant said that *“the sector is the problem”* pointing to aspects which she (and other participants) believe to be important for women and which might yet be perceived negatively by the public. Yet, the interviews as well as the focus group revealed many positive things about the company that are mainly linked to the rather ‘geeky’ corporate culture which is considered to be a strength, making the women feel that they ‘fit’ from the start. As no dress code exists, some employees are dressed more ‘casually’, wearing tattoos as well as piercings, hence having the opportunity to express individual identities. The atmosphere has been described as *“very special, in a positive way”* and several times, the term *“family”* was used to describe the personal interactions. A ‘work hard, play hard’ mentality is present and HR is aware of the importance of fostering bonding as well as releasing some pressure. They established a break room equipped with areas to relax and furthermore organize events such as poker nights etc. Also, employees themselves organize activities. PN2 stated that she was generally positively surprised about how she was welcomed despite being a career jumper. She describes her co-workers as open and helpful, and willing to exchange knowledge which helped her to acclimatize quickly. Also, the non-natives in our study (PN3 and PN4) felt appreciated by their team right from the start. Thus, despite subtle notions of masculinity (Ahmadi et al., 2019), the atmosphere within the company seems intact. In this context PN4, who reported negatively from her previous working experiences, stated:

“Really honestly, I think that this company is really great like their work environment is nice compared to my former company (...). That was the best decision I ever done in my life to move here.”

The participants furthermore praised HR’s dedication to fostering talent within the company and the opportunities provided for personal development. Talent for open positions is usually searched for internally and HR seeks ‘hidden skills’ to fill vacant spots. Employees get motivated to apply to courses and the company tries to offer a contact person, either a representative from HR or an employee in a leadership position (*“There is always a person you*

can speak to”). Thus, ambitious employees are not left on their own. Responsibility for growth within the company first and foremost lies with the employees themselves who have to show ambition, but the opportunities, it is agreed, are numerous if one is willing to make use of them. Furthermore, there exists a high degree of flexibility as HR encourages employees to try out things, seek new experiences and apply for areas of interest. PN7 for example (who could be described as a ‘scanner personality’, a person who has a wide range of interests) inter alia added acting, film-/television and journalism studies and working in PR to her portfolio before starting as a game designer at the company and then added further qualification to her skill set such as a fitness trainer certificate when she was developing exergames. More importantly, she decided to work half time to study psychology (which has been her wish for a long time) and the company offers structures which helped her to realize this ambition. This came with benefit for both parties as PN7 reported that her knowledge in psychology helped her broaden her mind and understand users’ perspectives better when designing games. Communicating such possible career paths to the public (as well as internally) and showing people what kind of opportunities they have was thus been raised as a possible solution to create a more positive employer brand image. This can be done, again, by making female role models and their success stories visible. Participants additionally discussed aspects of job security, work-life-balance and family aspects as being important to retain female professionals. One participant at the focus group said that, *“Women shy back from one-year contracts; they look more for safety than maybe men would do, who think they have all the time in the world.”* While the industry is not necessarily known for long term employment, the participants stated that the company is actually *“really good here compared to others in the sector”*, since it is embedded in a larger, international and profitable company network. This has however not always been the case, as PN7 told that during her early years the situation was very different and only now does she feel safe about her job. Compared to other players in the field she added: *“You can stay amazingly long here.”* The economic imperative, then, is important and is something else that can be usefully communicated to aspirant young female professionals, but also to parents as influencers on their children’s decisions about potential future professions.

Yet, at the focus group a more critical discussion arose about the size and popularity of the company which, it was thought, might lead to some reluctance to apply by women. One woman mentioned that she was actually afraid to apply, fearing that in a big company structure, she might be *“tossed away”* more easily. Presenting the ‘familial environment’ of the company to

the public was considered to be an adequate solution to this. Another possibility to deal with those issues was raised at the symposium workshop: Possible negative associations of the IT and respectively the video game industry should be taken into account when designing job advertisements. From a gender perspective, this can be done by e.g. explicitly mentioning a positive work-life-balance, home office possibilities, support for child care and flexible work time. In this context, the company already shows some flexibility, e.g. offering part-time models, paying kindergarten fees, trying to realize home office opportunities and encouraging parental leaves (with a raising number of fathers making use of this possibility).

Considering the profile description of the company, expressions like *“famous/prestigious”*, *“leading”*, *“your advantages”*, *“that's what we offer”* as well as *“flexible and mobile working”* were brought up by the participants to have a positive influence on female recipients. In terms of tonality, talking about *“games”* instead of *“products”* and thus emphasizing the creative and social aspects of video games was regarded as a possibility as well.

8.5 Discussion

Openness, transparency and authenticity are terms often used when discussing initiatives around employer branding. Yet, from a gender perspective, how to communicate those values to the wider public is still a matter of debate. A synthesis of the two fields, gender and employer branding, seems “logical and beneficial” (Lundkvist, 2015, p. 68) and our results support this. The company of our study is aware that a diverse environment can be a competitive advantage and they are willing to foster diversity: *“We are diverse and we are also dependent on people from all over the world, women, men, whatever. That means this is super important!”* (PN5). Participation in our project helped the company to identify and structure areas of concern and we collaboratively developed adequate interventions for designing external communication measures in order to increase gender diversity within the company. In the following we will discuss our lessons learned.

8.5.1 Lessons Learned for Gender Sensitive External Communication

Employees represent a huge resource in terms of human capital and the participants of our studies are no exception. They show a high intrinsic motivation to work in the field in general and respectively at this specific organization in particular and they overcame obstacles along the way to land their ‘dream job.’ Thus, to attract, retain and foster such employees, it is first

and foremost important to understand what drives them. Here, it is beneficial to take a closer look at the context of the video game culture and the main motivation of gamers who make their passion a profession. PN5 said, that compared to her former (non-gaming related) organization, she recognizes that the involvement into a project and creative freedom are far more essential for people employed in the industry:

“The creative people want one thing above all else, they want to realize their full potential. That is their thing. They want to create a world. (...) Well, that's super, super important to them. They want to be able to tell their people (...) ‘That's my vision behind it!’”

The participants of our study told us that they identify as geeks and felt an immediate ‘fit’ when they started working at the company. HR encourages such a ‘geek mentality’ and urge their employees to keep playing video games as this helps to maintain an open mindset. Offering such identification points seems like a crucial take-away for designing external communication measures. This means not only communicating the benefits of the company itself but also “*pushing*” the industry, as one of our participants coined it. From a gender perspective, this however comes with challenges as interweaving the gaming culture into the corporate culture like that can be a strength and a weakness at the same time: On the one hand, the culture is the first and best selling point itself if someone identifies with a gamer or geek mentality while on the other hand, such an identity might still be loaded with negative stereotypes such as being an unpopular, unattractive, asocial geek (Kowert et al., 2012, 2014). Masculine definitions of ‘true gamers’ and ‘true games’ might create further barriers for female gamers to feel a stronger belonging to the gaming culture (Cassell, 2003; Consalvo & Paul, 2013; Paaßen et al., 2017; Shaw, 2012; Vermeulen et al., 2016). Gender sensitive communication measures which have the ambition to break up stereotypes and display possible diversity of gamers and games as well as the diverse occupations needed in the industry are facing the major challenges of walking a fine line: They can create reaction by making gender or other marginalization topics salient but they can also help designing an environment in which the reification of gender topics can be alleviated. For instance, games explicitly targeted towards girls might trigger female interests (Cassell, 2003) (comparable to e.g. e-textiles where tasks associated with femininity have proven to be useful to trigger female interest in making (Buchholz et al., 2014)) but can also allure to reinforce gender stereotypes and distance female gamers possibly even further from mainstream games by denying them of being ‘real gamers’ (Shaw, 2012).

Evidence that women care more than men about an atmosphere of trust (Trübswetter et al., 2016) seems especially important to consider when dealing with masculine environments which can possibly be intimidating to women. Thus, to attract and retain more young female professionals, companies situated in environments which are dominated by masculinity must radiate a feeling of safety. The participants of our study universally agreed that the corporate culture was ‘familial’ and emphasizing the mentioned ‘fit’ to the public might increase the feeling of entering an environment where one feels valued and understood. In the context of creating a feeling of safety, job security and prospects of long-term employment have been stressed by the participants of our study as being crucial deciding factors for women. Data shows that the company has a competitive advantage here compared to other players in the sectors, at least from the viewpoint of our participants. During the focus group discussion, the male employee working in the HR department emphasized “*We want to keep people as long as possible in the company.*” Communicating this more clearly to the outside, showing that the company is profitable and has an interest in fostering and retaining their talents (especially in an industry known for short-term employment and high turnover rates) might convince girls, young female professionals as well as their relatives that the industry is worth considering as a career option (Prescott & Bogg, 2014). Taking parents into account when design communication measures indeed seems fruitful as research showed that those have an influence on women’s career aspirations (Li & Kerpelman, 2007). The mentioned initiatives – presenting the industry in a proper light, also by emphasizing the educational value of games, fostering female participation in gaming etc. – might then also (in a long term) overcome girls (socially constructed) reduced access to computers and video games compared to boys (C. Martin & Rafalow, 2015; Natale, 2002; Weststar & Legault, 2018).

The fact that the few women working in the industry are rather employed in non-technical areas (which is equally true for the participants of our study), such as project management, human resources or journalism (Prescott & Bogg, 2014) might show a tendency that women are more drawn towards ‘social’ occupations (Bellou et al., 2015). To draw comparisons to other fields, similar evidence was e.g. found in the field of making (V. Bean et al., 2015; Holbert, 2016) where female crafters were found to increasingly enjoy making and tinkering with technology if the crafting tasks encompassed a social component. Of course, one must be careful with those assumptions as there exists a broad range of diversity amongst women as well (McCall, 2005), which is also true for women attracted to video game culture (Shaw, 2012). Yet, this pattern is

observable and several women of our study reported that their daily job indeed requires a high level of social skills. Tasks of project managers such as PN1 and PN2 or PN6 in her role as diversity and inclusion manager include a lot of communication. For PN7 working with potential future users is an important part of her daily work. Emphasizing such social aspects and, again, the numerous occupations needed in a video game company (or IT companies in general) is hence one implication for external communication measures. Also, the pool of applications could be raised by communicating more strongly that career jumpers and autodidacts are welcomed at the company as is the case with PN2 and PN3. In a time of shortage of skilled labor in IT, this seems like a promising take-away.

Studies have furthermore shown that monetary incentives are less important to women compared to men (e.g. Konrad et al., 2000). Instead, women value the quality of workplace relationships, internal customer orientation, development opportunities and social responsibility more than their male counterparts (Bellou et al., 2015). This can be underlined by our data as the participants of the symposium workshop did not mention salary as a factor being important to mention at gender sensitive/neutral job ads. Nonetheless, if a company wants to radiate openness, emphasizing payment equality in job ads might be a step forward to promote gender fairness (Schuth et al., 2018). This is then in line with PN2's opinion who sees pay rises as a generally good incentive and a sign of appreciation (hence as a lead trying to push this for her team). Nonetheless we stress once again that salary is not the main motivation to pursue a career in this industry, which might be true for all genders in this case.

Our data also shows that terminology in this context is significant. The data gathered at the company and the symposium workshop can be helpful to raise awareness for gender issues in terms of visuals and wording. While 'talent development' is a technical term from HR, participants perceive it as problematic. 'Talent' might implicate the need of 'inborn' qualities and from a gender perspective, this is important to mention as research has shown that occupations in the computer industry are not uncommonly believed to require 'brilliant genius' (Leslie et al., 2015) and are mainly attributed to be masculine tasks. As a result, women often ascribe themselves lower self-efficacy considering computing tasks (e.g. Leslie et al., 2015; Margolis & Fisher, 2003), a pattern which was supported by our data as well. Participants hence seemed to be vulnerable for 'stereotype threat' (Aronson et al., 1998). Yet, many women of our study told us that after making career progress within the company, their self-efficacy raised and they now believe, that they could have mastered learning how to code in principal.

The ideas brought up at the symposium workshop about gender and job advertisements are consistent with insights from existing research (e.g. Schuth et al., 2018) and indicate that choosing terminology that does not imply biases towards individuals which fit to the standards of the predominant masculinity seems like a step forward. This said, participants of the workshop preferred gender neutral job advertisements compared to ones that explicitly address women as recipients as such underline the desire to be open and diverse. Gender neutral job ads also leave the possibility to address aspects of family life without reinforcing stereotypes of gender roles. Literature shows that women with family obligations often feel judged and motherhood is still regarded as making a difference compared to fatherhood (Ruder et al., 2018). The video game company in our study tries to break up gender roles and also encourages men to take parental leaves. Interviews revealed that the company's situation changed for the better in such terms during the last years with part-time options, the establishment of a break room for pregnant women, covering expenses for kindergarten, possibilities of home office etc. Mentioning such aspects in the ads (or other channels) without making the gender of the recipient a topic can thus create the impression of an open and diverse corporate environment which tackles traditional gender roles. If desired, more personalized job advertisements targeted towards a specific gender might yet be useful on social media where the gender identity on platforms such as Facebook (Haimson et al., 2015) are often displayed by the users; especially as the intended target group surely has an affinity for said services. Our findings leave implications for either ways, gender neutral and gender sensitive job ads.

One of the most interesting and influential results of our study was the importance of female role models. Their positive impact on girls and women in terms of male-dominated fields in general and gendered behavior considering gaming in particular (e.g. Cheryan et al., 2011; Paaßen et al., 2017) might increase the effects of the gender sensitive communication measures discussed before. There is e.g. evidence (also from a gender perspective) that testimonials displayed on recruitment websites can increase a company's attractiveness and credibility, especially when delivered via video and audio compared to picture and text (Walker et al., 2009) which might be one exemplary implication for companies. Yet, personal contact of (female) role models e.g. at schools and universities has been proven to be one of the promising measures to recruit diverse personnel in the past which is a major take-away of our study. Here, it is important as well to put the competence of the female employee in the center rather than

making the gender a topic and to show that women are working naturally and successfully in such an industry.

Overall, we believe that the ideas sketched in the findings leave adequate and well-grounded implications for gender sensitive external communication measures to foster gender diversity in IT organizations. PN5 yet hinted that all the actions which we advocate must be made available for everyone to avoid negative discrimination. This way, one can radiate openness, diversity and inclusion to the public and transport notions of a consistent employer brand.

8.5.2 Epistemological Considerations, Limitations and Future Work

Dourish (2006) points out that “ethnographic inquiries can illuminate the practices of particular peoples, but it does more; through this, it explores the generally operative principles by which (...) practices are shaped, shared, reproduced and transformed. The question is how specific practices become exemplars of ways of encountering the world (...), how the world (...) becomes a site for cultural production.” We believe that our ‘on the ground approach’ (Wulf et al., 2013) utilizing a mix of methods proved to be a good way to achieve this. Through observation we gained insights into the company culture, explore its operative principles and expose areas of concern which are important for women working in the industry. It also made us understand the contextual contingencies, such as socially constructed, often taken for granted processes. The women’s narratives offered themes for discussions spanning from childhood to actually being a professional in the field. In turn, this provided material for reflexive consideration by our participants and generated implications for gender sensitive external communication measures. Also, being embedded into the Living Lab network (Ahmadi et al., 2019, 2018) proved to be beneficial for the company. The participation and the integration of additional stakeholders interested in the topic at the symposium offered a broader perspective. Although wider symposia participants were not experts in the video game industry, they were all keen on the topic of HR in IT so a natural fit seemed to exist.

Trust building and the establishment of a safe space for participants to speak out seems particularly important in research settings and required a certain degree of sensitivity (Farquhar & Das, 1999). The women were open, appeared glad to express themselves and generally supportive during the observation phase. Furthermore, the establishing of trustful personal relations, achieved in a relatively short space of time, enabled us to gain a deeper of the viewpoints of participants (Maguire, 1987): Researchers talked with PN3 and PN4 about

personal things apart from their daily work routine. PN2 furthermore invited two researchers to a privately organized event that deals with the topic of female game developers. Several aspects were aiding this trust building process and the advancement of the project: Our research endeavors were much supported by HR who were our contact person and made things possible despite their own time constraints. Furthermore, the openness of the ‘geeky’ corporate culture and quite young personnel with a similar age-range between researchers and participants as well as shared mindsets towards feminist ambitions also helped to build trustful relationships.

The study at hand has limitations. Our results from the first iterative phase of our FPAR endeavor are preliminary. We worked with a limited number of participants and used qualitative methods to gather descriptions of personal experience. This worked to help us understand the local context and also our participants gain a sense of our purposes. Our group of participants was however, and perforce, rather homogenous and we have to point out that no software developer was involved to this point. Also, the ‘male perspective’ (apart from the first author) was provided only in the focus group discussion and the symposium workshop. Again, though, we are still in a fairly early stage of what will be an iterative Action Research cycle. It is our intention to and involve more participants, bringing additional in-depth insights in the future and sharpening our themes. We were encouraged to present our findings to a larger, more heterogeneous group in the company and intend to do so (we plan to report about that in a future publication). Also membership in the Living Lab network leaves opportunities not only for cross-cutting insights across different organization and sectors but also for involvement for other interests, such as those of aspirant students and other very early career individuals. Understanding how they might perceive barriers and opportunities would be valuable and provide some measure of how and whether things might be changing. In addition, we are planning to interview male employees which means that future work will continue to compare and interpret different perspectives. This then helps us to put our recommendations to test and refine them by continuing to follow an iterative approach.

Regarding figure 15, our array of data confers an opportunity to focus on issues which have wider ramifications than external communication measures in the future (we e.g. thematized the internal perspective about women’s situation in a previous publication, Ahmadi et al., 2019). Of course, in Action Research processes, the journey is part of the destination and the involvement of the company in our Living Lab represents a modest but fruitful vehicle for social change, not only in terms of communication measures, but also in raising awareness of diversity

issues. Also, the involvement in this project offers participants a sense of belonging and legitimation, allowing them to 'be heard' where they otherwise may not be.

One might argue that the focus group design has limitations in the form we used it as integrating representatives from HR into the setting might have recreated an organizational hierarchy. While this, of course, is a possibility, we saw no evidence of reluctance by the participants to express viewpoints. Discussions seemed fruitful and not restricted in any way at the focus group. Indeed, sentiments were very similar to views expressed in an interview context, suggesting we might have found a possibly unique setting. This might be connected to phenomena of the company's 'familial' atmosphere as laid out in the paper. We also had the feeling that the women acknowledge the efforts of HR and want to collaborate with the department to change the situation for the better. In other organizations of our Living Lab, we actually found different dynamics which decreased the frequency and efficiency of focus group discussions (as we plan to lay this out in a future publication).

As mentioned, for pragmatic reasons we limited our perspective to a rather binary approach to the gendered nature of video game culture. This was because we had no data with which to examine other complexities. In the future, we hope that more gender identities will be brought into the spotlight.

It also became apparent that the internal and external aspects of Employer Branding are inseparable in creating a coherent employer brand. Sketching interventions and implementing external communication measures will not be successful in the long run if there exists a mismatch between what is externally communicated (this paper) and internally perceived by the employees (Ahmadi et al., 2019) as the latter are representatives of the companies working conditions (Backhaus & Tikoo, 2004; Barrow & Mosley, 2011; Kunerth & Mosley, 2011; Leekha Chhabra & Sharma, 2014). Adequately communicating the career development initiatives (such as courses and paths) internally, for instance, can also be an 'advertisement' to outsiders. Put differently, the company has to keep their promises. This undoubtedly is an ongoing challenge as "both employer branding and the process of becoming an unbiased, gender aware organization are complex long-term development programs" (Lundkvist, 2015, p. 67). It became apparent in our own study that some initiatives can be regarded as rather short-term solutions (such as designing job ads or trying to tackle young female professionals at fair trades and universities) while others have a long-term perspective (e.g. going into schools and addressing children as well as their relatives or changing the public perception of the video

game industry in general). It is clear to us that the efforts of the kind we advocate need to be sustained. Research pragmatism might yet contradict those ambitions: Funding of our Living Lab research is reduced to a 3-year time period. At best, the company we accompanied will continue with their gender-sensitive interventions which we created collaboratively and we hopefully will be able to stay in touch with them to foster collaboration in the future. Yet, from a research perspective, measuring the impacts of our efforts, especially the long-term ones, is difficult to achieve with such obstacles.

8.6 Conclusion

Companies in the IT field still wonder how to attract more female personnel and what communication mechanisms are needed to do so. To gain a richer understanding of adequate gender sensitive ways of communicating towards girls and women, we conducted a qualitative field study in a video game company in a large city in Germany. We present above a detailed account of practices, cultures and operative principles of the industry with a gender lens and sketch out implications for the design of gender sensitive external communication measures together with our participants. Our lessons learned can serve as implications for companies to encourage gender sensitive external communication strategies to attract more female personnel. Furthermore, our lessons learned from a video game company provide an interesting and instructive case study other 'tech' industries can learn from. This way, we hope to add our part to the realization of more gender balanced working environments in IT.

9 Feminist Living Labs as Research Infrastructures for HCI: The Case of a Video Game Company

Abstract

The number of women in IT is still low and companies struggle to integrate female professionals. The aim of our research is to provide methodological support for understanding and sharing experiences of gendered practices in the IT industry and encouraging sustained reflection about these matters over time. We established a Living Lab with that end in view, aiming to enhance female participation in the IT workforce and committing ourselves to a participatory approach to the sharing of women's experiences. Here, using the case of a German video game company which participated in our Lab, we detail our lessons learned. We show that this kind of long-term participation involves challenges over the lifetime of the project but can lead to substantial benefits for organizations. Our findings demonstrate that Living Labs are suitable for giving voice to marginalized groups, addressing their concerns and evoking change possibilities. Nevertheless, uncertainties about long-term sustainability remain.

9.1 Introduction

The information technology (IT) field (Cheryan et al., 2015) remains male dominated and design teams still tend to be comprised of homogeneous groups of young, white, educated men. One reason for this is seen in gender performativity in organizational spaces (Acker, 2006; Tyler & Cohen, 2010). Masculinities in IT industries (e.g. Alfrey & Twine, 2017) in general as well as their associated fields such as gaming (e.g. Prescott & Bogg, 2011; Weststar & Legault, 2018) in particular are then widely discussed and working as a non-man in such androcentric environments remains a challenge (Ruder et al., 2018). As a result, IT companies not only have a problem attracting but also retaining female personnel (Holtzblatt & Marsden, 2018; Tapia & Kvasny, 2004). In terms of technology production (D'Ignazio et al., 2016), such as video games (Cassell, 2003), this is problematic: The absence of diverse perspectives can contribute to fundamental design flaws, being based upon rather unreflective assumptions in this 'sea of dudes' (J. Clark, 2016). In response, studies advocating feminist design (e.g. D'Ignazio et al., 2016; Fiesler et al., 2016; Van House, 2011) and methodological reflections on feminist HCI (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011; Rode, 2011a) have gained

momentum in recent years in HCI research. For this reason, we adapted the Living Lab methodology (see below).

Establishing gender sensitive working environments to foster women (and other minorities working in the field) as team members, it is argued, is a moral imperative for a number of reasons (Herring, 2009). Nevertheless, and despite numerous studies revolving around gender and IT topics (e.g. Holtzblatt & Marsden, 2018), such efforts have had only limited practical impact. Ergo, how to best describe, conceptualize and act upon the problem of integrating gender awareness into design practice remains obdurate. The problem is inherently methodological, incorporating epistemological issues, contested theoretical stances, and matters of practical policy. Putative solutions have embraced participatory and emancipatory approaches, such as ‘Participatory Design’ (PD) (Ehn, 1993), Participatory Action Research (PAR) (Gatenby & Humphries, 2000; Kindon et al., 2008) and institutional ethnography (DeVault & McCoy, 2004; D. E. Smith, 2005). We argue, along with others, that this requires a certain degree of co-production with research participants (e.g. Ehn, 1993; Ley et al., 2015; Ogonowski et al., 2013; Wagner, 2018). Certainly, from a gender perspective, “the design process itself would benefit from having different sets of experiences as bases for ideas and visions, which is a reason for advocating participatory design (Bratteteig, 2002, p. 103).” A shift towards emancipatory agendas can thus be a step forward but PD and other collaborative approaches rooted in a practice-theoretical tradition also run the danger of creating their own pitfalls: “One limitation that has been only marginally addressed within the participatory-design community has to do with the complexity of a setting and project (Wagner, 2018, p. 244).” Indeed, feminist research proposes that associated issues take place in a cultural context which involves people with a multiplicity of identities, perspectives, experiences and biases (Collins & Bilge, 2016; Dill & Kohlman, 2012; Maguire, 1996).

In this context, Living Labs (e.g. Eriksson & Kulkki, 2005) as holistic, human-centered long-term co-design research infrastructures in real life environments might offer a considerable potential. We believe that they are a suitable and productive methodology for both, challenging the gendered assumptions that are present in much design and creating a reflective space in which women can share and exchange experiences. Typically, a Living Lab is defined as an open innovation, user participative approach which takes place in an ecosystem of some kind (Eriksson & Kulkki, 2005). However, definitions of Living Labs are still open (Westerlund & Leminen, 2014) and within the broad framework a number of methodological

choices are possible. Leminen & Westerlund (2012) describe a number of different types of Living Labs, one of which they characterize as ‘enabler driven’ and which has as its principle purpose strategy development. This is a close approximation of what we attempted in our work. Specifically, our aim in the project was the enabling of ‘safe spaces’ for explicitly reflecting on women’s experiences in the IT industry and with a commitment to the co-creation of *policy* initiatives which might provide learning opportunities. The need for research into gendered design (of both technology and policy) has recently been strongly attested to by Criado-Perez (2019) in a powerful critique of existing practices in the IT industry and elsewhere. A practical focus also provides advice scenarios for others, contributing to co-design of the future (S. Bardzell, 2014). Yet, such a research infrastructure is not per se feminist. Feminism is not a status but a commitment and while Living Labs are the vehicle (the methodological framework), a feminist epistemology is the driving force. Being situated in real-life environments and methodologically flexible, Living Labs can thus be a canvas for several ambitions but managing a Living Lab requires the translation of the feminist commitments which have informed the HCI community (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011; Rode, 2011a) into research pragmatics; for instance putting the otherwise marginalized into the center of research, ensuring that their voices and perspectives are heard, managing conflicts of interests and foregrounding the moral interests of researchers as well as participants.

Our main aim of this paper is to offer a methodological contribution, reflecting on our efforts to translate the broad commitments of feminist HCI into a pragmatic, long lasting Living Lab co-design space. Below, we demonstrate the operationalization of epistemological principles by presenting a detailed case study of the collaboration between committed researchers and one stakeholder of our Lab, a video game company from Germany. Our methodological approach both identifies the gendered nature of work in video game production (Cassell, 2003) and, through a long-term co-creation process, seeks to remedy existing biases. It thus acts as a perspicuous setting for a wider consideration of the issues.

9.2 Related Work

9.2.1 Living Labs and Feminist Research

Living Labs still lack a precise definition (Westerlund & Leminen, 2014) but they provide for a holistic, co-design philosophy. They typically include different stakeholders from several sectors such as public, academia, and commercial interests among others. Methodologically flexible, Living Labs are increasingly associated with approaches emphasizing co-design, such as Participatory Action Research (PAR) (Kindon et al., 2008) and Participatory Design (PD) (Dell’Era & Landoni, 2014). Although the boundaries between such approaches are blurring, Living Labs arguably take the aforementioned concepts a step further via the integration of diverse stakeholders from several sectors who then form a ‘network of excellence’ (Corallo et al., 2013; Ståhlbröst, 2013). This provides all involved parties with a more holistic picture of a problem situation (Ogonowski et al., 2013) which in turn supports mutual learning. Users share experiences, provide insights from their daily experiences and co-create new solutions based upon their requirements. Research in such labs usually takes place in iterative cycles, encompassing 1) analysis of the status quo, 2) action planning 3) intervention and 4) re-evaluation (Ogonowski et al., 2018). It can be argued that participants are more likely to resolve existing attitudes and stereotypes in such a real-world research infrastructure, adopting a constructive mindset, and thus being inspired to pursue creative solutions (Higgins & Klein, 2011). Crucially, Living Labs provide a *setting* for such exchanges, one which otherwise does not exist.

Living Labs with a more progressivist agenda have subsequently dealt with marginalized or vulnerable groups such as elderly people (Müller et al., 2015a, 2015b) and people with dementia (Unbehaun et al., 2018), also having focused on sustainability issues (Meurer et al., 2018). Historically, Living Lab research has involved technological interventions, but this is not a necessary feature. The infrastructure can be used to design any kind of innovative idea or measure for intervention in a social system (e.g. experience sharing, case studies, opportunities for learning etc.). Thus, they evoke a certain type of social change within a system in iterative research cycles (Higgins & Klein, 2011; Schaffers et al., 2008; Ståhlbröst & Holst, 2017) which is why they are sometimes characterized as ‘Social Innovation Spaces’ (Edwards-Schachter et al., 2012) which target social justice and equality by helping individuals to liberate themselves.

Building upon the aforementioned, Living Labs as co-creative ‘social innovation hubs’ aim for social change, include a multiplicity of stakeholders and show a certain flexibility with regard to setup (including epistemology, methodology and method). Furthermore, their commitment to long-term, sustained, engagement is a vital characteristic. Such general commitments make Living Labs eminently suitable for an explicit engagement with strategies for understanding and improving women’s experience in a perspicuous setting in the gaming industry. Living Labs hence seem to offer a natural fit to feminist Participatory Action Research (FPAR) (e.g. Frisby et al., 2009; Maguire, 1996) as they integrate heterogeneous stakeholders, providing a stable space, broadening participation (Corallo et al., 2013) and revealing unique insights (Almirall & Wareham, 2008; Schaffers et al., 2008) which otherwise would be ‘hidden.’ From a feminist research perspective this creates new opportunities to manage stakeholder conflicts (Ogonowski et al., 2013), power relations and offer ‘safe spaces’ (DeVault & Ingraham, 1999).

Nonetheless, there still is a need to elaborate on what a ‘feminist way’ of doing Living Lab research looks like, since it is reasonable to assume that its character will be substantially different from labs which focus on product development.

9.2.2 Feminist HCI

Feminism comes in several (often contested) forms but they all examine at very least the various reasons for gender inequality and share a similar understanding of emancipatory potential. Feminist research (Campbell & Wasco, 2000; Reinharz & Davidman, 1992) then proposes a more humanist approach by advocating that the social context should be explicitly taken into account, both through a reflective analytic focus and through participatory commitments. Such a view addresses two issues: One is concerned with the development of women-friendly policies (or at least a better understanding of the challenges) within an organization. The other focuses on the development of skills and knowledge on the part of women (and others with marginalized statuses) so that they can navigate their way through the obstacles that organizational life confronts them with. This implicates the way data is collected and analyzed, how wider power relations in research projects and elsewhere are constituted, and explicit value commitments (Harding, 1986). ‘Standpoint’ epistemologies underpin much of what is usually termed ‘feminist HCI’ (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011). Research of this kind argues for a politically engaged science which focuses

on the experiences of ‘marginal lives’ with a view to transforming them (S. Bardzell & Bardzell, 2011). This approach (Acker et al., 1983; S. Bardzell, 2010; Campbell & Wasco, 2000; R. Edwards & Mauthner, 2002) tends towards qualitative methods which emphasize the everyday, subjective experience. In addition, participatory methods are used with the explicit aim of empowering participants (Maguire, 1996) and, aiming for a reflexivity which recognizes the relationship between research and researched (Reinharz & Davidman, 1992), seeking “to undercut the distance between the researcher and the research subject (S. Bardzell & Bardzell, 2011, p. 681).”

Bardzell (2010), drawing on these commitments, introduced the notion of feminist HCI, later revisited by other scholars (e.g. Rode, 2011a), arguing that HCI research, given its transformative potential, has ambitions similar to those of feminism. Feminist HCI is especially informed by standpoint epistemology (S. Bardzell & Bardzell, 2011). They suggest that this has implications for methodology including a commitment to scientific and moral objectivities while creating a participatory, empathic research relationship with subjects, relating to their experiences and taking the social context into account. Ongoing reflection and self-questioning as well as disclosure of the researcher’s position and values are an additional key dimension.

A significant amount of feminist literature in science and technology studies (STS) examines the gendered nature of technology and, following this, explicit feminist agendas in HCI design research have also gained traction in recent years (Marsden, 2014; Marsden & Pröbster, 2019; Metaxa-Kakavouli et al., 2018; Vorvoreanu et al., 2019). In this paper, we build on the abovementioned work by examining how *long-term sustainable* commitments manifest in the Living Lab approach, allied to a standpoint feminist HCI perspective, can create structural conditions for such work.

9.3 Methods

Translating the commitments of feminist HCI into a pragmatic design space requires explicit rationales from the very beginning. From an epistemological perspective, our Living Lab was methodologically informed by feminist Participatory Action Research (FPAR) (Maguire, 2001). FPAR helps to “unmask taken-for-granted social practices that reinforce hierarchies and exclusions, while revealing new social change strategies that can directly contribute to the transformative aims of action research” (Frisby et al., 2009, p. 25). Originating in

organizational workplace studies, the approach “seeks to connect the articulated, contextualized personal with the often hidden or invisible structural and social institutions that define and shape our lives” (Maguire, 2001, p. 65). Hence, FPAR gives marginalized groups a voice. We did this through a combination of observational work intended to reveal something of the daily routines of women in this organization as well as focus groups in which experiences could be shared and reflected upon. Our aim was, and is, to facilitate change and we reflect on this below. Our approach to the fieldwork at the organizations was then in the anthropological tradition of ‘institutional ethnography’ as proposed by Smith (1987, 2005) which especially aims “to make the viewpoint of the researched women central to the research” (McDonald, 2005, p. 465) and focuses on ‘everyday experience.’ We might note in passing that observational work proved easier to do in some contexts more than others, which is a further reason for concentrating below on the video gaming company. Below we lay out how we set up our Lab with a woman-centered ethic in mind.

9.3.1 Living Lab Aims and Stakeholders

Our case study is based upon 2.5 years of an ongoing three-year Gender and IT Living Lab project in Germany. Scientific knowledge transfers and exchange amongst stakeholders into real life environments is at the core of the project. The group of relevant stakeholders consists of company representatives, students and trainees from IT-related areas as well as researchers from the field of HCI. A shared and overarching goal of all stakeholders of our Lab is to strengthen the role of female talent in IT organizations. A vital element of the lab are six organizations with whom we aimed to collaborate closely. Our partners are a mix of small and medium-sized (SME) and larger enterprises from different locations (Ahmadi et al., 2018): 1) A smaller nano optic and sensor technology company, 2) a service provider for IT services for local governments, 3) a large, international manufacturer and service provider of vehicle registration marks, 4) a local fabrication lab, 5) a scientific data management department and 6) the video game company which is the specific focus of this paper since it is where we obtained most of our data (details below). Although we undertook fieldwork in more than one organization, our variable observational experiences led us to rely on the video gaming company for major contribution to the Living Lab work. At initial meetings we held with each organization (separately), we encouraged organizations to define their own research questions, based upon real life company situations (Ahmadi et al., 2018). This allows us both,

collecting different cases for each organization as well cross-cutting comparisons across several industries.

Additional stakeholders to the wider project consisted of eleven gender-mixed HCI and business informatics students from our local university, whom we interviewed about their expectations around future employment, data which was cross-referenced with insights from the organizations. We also organized five symposia across Germany for dissemination purposes (details below) with approximately 50 to 80 participants. Attendees of the symposia were diverse, e.g. company representatives, consultants, students and trainees from IT-related areas as well as researchers (including us). Symposia were established as a ground for stakeholder interactions where workshops were organized.

9.3.2 Case Study of a Video Game Company

In March of 2017 we got agreement from the video game company through a ‘cold call.’ The company successfully develops games and is embedded in a nationally (two additional German branch offices) and internationally operating company network. German or English are used during daily business and the background of the employees is mixed. By April 2018, roundabout 60% originate from Germany while 40% come from other countries. The proportion of women employed in this company was estimated to be about 16%. To our knowledge, our participants (see below) identify as cisgender, were in their 20s or 30s and some had a migratory or international background.

Initial meetings took place with mostly HR representatives, later with other potential female participants. The head of HR sent an email to the staff asking about potential interest in the project with some of them joining those meetings. Attendees expressed a positive view of the project from the outset, wanting to share experiences and acknowledging “organizational blindness” (hence feeling “helplessness”). At one of the first meetings we were also asked questions such as *“How often will you be here?”*, *“Which questions do you ask?”*, *“What should we do?”*, *“When and how do we receive the results?”* We made clear that we wanted to address such issues cooperatively. Thus, right from the start, we were eager to put collaboration at the center of our Living Lab research. We wished to emphasize the importance of allowing women to voice, share and reflect upon their experiences with a view to providing ‘learning moments’ for others (e.g. Gottfredson & Mosher, 2011). We jointly

decided that the research agenda should focus on ways to foster processes of talent acquisition, development and retention.

Throughout the time frame described in this paper, we went through two iterative cycles (figure 18). The first phase took place in 2018 and the second in 2019. Work with this company involved observations, interviews, two focus groups as well as the organization of workshops at three symposia. Our ‘methodological toolbox’ for Living Lab research (Ogonowski et al., 2018) consisted in mainly qualitative approaches. Data came from interview transcripts, field notes, notes about informal talks and documented workshop results.

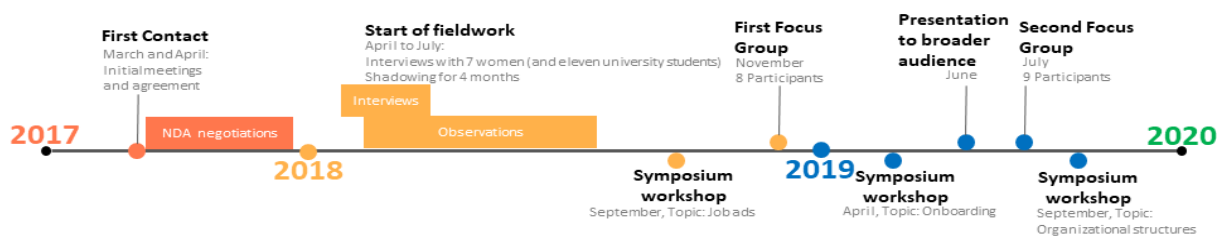


Figure 18. Timeline

During the evaluation phase of the first cycle we relied on interviews and observations to collect data in the company. This helped us to gain a richer understanding of the context and give voice to personal sentiments of our participants. We conducted semi-structured interviews (mean of 46 minutes) with seven women, inter alia asking them about their childhood, education path and business experiences. We furthermore used shadowing as an observation method (McDonald, 2005). Here, two researchers visited two female employees twice a month on ‘ordinary’ working days over the course of three months. At the beginning of the first phase we explicitly recruited women, including project managers with lead responsibility, a senior concept artist, a game tester in quality assurance (QA), a senior HR manager, a game designer (UX) and a woman from communication who later additionally became responsible for diversity issues as well as an ombudsperson.

Following the first months in the field, after collecting and analyzing this data, we were able to identify critical “*building blocks*” (as desired by an HR participant at one of the initial meetings) which cover the ‘lifetime’ of an employee within the company (figure 19). It

became clear, that women are confronted with gendered practices at all stages of their career progression.



Figure 19. Areas of concern identified via field work

What followed was a symposium workshop in collaboration with two company representatives, offering the company and additional stakeholders a creative space for brainstorming and reflection. The topics of the workshops, in the main, emerged from the framework described above (figure 19). The first workshop dealt with gender sensitive external job advertisement to mitigate gender stereotypes and address recruitment of female personnel more adequately. Here, participants were asked to creatively ‘tinker’ with gender stereotypes and come up with designs for job advertisements (Ahmadi et al., 2020b). Throughout the first cycle, additional parallel activities in our Living Lab involved interviewing students from our local university with a view to obtaining a picture of initial expectations. This data was used as well for designing branding policies.

After analyzing this initial data, we organized a focus group as such represents “a contextual method which acknowledges the active process of meaning-making by individuals within social contexts (Næss, 2001, p. 130).” In addition to the participants mentioned above (two were on sick leave), two interested men (from communication and HR) as well as two female colleagues (QA) who were identified as being important in our context were enlisted to the focus groups on an opportunistic basis. This activity finalized the first cycle.

The second cycle started with another symposium workshop covering the question of how to manage a gender sensitive onboarding process (arguably for each employee a challenge, but even more for women entering male dominated environments). This time, a short role-play session (a method from feminist social science, S. Bardzell & Bardzell, 2011) took place with two groups either acting out a best or a worst-case scenario of an onboarding process. Later that year, a 60-minute presentation was held within the company where we discussed our insights with a broader, more heterogeneous audience. After this, a second focus group

followed. The outcome from the previous cycle as well as the data from the second symposium workshop helped us planning the second focus group as we used our insights as a base for discussion. We furthermore introduced a framework (Holtzblatt & Marsden, 2018) that companies can use to identify dimensions with which to address gendered workplace issues and improve retention of female employees. We also broadened up the participants: The diversity and inclusion manager encouraged participants with the ‘right mindset’ for the second focus group and two women (event manager, junior PR manager) as well as three men (QA, internal communication, head of communication) took part. Five participants did not return (see discussion). The second cycle was concluded by a third symposium workshop where gender aspects in talent development were discussed, addressing barriers for women within the company and additional retention aspects such as hygiene factors (e.g. Worthley et al., 2009).

In terms of data analysis, we analyzed our array of data using a thematic analysis approach (Braun & Clarke, 2006) while codes were created via inductive analysis using the software application MAXQDA. The themes were jointly agreed by the authors in informal discussion.

9.4 Findings

In the following we report how our *explicit* commitments influenced the process, results and experiences we jointly constructed.

9.4.1 Participation Process

Many organizations we cold called saw relevance in the topic but we experienced some practical difficulties as organizations do not normally see academic research projects as high on their list of priorities (Dachtera et al., 2014). Most of our project partners were very engaged at the beginning but we saw some of their engagement decrease (a pattern not uncommon in Living Lab research, Logghe et al., 2014; Ogonowski et al., 2013). This being said, the video game company was by far the most engaged one, being the only organization making effective use of the symposia’s opportunities. We found that the more engaged an organization was during the ‘regular’ project work, the more eager it was to send representatives to the symposia. In this context, one person from HR said to us: *“We are young and wild and if we don't manage to change things like that, then how can a big dusty company? (...) We are flexible enough, we can change things quickly...”*

Despite this, several organizational barriers nonetheless proved to be a burden. The signing of non-disclosure agreements (NDA) was sometimes difficult, in one instance taking nearly half a year. This delay also influenced attendance at the symposia with the first two (out of 5) events taking place without some participants. Still, the “young and wildness” made collaborating with the gaming company easier because of their corporate culture. To speculate, it does seem that the more bureaucratic the organization and the more top-down its decision processes, the greater the challenges for participation.

We furthermore found that our approach to a collaborative, non-hierarchical mindset from the very beginning turned out to be fruitful. This involved balancing our participants’ desires as well as ambitions and we also had to change aspects of our approach: After reflecting on the first focus group we tried to maximize the participants’ buy-in at the second one, asking explicitly for expected results. Participants also had more influence on the discussion format and they preferred discussing as a whole group: *“I would also be interested in all other perspectives here, so it would be a pity if we limit it to a small team now.”* Overall, a democratic and productive approach was generated, resulting in tangible outcomes. This surely made participants show enthusiasm for our focus groups as they created, in their view, room for reflection and ‘legitimation’ (see next section). At the first focus group, a female participant said *“I hope this is done again”* and at the second focus group, the diversity and inclusion manager emphasized: *“I think it's great if you have an extra room for it (...). Where several people are sitting in. (...) If these 10 people sit here together, you can get more out of it.”* We also received similar feedback via the survey from the attendees of our symposia with most of them expressing positivity about the discussion atmosphere.

9.4.2 Experiencing Common Standpoints

In terms of motivation, female participants stated that they want to share their experiences of stereotyping and stigmatization, hoping this way to shed light on gendered inequalities within the industry and contribute to change processes. Male participants of the second focus group seemed to acknowledge they might be privileged when working in ‘masculinist’ environments and stated that they want to help breaking up such structures, adding their part to ensure equality and fairness. Feeling a sense of belonging when sharing experiences was especially highlighted as a motivator by a female participant. Thus, *“For me, it is important to talk about it and to see that the experiences that I make are also shared with others (...),*

that men also support and perceive these experiences in order to legitimize me (...) to seek a dialogue with my colleagues (...)."

The aspect of *legitimation* is important as the women reported that at times they feel stigmatized (and as a result disadvantaged) as *"bitchy"* or *"pushy"* when e.g. showing interest in fostering their own career ambitions, when trying to integrate 'feminine' perspectives into game design or when speaking up against casual gendered assumptions. This was supported by the view of a male participant who at the second focus group related to injustice present at the company: *"Put quite simply: A woman complains, a man improves."* Managing those dilemmas, especially in terms of project duties, solidarity towards colleagues and group pressures, engenders tension and stress for female employees. One woman at the first focus group even said *"I feel bad sitting here, because that way I spend time not working on my project."* Despite this, we felt that opening up a dedicated space (at the focus groups but also at the symposia), where several people with similar concerns and shared values meet, offered such a 'legitimation.'

Another motivation for the women of the video game company to join the project was the desire to act as a role model. This was expressed several times in both interview and focus group settings. Being part of the project helped one participant to understand how to achieve this. Hence, *"Of course (I'm) trying to be a role model. (...) I want to go into the discourse, talk with the people, get opinions and then stand up as someone who is also a bit of a mentor. That totally helps me when workshops take place where you hear a lot of different opinions."*

Having a safe space and experiencing that others have similar perspectives raised awareness within and outside the people that participated in the focus groups. After a 60-minute presentation of the project and its insights held by the first author which was open to everybody at the site and transmitted via video, a female coder (the first female participant from a technical area) from a different branch office contacted us, keen to share her perspectives as well in an interview situation. This showed us two things: Making a project visible like this can not only lead to a general interest to join the project, it can also offer the degree of 'legitimization' to become a member. Our participants were all intrinsically motivated and willing to share experience of working in what they saw as a masculine culture. Nevertheless, there was appreciable frustration over the fact that there exists a need to *"explain"* why equal treatment is a necessity. Clearing up reservations and misunderstandings was seen as a major benefit of the research collaboration: *"I don't know how I'm supposed to*

interact (with them). (...) It's a pity that I have the impression that I must explain to people why they can profit if they show consideration for other people."

9.4.3 Understanding Contexts

Our approach to the fieldwork helped us to gain knowledge about otherwise relatively invisible, subtle, but nevertheless quite routine practices of hegemonic masculinity. This way the Living Lab participation of the video game company brought insights for both the company and the researchers which were e.g. shown in a situation where three women were seen complaining that they had to consistently undertake the duty of brewing coffee. This was not predicated on any set of instructions, but simply reflected the fact that male colleagues seem to make less effort to replenish the collective coffee facilities. Insights of this (seemingly trivial) kind arguably would have been 'hidden' to us had we just relied on interviews and on a short-term approach. The evolving nature of our discussions revealed a number of such realizations and recognitions. Early on, we recorded very few instances of what we might term 'harassment' as women interviewed reported very positively on a 'familial' working environment fueled by a creative (at times anarchic) environment (Ahmadi et al., 2019). There was one exception however, when a more experienced woman told us that several years ago she noticed gossip 'behind her back' because of her sexual orientation: *"I am bi(sexual) (...) and almost everyone here knows that. I have always lived this openly (...) but there was someone, he didn't tell me that directly, I heard it from a friend."*

Subsequently, the second focus group revealed that women were now more willing to report on such instances where they felt harassed, building on their gradual recognition of a shared orientation and the trust engendered over time. We also obtained new insights in terms of power gaps and a discussion culture. What was striking about this was that women had initially only made passing reference to this but during the second iteration it became evident that this was in fact a deeply 'felt' matter. A female attendee of the second focus group e.g. misses *"appreciation for qualities that we connote as feminine, they are usually regarded as weak, no matter whether it comes from a man or a woman."* A further example was provided by a female executive who had indicated during her interview that, being inspired by a female role model, she preferred a more 'feminine style' of management, stressing the need for supportiveness. Although we did not mention her example explicitly (she was not present at the second focus group), a male attendee saw this pattern as well, bringing it into discussion

as an “*interesting example*” himself. Being a member of her team, he reported that she was ignored on various occasions which is why she adopted a more forceful tone in her leadership style: “*If you know the background, you notice that there is a somewhat stricter tone and I can imagine that the target persons might think ‘Oh, now she's talking bitchy to me!’ (...) It turned out that it wasn't accepted because it was said too nicely or was simply said neutrally.*”

9.4.4 Giving Access to Resources and the Creative Space

The company acknowledged that it benefited from inclusion in the Living Lab’s network of excellence and access to its resources in multiple ways. They received researchers’ expertise as we linked the insights gained via fieldwork to broader findings on gendered structures. The knowledge we introduced, the symposia workshops as well as the insights brought in from student interviews was considered to be useful. According to HR, those efforts, especially short-term solutions such as implications for job advertisements, were adopted. Future research might report about their impact. Indeed, the symposia workshops subsequently provided a suitable device for gaining a broader perspective from other IT-related organizations. The attendees, though not being experts in the video game industry, gave the company access to knowledge that otherwise was out of reach. It also helped researchers to understand how different circumstances and cultural contexts are shaped by gendered experiences. The same can be said for attendees who reported via informal talks and online surveys that they gained value from participation, either in terms of networking opportunities or as their perspective on gender aspects in organizations was sensitized.

9.5 Lessons Learned and Discussion

As HCI researchers, we are committed to research infrastructures that offer a *practical* contribution to a more equal society (S. Bardzell, 2014). With an increasing focus in our field on *how* technology is developed, Living Labs seem to offer such an infrastructure (Ståhlbröst & Holst, 2017). Participants in our setting took part in co-design activities and though not with an explicit focus on technological artefacts, our paper provides, we believe, implications on a sustainable methodology for pursuing a feminist HCI ambition. Having said that, success in a Living Lab depends on the creation of a suitable setting where the interests of all stakeholders can be represented (Schaffers et al., 2008). ‘Suitable’ and ‘human-centric’ (Ley et al., 2015) in this context remains a matter for debate. Nevertheless, elements of our work,

it seems to us, are critical to this sustainability. Identifying supportive organizations at the outset was important, managing individual recruitment equally so. Building a trustful, shared environment in a common space was absolutely central. In the light of our explicit commitments, however, these general principles panned out in specific ways.

9.5.1 Ideology, Membership and Commitment

A Living Lab is feminist if it is explicitly designed to be so, hence ideology determines its constitution from the outset. This also means that a feminist Living Lab depends on the commitment of its members to a shared set of broad feminist values and ambitions. We were eager to, as Dorothy Smith puts it, regard the “everyday world as problematic” and privilege the knowledge of the marginalized (D. E. Smith, 1987). From a feminist point of view, this shift from ‘lead users’ (Ley et al., 2015) to the ‘marginal user’ (S. Bardzell, 2010) seems like a step forward. We worked closely with a rather homogenous group of participants in terms of ideology, which helped the project to gain momentum. This, of course, comes with its own set of limitations when walking the fine line between recruiting participants with likeminded views and ensuring that diverse opinions are respected. Also, it raises the question how to manage intersectionality and the particular difficulties that minority female populations might have. In the setting at hand, this can not only be in terms of heritage, age or ethnicity but also in terms of occupation. An obvious limitation of our work was that during our two iterative phases no female developer was involved in the study yet (as mentioned, one female coder contacted us after the 60 minute presentation and her interview data will be part of the third iteration), despite this task arguably sitting at the core of game development (Weststar & Legault, 2018). Having said that, a participant of the second focus group actually praised the format for its effort to integrate employees from different departments which, in her view, also represented a certain degree of heterogeneity. Those elaborations show that ‘heterogeneity’ and ‘diversity of membership’ in this context remain a matter of debate. A degree of homogeneity, in our view, enabled consciousness raising, built confidence and reduced skepticism. Getting a broader interest in the topic and recruiting a more general and probably more critical audience is still a challenge, however. At the second focus group a male attendee emphasized that need by saying that diversity is not necessarily regarded as a desired mentality within the company as some people are concerned that they may lose privileges, or see restrictions on their behavior.

As other authors have suggested (Ley et al., 2015; Logghe et al., 2014; Ogonowski et al., 2018), retaining participants is a vital challenge for the organizers of Living Labs. Four women did not return to the second focus group because of time and project constraints and we lost another participant who moved to a different branch office. We did not find the general commitment of our participants to be a problem but balancing time constraints was. Staying the course, even so, brought rewards. One (male) participant concluded at the end of the second focus group: *“We’ve (he and his female colleague) considered, should we go? Because we’re having a lot on our plate right now. We are glad that we came.”* Of course, practical research with profit-oriented companies means compromises between research and business objectives (Dachtera et al., 2014), regardless of the topic. Overall, we felt that in this case the retention rate was supportive of the Living Lab long-term objectives.

Implications: A feminist stance includes constantly reflecting on how participatory and egalitarian the participation process really is and how much participants are embedded into important decisions. Ensuring that their voices and perspectives are heard in the design process and putting marginal experiences in the center means paying attention to their needs and desires but also to aspects which could decrease the likelihood of engagement. Other feminist HCI studies (e.g. D’Ignazio et al., 2016) have shown the importance of the social context when engaging marginalized groups in participatory processes. Woman is not a unitary category and so recognizing heterogeneity and possible stakeholder conflicts of interests is important: Recognizing that participation might be difficult for some, for a range of reasons, entails balancing time and other constraints against the maintenance of interest and motivation). Equally, while it is hardly surprising that organizations showing interest at an early stage were likely to be more involved, there remains the vexed question of how one motivates collaboration by others who are less committed: We did have a degree of success in opening up the participant pool at the second focus group which helped us to receive broader insights. Hence, a certain flexibility towards scalability can be fruitful. Also, to find fitting participants, a contact person within organizations proved crucial. In our organizational contexts, those were often from HR personnel with responsibility for diversity matters. Again, preaching to the relatively converted is both an opportunity and a challenge. Also, researchers and participants have to be patient about aspects which are beyond their influence and a long-term focus rather facilitates that attitude and enables momentum to develop in due course.

9.5.2 Choice of Methods

The methodological stance of FPAR (Maguire, 2001) served as a means to translate an otherwise abstract feminist epistemology and the ideology of the stakeholders into an iterative and cyclic research approach. Doing this kind of Action Research in the context of our Living Lab helped us gain deeper insights into the context, correct previous assumptions and also adapt our approach to the fieldwork when necessary. There are many versions of Action Research (Hammersley, 2004, 2007; Reason & Bradbury, 2008) but all imply at very least a transformative agenda, one which we pursued in our iterative methodological approach.

As Dourish (2006) argues, ethnography in the field of HCI can not only unravel the performances of individuals but also explore the mechanisms which shape and reproduce (often taken-for-granted) practices in a social system. The latter is regarded as a major mechanism for gender performativity (Tyler & Cohen, 2010). Such empirical accounts of human experience are hence positions compatible with both HCI and feminism (S. Bardzell & Bardzell, 2011) and said interest in everyday gender performance is why Smith's approach of 'Institutional Ethnography' (D. E. Smith, 1987) was instructive to us. Interviews and shadowing then turned out to be suitable methods for understanding of daily business routines, different roles, delegation of tasks as well as the corporate culture in general (e.g. Czarniawska, 1997; McDonald & Simpson, 2014). The shadowing technique added value to the interview reports, handing "access to (...) the difficult to articulate" and to aspects of organizational life which "are the hardest to research" (McDonald, 2005, p. 457). Shadowing at this specific setting worked well whereas in other participating organizations, it was less rewarding. Our focus on the video gaming company in this paper reflects the fact that it was where data collection proved most fruitful. We did not find the same openness everywhere we went. To state an example, in a different organization people stopped talking when we were nearby, decreasing the opportunity to collect useful data which is why we more heavily focused on interviews there. One can only guess about the reasons but we believe it is the result of different corporate cultures. This highlights that the methods in Living Lab research have to reflect conditions in the setting (Ståhlbröst & Holst, 2017). In terms of interview data, the result of the coding process can be understood as 'narratives' (Czarniawska, 1997; Etherington, 2004) which explore individual sentiments shaped by their environment. These narrative stories are, of course, negotiated between the stakeholders involved in the research process. The subsequent focus groups provided the participants with a sense of belonging and

empowerment (Farquhar & Das, 1999). Overall, we think that the mix of methods (Taber, 2010) and the long-term approach we chose revealed insights that would otherwise have been hidden to us. Careful description of social practices such as the case study at hand can then help to retrace effects of specific interventions (Wulf et al., 2011). Of course, the field work based in a single study reflects only contextual experiences. Nevertheless, there are reasons to think the setting is perspicuous: It is a place where men predominate, where IT is implicated, and where the culture has some relationship to gaming at large. As such, it gave us what we think are plausible insights into gender relationships in the IT industry at large (some of which, at least, are consistent with existing literature). Even so, we acknowledge the need for some cross-comparison. It is a feature of all research that some tradeoff between reliability and validity occurs and our work is valid for our context. How reliable it is across other contexts and organizational cultures is, at present, something we can only presume and further work clearly needs to be done.

Implications: We emphasize the long-term process as being vital to our successful cooperation with the video game company. Staying in the field for a longer period of time, bonding with participants (see below) and adding more diverse perspectives to the second focus group fueled mutual learning experiences. We encourage others to become acquainted with methods which serve long-term objectives and lean towards methodological pluralism. Observations, for instance, have shown value in our context (as in other feminist studies). Having said that, they might not work in every setting which means flexibility is key.

9.5.3 Role of the Researcher

The role of the researcher requires reflexivity on our part, not only in terms of the methods employed, but also considering our role within the process (Etherington, 2004). Building relationships within the field, hearing the inspirational stories of the women and digging deep into the data is an emotional journey for the researchers and can lead to biases. As feminist STS scholars (Haraway, 1988; Suchman, 1987) propose, our vision of the world is based in an embodied perspective which makes us personally responsible for it. In our case, we are Action Researchers (see Hammersley, 2004, 2007; for discussion of the tensions Reason & Bradbury, 2008) as well as organizers of the Living Lab which means that our views unavoidably shaped its structures, at least in part. We, as HCI researchers, must therefore be aware that design research practice is an intervention, an intentional effort to create change

(Wulf et al., 2011) with a simultaneous commitment to scientific and moral objectivity (S. Bardzell & Bardzell, 2011). Hence, we were mindful of the view that an activist stance “seems to privilege the social values of the designer” (S. Bardzell, 2010, p. 1304).

Implications: In a feminist Living Lab where the organizers’ decisions have an impact across a variety of stakeholders, we have to take responsibility for our role (see also D’Ignazio et al., 2016). Our standpoint research aims at creating research for women with women. It does not imply that the research has to be done by women. In our view, ideology and not biology determines the outcome of research. We are confident that, over a period of time, trustful relations with a (male) researcher were established, although we ensured that, wherever possible, interviews were conducted by a male and female together and observation tasks swapped. A certain transparency can help here further, as we will lay out in the following section.

9.5.4 Safe Spaces and Power Dynamics

Opening up places for communication does not, on its own, create ‘safe spaces’ for reflection (DeVault & Ingraham, 1999). Rather, showing empathy (P. Wright & McCarthy, 2008), dedication and care for our subjects’ concerns helped us to gain trust. Our respondents have been forthcoming and reflective about their various concerns. Building personal relationships by e.g. also chatting about personal aspects (such as leisure time activities, heritage etc.) helped us understand the viewpoints of our participants better. The long-term perspective of our lab significantly aided this (Ley et al., 2015). Building trust in this sense is not a one-way street: We had to rely on our contact persons to see that our concerns were thoughtfully addressed.

The power dynamics in a Living Lab are complex. They implicate not only the relationship between researchers and organizational participants, but also the internal dynamics of the organization. Different groups of participants had different legal status, social status, age and gender etc. which in turn implies that a high level commitment to feminist ideologies is not enough. Again, the value of the Living Lab lies in its marriage between ideological orientation, understanding of practice and pragmatic, cooperative policy making. We found quite flexible structures in the video gaming company, and a surprising and positive relationship between HR and other participants which might be rather unique. Again, such a positive case ought to be instructive, but some caution is necessary as internal corporate

hierarchies are clearly important. Indeed, a representative from HR said that based upon her previous experiences, HR departments usually have an “*anxiety function.*” She was adamant, however, that this was not the case here. Most respondents stressed the ‘familial’ atmosphere of the company and employees acknowledged the efforts of HR. Indeed, we saw no sign of reluctance by participants in any kind to express viewpoints and sentiments although HR representatives were present at the focus groups. However, when opening up ‘safe spaces’ and offering ‘legitimization’ one must also acknowledge that participating in the lab might come with risks of stigmatization for participants.

Implications: To make a feminist Living Lab a more reflective space, one must be aware of dynamics within those safe spaces but also the broader setting they are embedded in as well as the power dynamics within the company. In our case, the installation of an ombudsperson within the company throughout the research process was a first step here. Acquiring sympathetic male participants at a later, timely, moment as ‘ambassadors’ was useful. Also, we believe that transparency is important: At the presentations we held for a broader audience, we made the intention of our research as well as our roles clear and used (anonymized) data to present the ‘real’ experiences and concerns expressed by our participants. Such data, it needs to be stressed, emanated directly from participants’ insights into the progress of the project (S. Bardzell, 2010; D’Ignazio et al., 2016) in a duly sensitive fashion. Participants appreciated that researchers “create an audience for the data that they are collecting and (show) how that data might be used to effect change that is meaningful to participants (not just to researchers) (D’Ignazio et al., 2016, p. 2620).” This was a significant validation for participants at symposia presentations.

9.5.5 Living Labs’ Ambition as Drivers to Create Social Change

Living Lab infrastructures should encourage critical reflection (Higgins & Klein, 2011; Schaffers et al., 2008). We found several encouraging examples:

“You have the opportunity to hear different opinions, different viewpoints and to also consider (...), do we have to do something different? (...) Otherwise you wouldn't receive the knowledge you would get here. (...). Everyone feels free to say something and I think if you just send around a questionnaire (...) you might only get a very selective perception and not so much concrete ideas and problems.”

Offering a dedicated infrastructure for egalitarian intergroup communication, in our view, was fruitful. Enabling the sharing of ‘situated knowledges’ which otherwise remain opaque (Haraway, 1988; Suchman, 1987). Nonetheless, how to carry our insights to a broader and probably more critical group of employees is a matter that will continue to occupy our minds in the future.

Participants considered the academic input which we brought to the process to be useful and relevant to their problem areas. Furthermore, one attendee said that our approach is suited to exposure the predominant masculinity within the company “*because you address things.*” Here, the narratives of a marginalized group within the company provided material for reflexive consideration which was, we believe, supported by the setup-of our Lab. This way, the company was e.g. able to realize processes of gender performativity and how this, in turn, influences game design. Also, the researcher can this way receive insights about gender performativity (and their influence on design) in different settings. All stakeholders, including us, are aware that the achievements of our Living Lab represent modest beginnings but its interventions at an organizational level linked with exchange at dedicated creative spaces is regarded as a process for envisioning a different future (S. Bardzell, 2014). Sustainability of our lab remains yet a matter of concern. As emphasized, a main advantage of Living Lab research lies in its long-term commitment (Eriksson & Kulkki, 2005) which however clashes with a terminally funded three-year project period. The issue of what happens when researchers ‘leave the wild’ (N. Taylor et al., 2013) has been discussed before and it raises questions of whether a feminist Living Labs can mitigate its ambitions in the long run, especially when it aims to tackle historically established structures (Acker, 2006).

Implications: The work we are engaged in is one which to “normally consider outside of the field of design” (D’Ignazio et al., 2016, p. 2614) but has a relevance to the contribution it makes to design and elsewhere. It may be that the experiences we report on are not generalizable in a strict sense, but they are perspicuous. They point to issues that can be researched in order to make comparisons. The contribution of a feminist living lab hence does not (solely) lie in the design of an artefact but in the approach itself – the opportunity to engage participants, to allow them to freely exchange experiences, to critically reflect and to build a community (D’Ignazio et al., 2016). The general outcome of this lengthy process of co-creation, a ‘network of excellence’, emancipates marginalized to develop confidence and skills which are undoubtedly design relevant. Having said this, sustainability remains a major

issue. Long-term learning experience has to fit the expectations and agreements participants and researchers have to arrive at collaboratively. This entails a recognition of the different organizational logics that may be in play and which punctuate project progression and affect personal outcomes.

9.5.6 Limitations and Future Work

There are a number of aspects of pluralistic experience that we have, as yet, not been able to deal with. We pointed to other potential stakeholders in our lab and there are a number of possible sources of heterogeneity in addition to organizational structures. They include considerations about queer HCI (Spiel et al., 2019) or feminist hackspaces (S. Fox et al., 2015) as a vehicle for further enquiry. Those topics deserve dedicated publications through cross-comparison. Reflection on this multitude of aspects (methodology, methods, our role as researchers, management of participation, hierarchies etc.) remains on our agenda. How to address them while paying attention to the feminist contingencies which shape our lab continues to occupy our minds.

9.6 Conclusion

The broad commitments of feminist HCI (S. Bardzell & Bardzell, 2011) have to be translated into a pragmatic design space. In this paper we provided a detailed case study of a methodological approach so that others can learn from our experiences. This long-term, participatory commitment allows a ‘broad view’ amongst several stakeholders and thus seems, from a feminist HCI perspective, a step forward in opening up a reflective space for experience sharing. Therefore, a feminist Living Lab helps to understand and challenge dominant practices of technology design and give voices to design (of any kind) to otherwise marginalized groups. Our case study of one stakeholder involved in our long-term feminist Living Lab infrastructure, a video game company, showed that the constitution of such a lab will be informed by the perspective of their members and can offer an organization access to resources to tackle gendered design practices and create social change. Our lab strives to make a positive, collaboratively created impact on the situation of women in IT sectors in general and the gendered processes of technology development in particular.

10 Surfacing Challenges in Scrum for Women in Tech

Abstract

Scrum, the most popular form of agile, is often cited for creating a positive working environment for women. Its values, principles, roles, and practices are said to hold great potential to promote fairness and gender equality. But does it? Social scientific literature has identified two key dimensions to analyze processes. The first dimension examines whether practices, behaviors, values, and attitudes are explicit or implicit. The second dimension separates the team experience from the individual experience. Using these dimensions to inform thinking about gender issues in processes and our data from women working on Scrum teams, we developed an analysis framework to surface gender issues in Scrum. We share what works and doesn't work for women in Scrum and where improvements can be made.

10.1 Gender Dynamics in Software Development

The IT sector is thriving, but many job opportunities go unfilled. Even after years of recruiting, women continue to be underrepresented as compared to their numbers in the overall workforce. Research on women in tech suggests that the culture in technology companies does not work for them, with reports of harassment, women pitted against each other, being ignored, and being devalued (Wynn, 2020). Tech is seen as a job for men, undercutting perceptions of women's competence. Yet, significant research shows that without input from women and diverse people, innovation and product quality suffer (Hunt et al., 2018). Since agile software development is so pervasive, we posit that improving the practices in teams can help both recruit and retain women.

Agile practices have proven an efficient means of developing software. There are many flavors of agile which then companies tune it to their needs. From a gender perspective, the values, principles, roles, and practices of agile have great potential to promote fairness and gender equality (Russo, 2015). Nevertheless, agile has room for improvement. Unfortunately, literature on gender and agile is scarce.

By identifying explicit and implicit practices, we analyze Scrum processes from a gender perspective informed by our data from Scrum teams. Because Scrum is the most widely used agile method, we focus on it for the purposes of analysis.

10.2 Agile Techniques and Gender – A Step Forward?

In 2001 the “Manifesto for Agile Software Development” was written by developers who had become disenchanted with waterfall and other typical techniques to manage software development. The original agile practices gave power to the development team and structured the work to ensure delivery of something valuable to a business customer. Companies like agile techniques and Scrum because short sprints are more likely to deliver something within a fixed period of time.

Scrum promotes the incremental and iterative development of a product from independently usable intermediate products. Development is managed through a series of working meetings: daily stand-up, planning, planning poker, review, and retrospective (Meyer, 2014). Each meeting has clear goals, roles, and procedures guiding the work. The team makes decisions, chooses work tasks, and completes an iteration within a 2-4 week sprint. Key Scrum team roles are the product owner, Scrum master, and the development team. Self-organized teams are advocated and managers are stripped of their traditional responsibilities such as assigning tasks.

Research on Scrum examines its methods, processes, and tools as well as the social aspects of the method, which emphasizes collaboration, communication, commitment, and care (Fontana et al., 2014). Scrum champions the primacy of team interactions for decision-making which is seen as more “female friendly” (Russo, 2015). Allowing the team to decide may give women access to more challenging work than they could get from managers with bias against women’s technical skills. Overall self-managed decision-making supports a feminist tradition that sees empowerment in collective endeavors. Also, structured practices like planning poker can be good for women because task time estimation is performed silently before sharing any ideas. This can ensure that every voice is heard and dominant voices do not sway the decision.

Gender issues have been identified in software development overall (Ernst & Horwath, 2014), but research on gender issues within Scrum is rare (e.g. Aksekili & Stettina, 2021). Experience reports suggest that agile practices can have a positive impact on women (Sudbery, 2016). However, discussions with women in multiple organizations reveal that Scrum contains both helpful and problematic aspects through the lens of gender equality (Barke, 2018). Does Scrum eliminate the harsh tech culture and gender bias? If women are a lone voice on the team, or if they are early career and so less respected, if their skill is suspect, will their voices be heard?

Will they actually be able to participate as equals within the Scrum working meetings? Will they advance?

10.3 Examining Scrum: A Framework

We developed a 2x2 analysis matrix with key questions to uncover gender issues in practices in parallel to the analysis of Scrum. The matrix focuses on identifying implicit and explicit practices as targets for reflection. Literature in gender studies, software development, social psychology, and organizational culture typically analyze situations differentiating what is implicit versus what is explicit. For example, we are raised with implicit cultural norms regarding clothes or food. These norms influence how we judge the choices of others raised differently. Implicit expectations of who is best suited for particular tasks (childcare vs. war) influence how we behave and judge the behavior of others. Literature also shows that people are not entirely aware of how implicit assumptions influence their own behavior.

Since tech in general and Scrum specifically is team-based, we also draw upon another significant differentiation in social scientific literature: influences on the individual versus the group. Individual behavior is influenced by many factors that lie within the person, e.g. goals, motivations, attitudes, experience, skill. However, social dynamics also influence what each person experiences or does within a group context. Groups influence us to conform to group expectations, which we might not do without this group pressure. Also, working together in a group requires different skills and approaches than working alone.

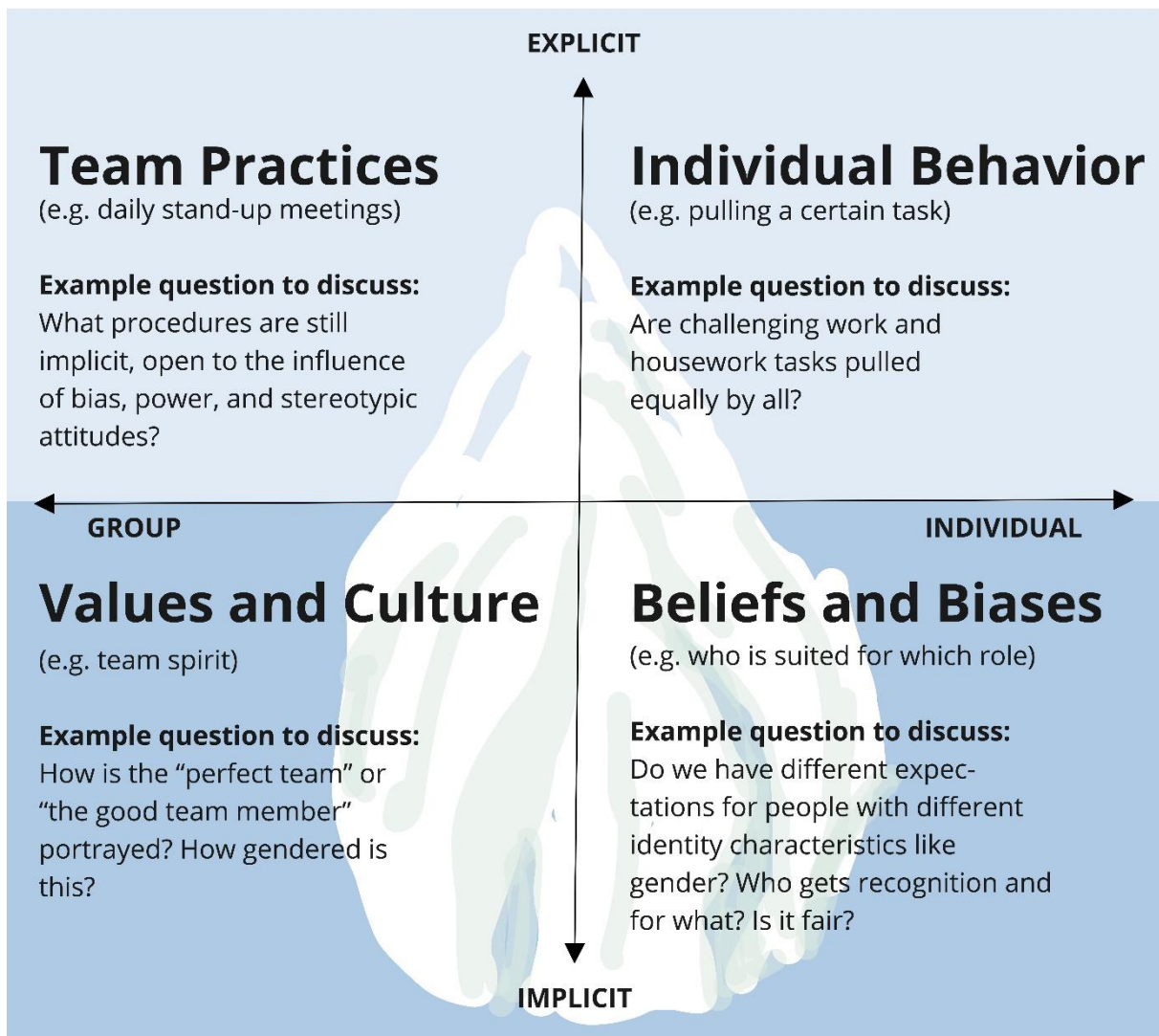


Figure 20. Gender-specific dynamics in Scrum: Mapping of the two dimensions

Our resulting matrix uses both of these dimensions to analyze processes from a gender perspective (Figure 20). To aid reflection on gender in the technology workplace, we created questions for each quadrant. These questions emerged from gender issues in literature, interviews with women working in Scrum teams, observations from consulting in tech companies, and informal interactions with women in tech experiencing challenges. We iterated the questions within our consulting practice and through our research with teams. The questions selected are those that best generate insights and encourage reflection. The resulting framework and the questions for each quadrant were then reviewed and iterated by experts to its final form presented here. These reviews took place in federally funded research projects addressing issues of tech and gender in Germany (see acknowledgments). The reviewers were experts with a

background in Scrum, gender respectively feminist studies, organizational development, or related fields. We share our analysis and the questions for reflection below.

10.4 Challenges in Scrum Using the Framework

The analytical framework (Figure 20) we developed uses the two dimensions to help organizations think about gender issues. The explicit/implicit dimension captures the difference between espoused values and procedures and how these are manifest in practice. When a practice or behavior is observable, well-defined, and documented, it is explicit. When a procedure is highly structured, so everyone knows what to do, it is explicit. However, when work practices are not well defined, implicit aspects like underlying values, bias, beliefs, or habits can drive daily work experiences. Explicit processes or behaviors may be influenced by underlying values, belief systems, attitudes, or unconscious mindsets. Any practice or behavior will have both explicit and implicit aspects operating.

The group/individual dimension helps us tease apart the difference between what is expected of the group as a whole and how those practices play out in the lives of individuals and vice versa. Groups have their own dynamics; they are more than just a combination of all the individuals' efforts, opinions, or interests. Any team practice has implications for how individuals are supposed to behave, and individual behavior impacts how a practice is manifest within the team. Any analysis must consider what might be happening within the group and with the individuals working together.

These two dimensions result in four quadrants, which help organize reflections on the real-world messiness of daily work practices. Any analysis of a practice or proposed intervention should consider all four quadrants, and how they interact. Below we discuss each quadrant as it pertains to Scrum. We introduce each quadrant with the questions relevant to that quadrant. Using our data and related research, we explore the impact of Scrum practices for women.³

10.4.1 Quadrant 1: Team Practices

This quadrant represents the practices, procedures, and working meetings that collaborating co-workers engage in every day. Here, organizations can examine if their processes are explicitly

³ Here we focus on women's experiences. These observations may also be relevant to other underrepresented people and those who identify as non-binary, but we do not have explicit research on this.

defined and include clear structure so that any team member will know what to do. This quadrant also represents any written values or rules of engagement guiding interactions.

For example, working meetings work well when their practices are explicit. These include status meetings, brainstorm and ideation sessions, critiques, or any collaborative interactions between co-workers. Research on meeting effectiveness shows, and our data from the experience of women in tech confirm, that good working meetings include clear goals, roles, procedures, a focal point artifact, rules of engagement, and a moderator to manage conflict (Mroz et al., 2018). When people in the meeting know what to do, the practice can be discussed, and interactions can be moderated. However, if these elements are missing, interpersonal chaos and bias creep in.

Questions you can use to discuss this quadrant are:

- Are our working meetings and processes well-structured and articulated?
- What procedures are still implicit, open to the influence of bias, power, and stereotypic attitudes?
- Where can we introduce more structure to ensure both the success of the team and equal participation for all?
- Where might our practices invite exclusion and devaluing of underrepresented and less experienced people?

Let's examine Scrum. Scrum is a highly structured and articulated process with many well-defined working meetings that lead the team members through completing work. Meetings have well-defined goals, roles, processes, practices, time-limited interactions, and ways of removing the chaos of shifting requirements. They include central artifacts to focus discussion: story cards, task board, and burndown charts. The Scrum master is a coach and moderates meetings to ensure they are productive. Everyone knows that success is when your code passes tests.

From a gender equality perspective, our research finds that 49% of women do not know what to do to be successful (Holtzblatt & Marsden, 2018). Scrum practices and criteria for quality remove this ambiguity and define success. Structure always reduces interpersonal chaos, which is better for diverse teams. As discussed, planning poker ensures that women and early career people form and express their opinion of how long something will take to code by making the first round of estimates private. This gives them space to find their voice, and then share it.

Scrum touts being self-organized as a core value. In practice, this includes group discussion for decision-making. Group pressure – or as the founder of Scrum, Jeff Sutherland, calls it “control by love” – is explicitly recommended to regulate work behavior and bring everyone into agreement (Meyer, 2014). But group pressure is always at the expense of minorities within self-organized teams. In technology, men greatly outnumber women; a woman is frequently the lone woman on her team. Women can also represent numerous intersectional identities that put her at even greater disadvantages (Purdie-Vaughns & Eibach, 2008). Last, Scrum demotes the role of the manager who – when done well – traditionally manages interpersonal issues. The result is described by one of the women we interviewed:

“My male colleagues were constantly questioning my work – I do not think they would have treated a guy like that. I tried to talk about it in the retrospective, but that actually made it worse. I think the Scrum master is supposed to be there for the team but who is ‘the team’ in this case?”

Scrum practices are very well defined – and this is good. Yet, the reliance on discussion and social pressure can result in women’s voices being ignored and devalued. Unstructured discussion may have worked for all male teams, but may not for gender-diverse teams. Adding structure to discussion is the organizational challenge. A simple explicit practice like round-robin contributions ensures that each person is heard, one idea at a time.

10.4.2 Quadrant 2: Individual Behavior

This quadrant represents behavior by individuals that are explicit because they are observable. Individual behavior occurs in working meetings as people participate. When the meeting is structured, everyone knows what to do to achieve the goal. When discussion or unstructured interaction occurs, how people treat each other is visible. Interpersonal interactions are then judged by others as professional, productive, and valuing – or not.

In addition, each person has a job type: developer, designer, manager, etc. Each job type includes expectations of how work is to be done. All can see the tasks a person is assigned, how they do the work, and its quality. Others then interpret how each person meets expectations and whether the work is valued. Last, to maintain the team, “housework” activities like taking notes, organizing parties, and mentoring must be done. These tasks, though vital for keeping a company’s processes going, are often not career-enhancing (J. C. Williams & Multhaup, 2018).

Questions you can use to discuss this quadrant are:

- Are the work expectations for each job role well defined and people coached?
- Are criteria for goodness well-defined for each work product?
- Are expected behaviors within working meetings clear?
- Are challenging work and housework tasks assigned equally to all?

In Scrum, well-defined activities and expectations support women both within working meetings and relative to their developer role. Activities are time-boxed, and all tasks (stories) are separated, named, and placed on the task board so the team can see their status. This gives women's work visibility. Theoretically, everyone selects their own tasks, so women may get more challenging activities than managers might assign because of bias against women's technical skills. But insofar as estimation of task work is often done with a particular developer in mind, bias may be creeping in.

The more problematic element of task distribution surrounds housework. Coding is by far the most valuable activity, which is true in tech in general (E. M. Trauth et al., 2010). Scrum does not track any type of housework, even mentoring. Scrum also denigrates as “waste” any typical software engineering techniques such as planning, requirement definition, or documentation (Meyer, 2014). Yet, documentation still happens in Scrum – a work that is job-typed as women's work. One product owner shared the following story:

“There is lots of documentation that needs to be done, e.g., refining the backlog or documenting architecture guidelines for our definition of done. None of this shows up on the task board.”

Generally, women are more likely to do housework, while men are more likely to do “glamor work” with recognition (J. C. Williams, 2014). In Scrum, “showing up on the board” by coding stories is crucial to gaining status. If women take on housework that is devalued or simply not tracked, they will not get recognition and be valued. Interventions that ensure an equal distribution of challenging work and housework are an easy fix.

10.4.3 Quadrant 3: Team Values and Culture

This quadrant focuses on the role of underlying implicit values and invisible team culture that influences daily work life. We have already seen that structured interactions and expectations mitigate against these invisible forces. To understand their impact, organizations must unearth

and explicate their values and culture. Then they may be examined, deliberately chosen, and iterated to improve the daily work experience.

For example, organizations may create corporate codes of conduct, but as popular news informs us when people with influence who harass others are paid off, the real culture is revealed. It tolerates and ignores unprofessional and bad behavior. When organizations define values and cultural expectations, we must ensure that these espoused values are indeed practiced at every level in the organization.

Questions you can use to discuss this quadrant are:

- What are the values in practice within the group that regulate working meetings and daily interactions?
- What is the culture of the team? Does it work for women and diverse people?
- How does the team iterate how they work together?
- How is the ‘perfect team’ or ‘the good employee’ portrayed? How gendered is this?

Scrum explicitly defines the values and principles guiding the agile approach, and it drives these principles into the practices of working meetings. This is important during the retrospective meeting at the end of a sprint. The retrospective is held to identify what worked, what did not work, and ways to improve how the team functions.

Well-defined values can be good for women because values can then be discussed, and violations of the values can be referenced. Too often, retrospectives can yet result in blaming people instead of improving processes. When a sprint extends several weeks, resentments can build up, leading to anger and blame – never good for anyone. We recommend more frequent retrospectives or shorter process checks to tune ongoing work.

More worrisome is the deeply held belief that team spirit will guide the work and that everyone indeed feels a sense of belonging. But do they? If a core value assumes that the team is cohesive and everyone is treated the same, will teams be willing to examine differences between women’s and men’s experiences? An agile coach in a workshop had this observation:

“People doing agile are trying really hard to make sure everybody is motivated and are very enthusiastic about agile. But they can become extremely defensive if you even suggest that the experiences might differ for men and women.”

By denying gender differences in daily work experience, practices cannot be tuned. This leaves gender assumptions about men and women intact (E. M. Trauth et al., 2010). Moreover, if

women who raise issues are seen as creating the problem, the feeling of belonging suffers. Scrum must find ways to pay attention to these differences. A good team manifesto, created by the team to define their overall values and guide how they will work together, raises awareness and can be referenced in frank process checks.

10.4.4 Quadrant 4: Individual Beliefs and Biases

This quadrant brings our attention to underlying individual differences: biases, different life experiences, the impact of country and family culture, interests, motives, the quest for power, and how we perceive competence. Implicit biases, personal sexist attitudes, and gendered stereotypes present in all areas of society are particularly prevalent in the tech industry. We have already discussed that women in tech are seen to be less technically competent and so may not be selected for hard work. Indeed, we have seen that women may be tagged for team housework – and they may accept the work without any career award.

We cannot remove all biases, expectations, and attitudes from people. However, as we have argued, explicit practices designed with an eye toward gender issues can minimize the impact of bias and stereotyping. A team manifesto, structured working meetings including goals, roles, rules of engagement, and moderation go a long way toward ensuring professional and efficient interactions. Moreover, clear intolerance of unprofessional and bad behavior at every level of the organization creates an environment where biases are less likely to be acted upon.

Questions you can use to discuss this quadrant are:

- Have we designed daily practices with an eye towards undermining bias that help teams and managers collaborate and communicate value to all?
- Do we have different expectations for people with different identity characteristics like gender? Who gets recognition and for what? Is it fair?
- Who feels a sense of belonging and who does not?
- Do we monitor how we work and treat each other to continuously improve the work life? Can diverse people easily share their concerns and have them addressed?

Issues in this quadrant ask the team to think explicitly about the role of bias in their work life. Unfortunately, because Scrum insists that part of its culture is that all team members have an equal voice, women may feel that it is hard to challenge beliefs held by the majority. The mainstream members of the team may feel that everyone is heard because they do not share women's experiences of bias. Using the questions in this quadrant to elicit real experiences

from women gives them a safe way to be heard on their experience of bias and devalue. Explicitly acknowledging that women experience dismissal, or unequal treatment helps the team hold themselves accountable for stamping out bias. Adopting this as a team value then puts the issue of bias squarely in retrospective meetings.

Scrum may also reinforce stereotypes of what women are good at, like empathy and fostering collaboration, driving them to roles that receive less recognition. The Scrum Master role, helping the process and facilitating collaboration, can seem like a ‘natural’ fit for women. Unfortunately, women are often “promoted” into non-technical roles (Sudbery, 2016) which are less valued than technical roles.

“When Scrum was introduced at (our company), it was stressed that a Scrum Masters needs to have high social skills, be a real people person. I did not feel inclined to go in that direction, but my male colleagues – developers like me – kept saying it would be a good role for me ‘as a woman’.

Gender stereotypes are still entrenched (J. C. Williams, 2014). Without awareness and examination, we reinforce stereotyping.

10.5 Conclusion

Using this framework, we have revealed ways in which Scrum may undermine women’s participation. A focus on what is explicit or implicit in Scrum at the individual and group level helps facilitators and teams uncover what they can improve in the work experience for women in tech. This framework also helps us reflect on the interdependencies of the quadrants. Our examination of Scrum reveals that team practices can be driven by unarticulated values and individual bias or attitudes. The success of individuals depends on how well role expectations are spelled out, including how to participate in working meetings. But also, the values and attitudes of individuals on the team can undermine team practice. Activity in each quadrant always has implications for how work experience may play out within the other quadrants. All interventions must consider how change in each quadrant may impact the others. With constant tuning, we hope that this framework can help diverse teams succeed.

Our own workshops have led to fruitful reflections on the quadrants and how to improve practices. Using visual facilitation techniques common in Scrum, we lead discussions which instantly document the discussion and results of the workshops. Using this framework teams

have included household tasks on the task board and give recognition for these tasks. Teams have agreed to monitor and manage airtime in meetings with attention to the gender of the speaker. Teams have committed to gender-fair practices like Planning Poker and round-robin participation. We have also introduced this framework in talks to Scrum Masters who report positive results using it in their regular retrospectives.

Last, understanding the implications of gender and bias is not a naturally occurring skill on any Scrum team. Rather, the structure of Scrum opens the possibility of keeping an eye on and raising issues of bias. Based on our research, the German Federal Equality Report⁴ has recommended that gender-fair practices for Scrum should be implemented further.

Issues of bias and stereotyping are part of the human condition. Scrum is not immune. But by reflection and redesigning our processes, we can interrupt our tendencies and improve the work conditions for women. Informed by the results of our facilitated workshops, we have developed a team-based procedure to encourage reflection. You can find more of our analysis and a description of the suggested team procedure online at: <https://www.witops.org/scrums-matrix/>.

The solutions, issues, and procedures we share are not meant to be exhaustive or fixed. We invite teams and facilitators to use the framework's analysis matrix on their own and iterate it to work for them.

⁴ <https://www.dritter-gleichstellungsbericht.de/de/topic/50.english.html>

11 Addressing Values in Co-Design Projects: Lessons Learned from Two Case Studies in Sensitive Contexts

Abstract

HCI scholars and others have advocated treating design as inevitably implicating political and ethical sensitivities. A subset of those considerations has been the attempt to deal with the often conflicting interests of stakeholders through ‘value sensitivity.’ Drawing on value sensitive design (VSD) as an inspiration, we emphasize the necessary way in which the evolving contextuality of the values in question shaped our research collaborations. This paper presents a complementary analysis of two projects in sensitive settings applied to the fields of feminist HCI and research with older adults. We will show how we translated general commitment into pragmatic, co-design research goals and infrastructures. The long-term ambition of our endeavors and integration of a broad stakeholder base were vital to support this. We additionally provide insights into how our approach offered safe spaces for trustful collaboration and flexibility when adapting methods to specific contexts.

11.1 Introduction

Over the last half a century, we have seen a gradual shift away from what might be called ‘objectivist’ or ‘scientific’ approaches to research and design, articulated through a critique that probably began in sociology with a concern for an empathic view. This evolution can be traced through socio-technical system design (e.g. Whitworth & de Moor, 2009) and Latour’s view (2008) that attention to ‘Matters of Concern’ could remedy the loss of critique. Over a similar period, Winner’s “Do Artefacts have Politics?” (Winner, 1980) and later, Suchman’s “Do Categories have Politics?” (Suchman, 1993) became influential in HCI’s evolving realization that design is a moral and political issue. This concern has become explicit over time: HCI, it is recognized, is not only concerned with the design and evaluation of new technologies but, first and foremost, with improving people’s lives (Hayes, 2020). There exists a long tradition of debate where methodological and ethical considerations have been addressed to show how HCI can play its part in “imagining a radically better” future (S. Bardzell, 2014, p. 189). Technologies shape social life and vice versa (Winner, 1980), and we, as design researchers, have an ethical responsibility to reflect on how we conduct our research.

In this paper, we engage with three related issues. Firstly, we briefly look at the relationship between ‘value’ and socio-political context. Secondly, we argue that ‘values’ can never exist in the abstract but must be considered as evolving and contextual affairs, and thirdly, we examine the idea of the Living Lab as a long-term setup that may provide an appropriate vehicle for engagement. To explore these issues, here in a German context, we offer a retrospective analysis of two case studies from long-term user-centered design projects in fields with explicit ambitions for value-driven HCI research and concerned with emancipation and empowerment. The first, a three-year project, entailed an explicit commitment to feminist HCI (S. Bardzell, 2010), and addressed issues of gender discrimination in IT organizations (Kelan, 2010) by co-designing policy initiatives with female participants that aimed at fostering values of gender equality. The second, a four-year project, dealt with HCI research with and for older adults (Vines et al., 2015, 2013), where a multimodal mobility platform for ridesharing and public transportation was developed. Participation in the project was intended to support older adults’ mobility through the use of mobile ICT to foster values such as active aging and wellbeing in later life. Values that we explicitly wanted to address in both projects involved creating and maintaining safe spaces, trust-building, and reducing inequalities, among others (see chapter 11.3).

Following an understanding that ‘design’ refers to “the development of a desired cultural context and to the development of applications which might support our aims” (Weibert et al., 2017, p. 717), we grounded value sensitive design (Borning & Muller, 2012; Friedman et al., 2002, 2006) (VSD) at an *infrastructural level*. That is, we were interested in how a value-sensitive, socio-technical co-design initiative might be supported over time. By ‘infrastructure,’ in this context, we refer to the general conceptual and methodological setup of co-design research endeavors, including purposefully established connections between the relevant actors within an innovation system and the provision of formats for exchange (Ogonowski et al., 2018). We borrowed from the notion of ‘Living Labs’ (Eriksson & Kulkki, 2005), which are commonly defined as holistic, human-centered co-design research spaces. Living Labs offer a broad stakeholder perspective and, crucially, have a long-term ambition. Throughout this paper, we shed light on the challenge of setting up such socio-technical infrastructures, carefully examining how we translated a commitment to specific values into pragmatic, co-design spaces. We show how we deployed values situationally and how:

- explicit values shaped the initial setup of the two long-term case studies;
- initial commitments to values were translated over time and to a variety of stakeholders;
- reflection on these values took place throughout our research endeavors
- their fluid nature was recognized, and potential conflicts managed.

11.2 Related Work

11.2.1 The Sociology of (Moral) Values in Research

The relationship between values, evidence, and conceptual work is a vexed one. An ‘objectivist’ tradition associated with Durkheim’s (1895) argument concerning the nature of ‘social facts’ and how to explain them became the foundational planks of a form of social science. These notions were later called ‘abstracted empiricism’ by C. Wright Mills (1959) and operationalized in the ‘variable analytic’ work of, i.e., Karl Lazarsfeld (1969; 1951). In this tradition, the distinction between fact and value was rigidly maintained. However, this did not preclude exploring the moral universe. The German sociologist Max Weber (2011), in essays written between 1903 and 1917, insisted on the difference between ‘value judgment’ and ‘value relevance.’ At the risk of oversimplifying Weber’s view, it is possible and even desirable to do empirical work on the nature of values held by people. However, doing research based on own values, with all the risks of subjectivism, is quite another matter.

During the 1940s, however, the Chicago school sociology promoted a more ‘qualitative’ approach to sociological study and was very concerned with urban inequality and explaining it (for an overview, see Turner, 1988). Some, but by no means all, of this school entailed ethnographic description. Everett Hughes, e.g., conducted studies of ethnic relations, white-collar work, and, among other things, the rise of Nazism. His famous paper, ‘Good people and Dirty Work’ (1962), exemplifies a move to a more humanistic approach to sociology. Other studies which broadly trod this line included Elliott Liebow’s ‘Tally’s Corner’ (1967), a study of black street corner life; Laud Humphrey’s, ‘The Tea Room Trade’ (1970), a study of homosexual encounters, and Ned Polsky’s (1967) ‘Hustlers, Beats and others,’ a collection of essays on poolroom hustlers, and the uses of pornography. It is fair to say that such work, at a minimum, entailed an empathy for its subjects, although in some instances (see the critique of Humphrey’s work, e.g. Lehmler, 2014) it became very controversial. It also typically ran ‘against the grain’ in challenging assumptions about practice reached by those who had never

examined it. It was Howard Becker (1967) who famously argued that it was not possible to conduct social research “uncontaminated by personal and political sympathies” (1967, p. 239), and that, therefore, the question that inevitably arises for the social researcher is which side to take. In parallel, in the period just before and after World War II, explicit critique of a value-free science was explicated by German sociologists like Theodor Adorno and Max Horkheimer, which were also working on the nature of scientific inquiry and, again, its separation of fact and value. In “*Philosophische Fragmente - Dialektik der Aufklärung (Dialectic of Enlightenment)*,” a critique of Western rationality, they point to the way in which the ‘use value’ of things had ceased to bear any relationship to human wants and needs (Horkheimer & Adorno, 1947).

Nevertheless, at that point, it is probably fair to suggest that such studies were not, for the most part, concerned with epistemological foundations. Third-wave feminism, dating in the main from the 1960s, was probably the engine for an explicit treatment of epistemological issues associated with value and commitment in the social sciences. Arguably for the first time, the very foundations of objective knowledge were challenged. Feminist epistemology has become, in turn, the foundation for at least some of the ‘engaged’ work that now takes place in HCI and cognate disciplines (S. Bardzell, 2010). Not least, such research unravels the mechanism regarding the choice of topic, inclusion, and exclusion in design (Criado Perez, 2019).

What might be broadly termed the ‘postmodern’ turn, which focused attention on the researcher's role and the text's social construction, is also relevant here. The researcher usually tends to steer the research process (Scott & Usher, 2010), thus significantly influencing the project (Biott, 1993). In the work of Bruni & Gherardi (2001), to give an example from feminist research, researchers’ attitudes, beliefs, values, and actions become a legitimate object for scrutiny. Of course, this does not release researchers from “energetic” and “systematic self-reflexivity” (Lather, 1986), including self-disclosure of the researcher’s background, intentions, and role in the research process to allow for judgment regarding how the underlying values have influenced the work (M. C. Williams, 2000). In this context, Friedman & Kahn (2002) show that values cannot be motivated solely by an empirical account of the external world but depend substantively on situations and the interests and desires of human beings within a cultural milieu. These various moves have proved a powerful impetus for engagement in HCI. They also raise important issues around the relevance of concepts, the use of particular methods, the role of participation, and the management of power and knowledge.

11.2.2 Values, Ethics, and Design

Associated with the concern of aligning design with a socio-political, or an ethical, perspective is the view that design should acknowledge the importance of research ethics (Fiesler et al., 2018) and encompass ‘values’ (e.g. Gilmore et al., 2008; Lumsden, 2013). Of course, attention to value is not the same thing as attention to ethics. We should point out that there are similarities and subtle differences between attitudes, values, beliefs, behavior, and ethics (Maio et al., 2006). In this view, values are what individuals or social groups believe is ‘worthy’ and ‘good.’ Beliefs are our assumptions based upon past experiences. Our values and assumptions form attitudes, and behaviors are the expression of attitudes. Ethics are the rules, norms, or codes of conduct for what a social group regards as ‘adequate behavior.’ Accordingly, individuals have a value system that influences their attitudes and behavior (e.g. Hammersley, 2000). In the following, we use a broad meaning of the term ‘value’ that refers to “what a person or group of people consider important in life,” in the sense that “people find many things of value, both lofty and mundane” (Friedman et al., 2006, p. 57). As originally pointed out by Perry (1954, reprint from 1926), values can be focused on various ‘realms,’ as he termed them, including morality, religion, art, science, economics, politics, law, and custom. Subsequently, distinctions have been made between ‘intrinsic’ and ‘extrinsic’ values, or values which can be thought of as good in and of themselves and those which are good for a purpose. The latter, of course, informs much economic thinking, while the former has been the province of moral and political philosophy. John Dewey (1939) famously challenged the notion of intrinsic value and argued that values can only be understood relative to specific situations and that insight informs our position, as described below.

Value-driven orientations to design research are plentiful. To name but a few, Dorst (1997) provided a comprehensive discussion of how reflective (ethical) creative approaches to design work are a step forward over the rationalist norms of (software) engineering design. Approaches such as ‘Worth Centered Design’ (Cockton, 2020) provide guidelines on designing technology that delivers worth to its users. However, one of the most famous approaches to conducting value-driven design research lies in what is labeled ‘value sensitive design.’ VSD became popular as a design orientation, offering an ethical ‘translation process’ of fundamental human values into concrete standards and specific design requirements (Borning & Muller, 2012; Friedman et al., 2002, 2006). It advocates an explicit commitment to recognizing values in design research, which researchers must negotiate with various actors involved in the research

process (Friedman & Hendry, 2019). VSD thus offers a development framework in which human values can be integrated with ethical aspects to undertake design systematically and from different perspectives. As such, it translates fundamental values into concrete recommendations and specific design orientations. “What does it mean to build things well, and what criteria do we need to consider in the development?” (Weibert et al., 2017, p. 717) are the kinds of questions VSD treats as central. The tripartite methodology associated with this proactive view relies on an interactional perspective (in which values are neither inscribed in technology nor simply transmitted by social forces) and encompasses three phases: conceptual, empirical, and technical investigations (Borning & Muller, 2012; Friedman et al., 2006). Crucially, emphasizing the co-emergence of values (Le Dantec et al., 2009) implies considering diverse engaged and less engaged stakeholders early on and throughout the design process. At the same time, concern for the impact on the social context in which such stances operate (Weibert et al., 2017; Yoo et al., 2013), including considerations about sharing power between researchers or designers and participants or users (Borning & Muller, 2012), has also become a central focus. These concerns have a clear methodological consequence. VSD researchers, for instance, have often leaned towards a qualitative stance, ranging from, e.g., stakeholder analysis to interviews, value sketch, and workshops (Friedman et al., 2017; Winkler & Spiekermann, 2018). Nevertheless, some criticism has been leveled at value-driven research because it is not always clear how one is supposed to identify what a value looks like (Le Dantec et al., 2009). Others have pointed out that the idea of a value makes sense only in specific contexts. Thus, “exactly how we are to think about our values and the situations in which they are manifested remains unclear” and “how values, including the explicit values that researchers or designers might begin their projects with, might be translated from abstract principles into pragmatic, situated stances, remains an issue” (Weibert et al., 2017, p. 716).

Pursuing a participatory approach to research can be another strategy through which values can be identified and enacted by enabling the feedback of preliminary results to research participants for comment and modification (Lather, 1986). Participatory and emancipatory approaches, such as ‘Participatory Design’ (PD) (Ehn, 1993) or ‘Participatory Action Research’ (PAR) (Kemmis et al., 2014), often, as is the case with PD (Wagner, 2018), have a clear political stance (at least in the Scandinavian context) and ambition for social change. This kind of engaged, participatory research work is resource-intensive and replete with diverse conceptual and ethical challenges. First and foremost, it requires interdisciplinary partnerships

(Cameron & Georghiou, 1993; Carroll, 1993) and leans towards ethnographic methods for designing networks and technical artifacts. This more egalitarian approach implies that researchers and users will work together as partners in the development process or even leave the final say in interpreting the research participants' data. Problems can arise when values come into conflict, and people are forced to prioritize some values over others (Glen, 2000). Participatory approaches, therefore, counterbalance the influence of the researcher's values. We should also stress at this point that participation as a principle has not gone unchallenged. Arnstein (1969), for instance, has pointed out that participation can take many forms, some of which scarcely merit the term. Kelty (2017) has shown how participation is not always an unalloyed good. Some have favored a more 'agonistic view,' recognizing the inherent conflicts and building them into participatory practices (e.g. Miessen, 2011; Miessen et al., 2012). Thus, they are less concerned with consensus building and more with the creation of democratic spaces.

Our point would be that the debate has taken place at a somewhat abstracted level, both for the advocates of participation and for its critics. It is at the detailed, *contextual level* at which value or otherwise can be discerned, recognizing the evolving nature of values and principles that participants bring to the table. The questions of how to engage with people or communities in *situated contexts*, address their problems and concerns in a 'meaningful way,' and provide an open, inclusive, and transparent co-design space thus remains a matter of debate. Not least, the issue of whether such approaches should be consensus-driven or 'agonistic' is up to discussion. On the one hand, engaged, long-term partnerships between academics and their participants might require that we consider the values, experiences, and ambitions of all stakeholders who participate in the research and do so as early as possible in the process – especially when carried out in social environments and sensitive contexts (Waycott et al., 2015). On the other hand, it is sometimes held that a space must be given over to conflict (e.g. Miessen, 2011). Open questions on how to conduct ethical or value-driven research inclusively, then remain. In practice, people decide to proceed in one way rather than another because they hold to certain kinds of principles. As Rokeach (1973) describes, values also influence the choice of research methods. In this context, Greenbank (2003) discusses the complex interplay of the researcher's morality, competence, and personal and social values on the research process, including influence on the choice of methods, stating that their application cannot be value-free.

We can conclude that there are several interrelated open issues in all value-related research (Borning & Muller, 2012; Le Dantec et al., 2009; Weibert et al., 2017): firstly, an axiological approach to value is not, in and of itself, adequate since values are grounded in a specific setting that comes with specific conditions and constraints. Therefore, initiatives, systems, and designs that commit to a certain set of values have to acknowledge their situatedness. Secondly, values usually emerge over time and precisely in response to the situations in which we find ourselves and, just as much, our relationships with the others with whom we engage. Thirdly, attention to ‘values’ can have a strong ethical component. This entails consideration of the ethical positions of various stakeholders but also a reflection on our positions. It follows that what and whose values are represented and at which point in time ramifies in the ways we enter fields, engage with participants, and the methods we apply. What we examine below, then, is a response to these concerns.

With our research, we aim to add our experiences to the discussion. Reflecting on the rising interest in sustainability, social justice, and critical computing throughout the community in the past decade, and by dealing with the place of technology and technology-oriented practices in creating a fairer and more sustainable society, our contribution to HCI research is thus:

- the promotion of a better understanding of the significant practical, institutional, disciplinary, ethical, and personal challenges involved in addressing values in long-term, action-driven studies;
- an indication of how our approach can serve as an infrastructure to address values in HCI research, hence expanding existing knowledge on value-driven co-design spaces with stakeholders (Yoo et al., 2013);
- lessons learned throughout two projects regarding managing long-term, trustful stakeholder interactions (and other project-related aspects), offering safe spaces for exchange, and methodological reflections from a value-driven perspective.

In the next chapter, we put our two co-design projects into context by describing the settings in which our research took place.

11.3 Methodology and Research Stance

This paper adopts a multiple-case-study approach (Yin, 2014) to present and compare data from our two projects, and our research questions focus on tracing operational processes over time.

We present a complementary analysis of two case studies in sensitive settings applied to the fields of feminist HCI (S. Bardzell, 2010) and HCI research with older adults (Vines et al., 2015, 2013). To fulfill our explicit ambitions for conducting value-driven HCI research, we had to make several key decisions regarding our research design: we are convinced of the necessity to actively enter, explore, and participate in research, gain practical experience of complex (socio-technical) systems, and from the beginning involve (potential) users in designing activities. Therefore, the two projects pursued an open design process (Følstad et al., 2009), an approach to the innovation process, where relevant stakeholders are involved in innovation activities (H. Chesbrough et al., 2008), supporting long-term cooperation and co-design (Wulf, Schmidt, et al., 2015). Such a ‘practice-based approach’ is, first and foremost, a human-centered and arguably emancipatory one that fulfills societal needs with its ambition to address problems in the real world. We primarily used an ethnographic research approach, emphasizing the co-production of research findings by applying observations, interviews, focus groups, and design workshops. This approach was vital, as we wanted to address values from a perspective of human experiences and emphasize a ‘situated view’ (Suchman, 1987). As some describe the joint creation of social values as a possible outcome of such a co-design process (Mastelic et al., 2017), the potential to pay attention to the situated context of values is present (Le Dantec et al., 2009).

In order to realize this ambition, there was the need for a research infrastructure that allows such a contextualized evaluation of values as well as long-term engagement to address the emergence of values over time. We anticipated that a Living Lab infrastructure might constitute an appropriate vehicle for such an engagement. In short, Living Labs offer a holistic, human-centered co-design stakeholder perspective (Eriksson & Kulkki, 2005), involving stakeholders from different areas such as the public, academia, business, civil society, and other residents, who work together towards a specific goal and for a certain period (Corallo et al., 2013; Ogonowski et al., 2013). While inspired by approaches such as PAR or PD, Living Labs, crucially, go one step further. The broad stakeholder view gives all parties involved a more holistic picture of the problem situation (Ogonowski et al., 2013), which in turn helps to trigger the process of co-creation of products and services through the formation of ‘value networks’ (Corallo et al., 2013; Ståhlbröst, 2013) such as ‘networks of excellence.’ This way, they hold potential for sharing knowledge and experience (mutual learning) over time and for participation in design for change processes (technical or otherwise) (Almirall & Wareham,

2008). Thus, they usually have a transformative agenda and evoke a particular social change within a system (Higgins & Klein, 2011; Ståhlbröst & Holst, 2017). For this reason, the literature sometimes describes Living Labs as ‘Social Innovation Spaces’ (Edwards-Schachter et al., 2012), aimed at social justice and equality by helping individuals to liberate themselves. Furthermore, since research in such labs usually takes place in iterative cycles (Ogonowski et al., 2018), they also offer the opportunity for constant reflection while still allowing for the ‘classic’ tripartite phases of VSD. We hoped that Living Labs had the potential to provide stable, trustful, and long-term research spaces which creates new opportunities to manage stakeholder conflicts (Ogonowski et al., 2013), power relations and offer ‘safe spaces’ (DeVault & Ingraham, 1999; The Roestone Collective, 2014).

Our Living Lab approach follows the praxeological notion of ‘PRAXLABS,’ which involves establishing a Living Lab infrastructure that mainly emphasizes long-term (and sustained) co-design research in real-life environments (Ogonowski et al., 2013, 2018) from a comprehensive stakeholder perspective. Throughout several projects in the Living Lab tradition, Ogonowski et al. (2018) developed the infrastructural and analytical ‘PRAXLABS framework,’ which was “motivated by the need to structure experiences among a multiplicity of projects” (2018, p. 355). As a result, the authors found four essential spaces (figure 21) relevant: the user space, creative space, methodological space, and management space. Chapter 11.4 describes these spaces’ formal aspects in detail, allowing for a cross-comparison of our practical Living Lab work.

Furthermore, we must note that we consider any innovative idea or measure for intervention in a social system as design in a broader sense (e.g., experience sharing, case studies, learning opportunities). This understanding of design is beyond the purely technical and does not necessarily relate to a technical artifact’s design (D’Ignazio et al., 2016). Nevertheless, design interventions of any kind – for instance, regarding tech design teams’ processes and policies – can significantly impact the latter. At the very least, we would argue, intervention in infrastructures conceived of as socio-technical lays the ground for more focused technical intervention. We saw significant potential in such an understanding of VSD, as it allowed us to interrogate the design decisions that already went into the setup of socio-technical research infrastructures that we established for both projects.

11.3.1 Settings

As proposed by several authors (e.g. Borning & Muller, 2012; Le Dantec et al., 2009), we adopted a pluralistic position, using a variety of heuristics relating to values to address explicitly supported values as well as stakeholder values (Borning et al., 2005):

- our projects were, inevitably, shaped by the values of the funders;
- we made use of lists of values, e.g., those with moral impact (Friedman et al., 2006) or those that argue for inclusivity, openness, and transparency (Borning & Muller, 2012);
- we turned to the relevant literature regarding feminist studies, feminist HCI (e.g. S. Bardzell, 2010), and HCI research with older adults (Vines et al., 2015, 2013). For this reason, we were especially concerned with putting the marginalized and potentially vulnerable into the center of our research. Furthermore, we aimed to create and maintain safe spaces, trust building, and the reduction of hierarchies, gender stereotypes, and (age-related) stigma. Our research activities were, first and foremost, concerned with improving the lives of the people we were working for and with (Hayes, 2020);
- we aimed to empirically investigate stakeholder values in our field of application (Le Dantec et al., 2009).

Concerning this, we also follow Borning & Muller's view "that VSD can become a stronger method for both research and also social change through a strategy that enhances the voice of its informants" (Borning & Muller, 2012, p. 1131). While social, transformative change is not necessarily a core value of VSD, it was one of the explicitly supported values in our projects and became vital for our work.

11.3.1.1 Feminist HCI Lab

The feminist HCI Living Lab (Ahmadi et al., 2020a) emerged from a Gender and IT project and addressed masculinity and gendered work tasks in the German IT sector. Androcentric and masculine working environments (Acker, 1990) still confront women (and other minorities that do not fit heteronormative patterns) interested in computing with barriers towards their career choices. Organizations struggle to put diversity initiatives into practice in an industry known for cultural stereotypes, sexism and pay inequality (e.g. Cozza, 2011; Prescott & Bogg, 2014). As a result, corporate cultures remain relatively stable (Wynn, 2020). The issue is essential in terms of equality and because, from an HCI perspective, a lack of diversity within design teams often leads to flawed products regarding usability for specific user groups (e.g. Cassell, 2003).

To tackle the issues of gender discrimination in IT organizations (Kelan, 2010), scientific knowledge transfers and exchange amongst stakeholders from different IT-related fields were at the core of the three-year project (2017-2019), which took place in Germany. All stakeholders shared the overarching goal of strengthening female talent in IT organizations by understanding gendered practices in the IT industry. We geared towards a commitment to the co-design of policy initiatives providing learning opportunities to remedy gendered mechanisms in organizations and tech design teams. From the beginning, the project was shaped by human values with ethical import, as suggested by Friedman & Kahn (Friedman et al., 2006). These included human welfare, values of trust and privacy (i.e., enabling ‘safe spaces’ for explicitly reflecting on women’s experiences in the IT industry), the remedy of existing, gendered biases, and understanding people’s identities (Friedman et al., 2006). We were also dedicated to maintaining the values that have informed feminist HCI (e.g. S. Bardzell, 2010). Others (Alsheikh et al., 2011; Borning & Muller, 2012) have already laid out what feminist theories offer for VSD. Feminist HCI adopts notions from feminist standpoint theory, i.e., putting the otherwise marginalized at the heart of the research, ensuring that their voices and perspectives are heard, managing conflicts of interest, and foregrounding the moral interests of researchers as well as participants. Participation in the project was not limited to women; programmatically, it focused on the gendered structures in IT environments. Actively taking this perspective requires a certain willingness and ability to reflect on current, often taken-for-granted structures. We collected an array of data, including transcripts from more than 50 interviews (mix of employees from the organizations regarding gender, occupation, position, and duration in the enterprise as well as 11 students from our local university, see below), field notes from observations and several focus groups, notes about informal talks, and documented workshop results. In the following, we will refer to this Living Lab as the ‘*feminist HCI Lab.*’

11.3.1.2 Older-Adults HCI Lab

The Older-Adults HCI Lab was part of a four-year project (2012 to 2016) which aimed to develop a multimodal mobility platform for ridesharing and public transportation (including buses and trains) that could maintain older adults’ mobility through the use of mobile ICT. The study took place in a university city in the west of Germany with about 100,000 inhabitants. The Older-Adults HCI Lab aimed to support older adults in their competent smartphone usage and everyday life mobility to foster values such as active aging and wellbeing in later life. Images of aging are often stereotypes based on age-related impairments and a lack of motivation

and skill (Chan, 2015). Light et al. (2015) and Vines et al. (2015, 2013) tackle age politics regarding technology development, raising concerns about potential stigmatization and age discrimination. Addressing the digital divide through digital empowerment and everyday mobility to enable older adults to go to (new) places is described by many gerontologists as a critical component of their well-being (e.g. Schwanen et al., 2012). To address these values, we built up the Older-Adults HCI Lab. While we aimed to enable older adults to use their smartphones to gain feedback about their daily needs, struggles, and personal user mobility contexts, we also had to translate these mobility needs and experiences into technical requirements. Therefore, we realized the technical conception and design of the mobility platform in close interaction with technical practitioners as well.

Throughout our project, we built a long-lasting relationship with the user group: from the very outset, until a final product was developed and appropriated by the older adults (19 participants, aged 58 to 83 years, media age 67, two married couples) (Meurer et al., 2014). Our data sets comprise transcripts from 39 interviews, field notes from observations, several focus groups, and notes about informal talks and documented workshop results. In the following, we will refer to this Living Lab as the ‘*Older-Adults HCI Lab.*’

11.3.2 Data Analysis

Two different teams of researchers designed the cases independently, adopting a similar Living Lab approach in researching their different topics, and performed a meta-cross-comparison for the paper at hand. First, the qualitative data was clustered and categorized using a thematic analysis coding approach (Braun & Clarke, 2006). Throughout this coding process, we explored the challenges we had encountered regarding the conceptual, empirical, and technical aspects of VSD (Friedman et al., 2006) and classified them according to the four spaces of the PRAXLABS framework. This way, we uncovered challenges inherent to the conceptual negotiation of values among all involved parties in our projects. We also revealed challenges regarding the empirical and technical processes associated with our co-design research process. Finally, the authors jointly agreed on the themes in informal discussions.

11.4 Setting Up and Maintaining the Living Labs

In the following, we describe our activities (figure 21) regarding the four spaces of the PRAXLABS framework. Our elaborations cover different phases of the projects, from the

initial phase to set up the Living Lab infrastructure to maintenance aspects throughout the project.





 <p style="text-align: center;">User Space</p> <p>Feminist HCI Lab</p> <ul style="list-style-type: none"> • Six organizations • 11 gender mixed HCI/business informatics students • Symposia attendees (young professionals, company representatives etc.) • Researchers <p>Older-Adults HCI Lab</p> <ul style="list-style-type: none"> • Project partners (incl. technical SME, municipal city services, mobility services, research organizations, user organizations) • 19 older adults • Multipliers and door openers 	 <p style="text-align: center;">Creative Space</p> <p>Feminist HCI Lab</p> <ul style="list-style-type: none"> • Five symposia across Germany • (Design) Workshops • Online resources <p>Older-Adults HCI Lab</p> <ul style="list-style-type: none"> • 72 assistance workshops • 10 PD workshops • Creation of user community • Learning environment
 <p style="text-align: center;">Methodology Space</p> <p>Feminist HCI Lab</p> <ul style="list-style-type: none"> • FPAR, Institutional ethnography • ~ 50 interviews (mix regarding gender, occupation, duration in organization and position) • Observations (shadowing) • Focus groups <p>Older-Adults HCI Lab</p> <ul style="list-style-type: none"> • 39 Interviews • Observations during assistance workshops • Documentation of smartphone use 	 <p style="text-align: center;">Management Space</p> <p>Feminist HCI Lab</p> <ul style="list-style-type: none"> • Coordination of stakeholder interactions • Legal aspects • Public relations for symposia <p>Older-Adults HCI Lab</p> <ul style="list-style-type: none"> • Coordination of stakeholder interactions • Public relations for the mobility platform • Sustainability management

Figure 21. Activities in the Living Labs

11.4.1 User Space



User (or stakeholder) space means a network of contacts or participants that form the stakeholder pool of the Living Lab. When setting up a Living Lab, there are two main tasks: acquiring and selecting participants and bringing technology into the field (in case this is part of the project).

11.4.1.1 Triggering Interest

A vital part of the feminist HCI Lab user space is represented by six organizations with which we collaborated closely via extensive fieldwork. On this ‘macro-level,’ we aimed for a mix of small and medium-sized (SME) and larger enterprises from different locations (table 5). To acquire said organizations, we mainly ‘cold called’ approximately 100 potentially fitting companies in the region of mainly North Rhine-Westphalia (focusing on ensuring, if possible, proximity to our university) and pressure groups. In most cases, we deliberately contacted the HR departments as we saw topical proximity to our inquiry. Two organizations contacted us, having had read about our project. While most showed general interest in the project and recognized the topic’s relevance, making a necessary effort to become a participating

organization turned out to be a different matter. This fact is already a striking indication of the importance and challenge of this kind of work.

We encouraged interested organizations to define their gender-related research questions based on real-life company problems at initial meetings. Thus, we made it clear from the beginning that we wanted to meet the people's concerns and stressed the participatory stance of our endeavor. Organizations admitted a certain ‘organizational blindness’ and showed dedication to unravel gendered mechanisms in their organization (hence the motivation to join the project) in the ambition of ‘doing better.’ We also negotiated aspects of resources as well as legal issues (see also management space). Organizations expressed commitment to the values of participation and the provision of safe spaces for reflection. Both less engaged and engaged stakeholders saw a general need in this engagement, even if they initially brought a different mindset (see 11.4.1.2). The engaged stakeholders, in particular, fulfilled an additional gatekeeper function in this context.

Table 5. Participating organizations of the feminist HCI lab

Organization	Sector	Research topic
A	Gaming	Gender and talent development
B	Nano optic and sensor technology	Gender and organizational culture
C	IT services for local government	Gender and organizational culture
D	Manufacturing of vehicle registration marks	Gender and organizational culture
E	Scientific FabLab	Gender and making
F	Scientific IT, media, and data management center	Stereotypical distribution of roles

In the Older-Adults HCI Lab, we contacted the participants through various local senior organizations that functioned as ‘gatekeepers’ to possible interested participants. In total, we selected a heterogeneous group of 21 elderly participants (two later dropped out due to illness) concerning age (see section 11.3.1.2) and local infrastructure (living in both urban and rural locations). An essential factor was a particular affinity, willingness, and curiosity to learn new technologies and an interest in mobility and environmental sustainability. In the initial interviews, we learned more about the initial motivation and existing reluctance to learn how

to use a smartphone. Some were quite skeptical about what value a smartphone would have in their lives and the degree to which they would be capable of mastering its use. For instance, one male participant raised doubts that he *“would ever use (a smartphone).”* He argued he had managed to live without a smartphone thus far and felt no concrete pressure or striking reason to get one. Many of the other participants similarly questioned the available functionality as *“unnecessary”* or *“gimmicks”* (female participants). Others expressed severe security and privacy concerns. However, the fact that all participants were quite curious was vital for the project’s success. They welcomed the opportunity to glimpse why other people, especially younger ones, were interested in this technology. Noticing that smartphones were becoming an increasingly common feature of their surrounding environment, some participants viewed them as a resource that might ultimately help them to deal with impairments or age-related restrictions: *“One has to go with the times. At least I think we (elderly people) have to try to cope with the (...) new media and use them as best we can. (...) We cannot ignore them anymore; it is everywhere”* (female participant). As we will see later, the primary motivation to learn smartphone usage was thus often entangled with the fear of social exclusion.

Regarding the feminist HCI Lab, we broadly diversified the remaining user space for this project to receive different viewpoints, attracting people who share similar feminist ambitions. Additional stakeholders were eleven mixed-gender HCI and business informatics students from our local university to receive their perspectives about their expectations around future employment via interviews; data we cross-referenced with insights from the organizations. We offered all stakeholders five symposia, which we organized across Germany (see ‘creative space’). Each symposium hosted 50 to 80 attendees (who were attracted via public relations initiatives, such as spreading newsletters), where we disseminated insights from the fieldwork and offered all stakeholders a place for discussion (see ‘creative space’). This helped us disseminate our project across the country and receive input from diverse stakeholders from different locations. With their registration, symposia attendees agreed to a code of conduct, stating that *“we do not tolerate harassment (...), sexual language and imagery”* and that *“(p)articipants violating these rules may be sanctioned or expelled”* because *“(w)e foster an event that is characterized by constructive, respectful cooperation.”*

Regarding additional stakeholders, in the Older-Adults HCI Lab (Figure 21), we collaborated with an SME software company responsible for the development platform and were also accompanied by researchers from the field of gerontology who developed a training concept.

11.4.1.2 Keeping Motivation Up

Keeping the motivation up was significant in both projects. Within the feminist HCI Lab organizations, we had to rely mostly on our contact points that our concerns were thoughtfully addressed when acquiring participants. Contact persons either sent around a general announcement or encouraged specific employees to participate in the study. At first, we had little influence on this ‘micro-level’ of our user space, and we found different degrees of motivation from the people with whom we were engaged. While more intrinsically motivated participants were mainly females who wanted to share their experiences of stereotyping and discrimination, hoping to shed light on gendered inequalities within the industry, some intrinsic motivated male participants also seemed to acknowledge certain privileges working in ‘masculinist’ environments, stating that they wanted to add their part to equality and fairness.

On the other hand, though mostly forthcoming, other participants seemed less motivated and instead ‘obliged’ to talk to us. We hence might regard the latter participants as less engaged stakeholders. This variation in motivation to talk to us was vital in our success within an organization to reveal hegemonic masculinity patterns as “values are part of the background that participants bring to these collaborative settings” (Borning & Muller, 2012, p. 1132). For example, in one focus group, some attendees argued that “*diversity is not a desired mentality*” by some men within the company because of a fear of losing privileges. Some participants across different organizations also argued that some employees (also those with lead responsibility) might not be overly reflective about matters of discrimination or harassment, thereby reinforcing structures of hegemonic masculinity. Throughout the project, we found that first giving voice to stakeholders directly affected (female employees) and then later to less affected ones helped, in our specific case, the project to gain momentum. We also found it beneficial to ask engaged participants about potential newcomers with a ‘fitting’ mindset (snowball sampling).

In the Older-Adults HCI Lab, we observed a range of motivations why participants wanted to become smartphone users. In particular, our long-term study showed that motivation was not static but evolved in and through appropriation. This initial skepticism changed when our participants gained more experience in incorporating smartphone use into their everyday lives. However, this was not an unalloyed transition. None of the participants came to the project with a specific desire to learn how to use smartphones. Instead, the usefulness of certain applications

was only *discovered* in the process of appropriation. Hence, solving particular problems with a smartphone was not the primary driver to get started.

Moreover, we found that many participants experienced some curiosity about what it is all about with these smartphones and wanted to give them a chance since using them might benefit the future. Over time, the participants gained more trust and confidence in their smartphone handling, noticing that nothing terrible or irrevocable occurred. After the first four to six months, we observed domestication activities where our participants began to customize their devices on their own. Statements like *“I’m so proud I could make it”* or *“I did not believe I’d finally make it”* (female participants) reinforced the point that integrating smartphones into daily life was about much more than learning the pure functionality but was a somewhat more significant achievement for the participants. During the weekly sessions or in the final interviews, many reported that learning how to use a smartphone brought them a means of social inclusion and participation. A female participant gave one example: *“I feel more like a member of society again.”* In that quote, she expressed that learning how to use a smartphone became an opportunity for her to feel reborn and resume her role as an ordinary member of society from that she felt excluded (hence empowering her). Generally, the participants had come to appreciate the value of having a smartphone by the end of the project; for some, smartphone-based practices had become utterly routinized within their everyday lives so that the smartphone had become a taken-for-granted resource for accomplishing a range of ordinary everyday things.

11.4.2 Creative Space



Bottom-up innovations are supported by a creative space that fosters an open and egalitarian communication culture, interdisciplinary interactions among stakeholders (Ehn, 2008) and offers a ground for self-reflection as well as empathy. In our Labs, we offered several physical events where we exchanged ideas and solutions developed collaboratively. Creative spaces are not necessarily limited to physical meeting places and can include remote meetings and other online resources such as instant messaging groups or forums.

11.4.2.1 Designing Spaces for Exchange

In the feminist HCI Lab, the creative space consisted, in the main, of five one-day symposia in different locations in Germany (with approximately 50 participants). Symposia were meant as

a ground for networking opportunities and creative exchange. The results of the symposia activities were documented and made public on a designated website to make our lessons learned available to a broader audience. Each symposium dealt with a specific gender and IT-related topic, which, in the main, emerged from the fieldwork within the six organizations. These events were free of charge to lower the threshold for participation, especially for young professionals. Besides, the decision to host them at different locations in Germany turned out to be a good option for attracting diverse stakeholders. With a feminist ethic in mind, we draw on ideas about boundary objects as vehicles for communication (as suggested by feminist researchers) to conceptualize the creative space (Star, 2010). We believed that linking the stakeholders together as an ad-hoc community should imply an egalitarian intergroup communication mode, hence offering room to reflect on practices and the *situatedness of knowledge* (Haraway, 1988). A dedicated format where people with shared ambitions and a shared mindset work towards a topic should radiate and support a feeling of safety. Overall, attendees generally gained value from participation and felt that we created a constructive atmosphere, as confirmed by informal talks and an online survey. We also heeded our attendees' critical feedback (mainly down to organizational issues) and iteratively improved the symposia settings (e.g., regarding formats or time schedules). We were eager to pick up the ideas of our stakeholders: one symposium participant suggested a “knowledge pool” with data and facts, studies, and experts, which we then established on the project website. Symposia, however, also revealed the organizations’ commitment regarding their participation promises: three of the six organizations never showed up at the symposia, although we always reminded them about the events. Admittedly, this problem can result from a design trade-off between our ambition to broaden the user space by diversifying the locations for exchange across Germany and the companies’ interest in reducing time and travel expenses (see also management space). Another example of conflicting design values in the creative space occurred at one design workshop we organized with the video game company. In this workshop with approximately 20 attendees, we aimed at designing gender-sensitive job advertisements (Ahmadi et al., 2020b). During her interview, a female HR representative from the video game company hinted at the challenge of ‘balancing’ policy initiatives to increase acceptance: “*If we take action, then (...) we have to be careful not to have such negative discrimination (...) If we offer something (...) it must be accessible for everyone.*” More radical perspectives were raised at the symposia by some female participants. One woman stated that, with the low number of women applying, her company favors women during the recruitment

process. Another female participant expressed that it is acceptable if a woman does receive a position in IT because of quota as the barriers are already high enough. With diverse perspectives being present at the workshop, participants discussed and finally achieved consent, agreeing that ‘gender-neutral’ job advertisements prove an elegant way to avoid excluding any gender group. This way, we ‘managed’ to address a design trade-off by negotiating and considering the company's values and the other stakeholders involved in the design process.

Our findings indicate that becoming a smartphone user and using a mobile mobility platform entails a set of meaningful practices to achieve coherent ends in the Older-Adults HCI Lab. Like in the feminist HCI Lab, we noticed that much of this came to be premised upon the support network and the reconfiguration of social relationships. One important social network included more formal support from the researchers. For older adults to become smartphone users, we were also compelled to provide aid and to be able to intervene directly when necessary. In a sense, this is a prerequisite for bringing this kind of community into contact with this technology. It was clear from the outset that an accompanied learning environment would be a central requirement for older adults’ participation in the project. None of the users were proficient with smartphones, so we aimed to support their learning process in weekly assistance workshops (in total: 72) operated by the researchers, which ran over two years (see creative space). On average, 5-11 participants took part in each session. In the first ten workshops, we introduced some fundamental functionalities, such as operating the device itself and accessing apps, making calls and writing messages, taking photos, or downloading new apps. We also designed a handbook to accompany the initial sessions. The assistance workshops were run with an alternating weekly rhythm on Tuesdays and Fridays to keep the groups smaller and ensure that all participants could attend at least one of the various time slots. It turned out that the same participants regularly joined either the Friday or the Tuesday group with a bi-weekly rhythm. Attendance at the workshops was not mandatory, but we tried to organize them warmly, offering coffee and cookies. The observable insecurity and hesitation of the participants quickly led to us reassessing our remit about what assistance should be provided. It became apparent that just teaching them about functionality was not enough. The work also entailed making the participants feel confident, reassuring them that they were doing nothing wrong and that things could be tried out quite safely. Besides, we aimed to demonstrate that mistakes were easily undone, and a part of the education became an education in repair. Many feared to cause irreparable ‘damage’ when changing smartphone settings, which showed in statements such as

“I don’t want to break it” (female participant) or *“I do not want to cause irreparable changes”* (male participant). With time, this fear decreased, and the users started to feel more skilled after about the first 4-6 months. They started to explore the different functions and discovered their use-cases and interests.

In parallel, we further conducted several Participatory Design workshops with the participants that strengthened their ability to report on their user experiences and make suggestions regarding how to improve the development process and influence the design decisions about the mobility platform and the training concepts. These insights were then carried further to our partners (gerontologists and software developers) to adapt the training concepts and mobile platform design iteratively. Moreover, becoming familiar with smartphones allowed users access to commercial mobility applications and testing them, which helped them imagine the opportunities opened up by these technologies (Vines et al., 2015, 2013).

11.4.2.2 Sharing Common Standpoints

In particular, during the first months of the Older-Adults HCI Lab, we noticed that the participants’ positive group dynamics became an essential motivational factor in joining the workshops and attending them regularly. As the participants’ skills became more sophisticated, the dynamics within the workshops began to change. Initially, the researchers had dominated the agenda, but as the participants became more literate in using technologies, they became more self-confident and raised their voices for their preferences. In this way, the workshops became a mutual learning environment for all parties involved. Furthermore, when the participants started to explore the technology’s possibilities more freely, they increasingly engaged in more informal conversations, both before and after the formal meetings. Thus, the learning group provided a safe place for the practice of various skills. A further dimension attached to all this is the question of just how older adults are supposed to acquire the necessary competence to ‘keep up.’ The unique character of smartphones is that the artifacts can be used as channels to exchange knowledge about these artifacts (Stevens & Pipek, 2018). With this in mind, we decided later in the project to use a group messaging service to support group learning and active communication between the workshops. While not intended, our participants also used this channel to chat about personal issues and general group activities. This way, the participants also acquired social media skills.

These observations suggest that group exchange needs to be ranked alongside other resources traditionally considered to make an appropriate learning environment, such as various technical infrastructure ecologies, the teaching of social media skills, and trust-based relationships. A key point also to note here is that the workshops were, by and large, the only place that the participants, being of a certain age, could engage in a mutual exchange about smartphone use. The workshops had become a place for the participants where an old smartphone user is not deviant, exceptional, or, at the least, outside the norm, but something goes without saying. Having a room where no one needs to justify has a significant impact on appropriation and how it is accomplished and what the practice is seen to achieve, not just in practical terms but also symbolically. Even after the project ended, the participants remained quite active on the group chat, underscoring how appropriation was serviced by providing a cohort within the confines of which smartphone use was a shared and unremarkable practice.

Regarding the feminist HCI Lab, we also thought about dissemination issues within the organizations throughout the project. In order to address values of transparency, make our roles clear, and include what we framed as ‘less engaged stakeholders,’ we were, in the main, eager to present our research project to broader audiences such as the whole organization, teams, or sub-teams. Towards our topics, such gatherings helped us receive an impression of the companies’ general degree of openness: in organization C, there were not as many employees at a meeting (which was initiated to present our project to a larger group of employees) as we anticipated, as some of them were on a company outing, playing paintball (which we found quite ironic given the link of masculinity expressed through imaginary ‘war games’ (Gibson, 1994)). Our approach was more fruitful in another context: we held a 60-minute presentation and Q&A session about two years into the project within the video game company. Here, we used anonymized data (this way addressing the value of protecting our informants’ privacy (Woelfer & Hendry, 2012)) to present the shared sentiments and concerns expressed by our participants to a broader, more heterogeneous audience. This open presentation format triggered fruitful discussions: to state an example, a male lead asked about ways to give voice to diverse perspectives in his team after we pointed this out as a general concern mentioned by some of our participants. At such public meetings, critical questions were yet also raised, especially in organization C, such as “*Why should this be due to our processes?*”, “*The problem is that there aren’t that many IT women (...) they don’t apply (so much)*” or “*Isn’t that discriminatory against men?*” However, we believe that making our project more transparent helped

communicate our engaged stakeholders' values. At the said organization, we were, e.g., also able to reduce skepticism by laying out the advantages of diversity for the organization (e.g., competitive advantages because of more diverse product design).

11.4.3 Methodological Space



In both labs, the 'method toolbox' consisted of mainly qualitative methods for each iterative phase. We chose methods that we believed helped us foreground our participants' needs and values (Borning & Muller, 2012). However, these methods were not forced by us; instead, we negotiated at the very beginning about their enablement and adapted our approach iteratively. Relying on a participatory and ethnographic approach to the fieldwork "allows us to instantiate the way in which values are made manifest in and through the ordinary pragmatic, day-to-day, concerns of participants and our attempts to negotiate our way through them" (Weibert et al., 2017, p. 731).

11.4.3.1 Giving Marginalized Groups a Voice

In the feminist HCI Lab, our commitment to a feminist HCI stance required several deliberate methodological decisions. Therefore, notions of 'feminist Participatory Action Research' (FPAR) (Maguire, 2001), and 'institutional ethnography' as proposed by Smith (D. E. Smith, 2005), informed our approach. In the Older-Adults Lab, we aimed for a dynamic perspective on aging, recognizing that personal values and interests can change throughout a lifetime (Chan, 2015). In short, both propose to shed light (with a transformative stance) on the taken-for-granted gendered social practices and women's daily experiences. Finally, we were eager to adopt a collaborative, non-hierarchical mindset in both Labs from the very beginning.

These ambitions then influenced our methods, although we had to adapt our initial plans throughout the research process. Regarding the feminist HCI Lab, we initially aimed at achieving this through a combination of observational work and interviews within the organizations, with focus groups following after we have gained a rich understanding of "dynamics of gender practices 'in the heat of the moment'" (Berger et al., 2015, p. 559). Since we wanted to reflect on our participants' viewpoints, and corresponding narratives are usually negotiated between the people involved in the research process, focus groups were meant to provide the participants with a sense of belonging and empowerment by allowing them to speak up (Farquhar & Das, 1999) and to validate our themes. However, we soon realized that this

approach's fruitfulness was volatile and that we could not follow this 'prototypical' pattern in all settings. For instance, observations were an essential and insightful part of data collection at the video game company. Shadowing at this specific setting worked well, whereas it was less rewarding in other participating organizations. We learned that this problem could only be tackled with methodological pluralism as the amount and willingness of participation and each organization's research aim heavily influenced the methods we chose for each context.

At the beginning of the Older-Adults HCI Lab, we conducted all interviews at the participants' homes to better understand their living circumstances and environment. We talked about their self-confidence, expectations, needs, fears, or insecurities regarding their technology use (particularly smartphones) and daily mobility habits. This also created a mutual feeling of familiarity. After that, we handed out smartphones to the participants and began the weekly assistive workshops (see creative space). We documented these events using observation protocols, often enriched with photos and screenshots from the participants' smartphones. Towards the end of the project, we conducted a second set of interviews with all 19 participants at their homes. We used these interviews to allow the participants to reflect upon the entire adoption and learning process that they experienced.

In both labs, all interviews (both initial and final) were transcribed and anonymized, and they followed a qualitative and 'open' analyzing process to respect different views and value points. The analysis further varied from using thematic analysis (Braun & Clarke, 2006) in the feminist HCI Lab, hence creating 'thematic narratives' (Czarniawska, 1997), to a reconstructive, documentary approach in the Older-Adults HCI Lab (Bohnsack, 2014).

11.4.3.2 Methodological Support for Building Trustful Relationships Over Time

Trust-building, decreasing hierarchies in gatherings such as focus groups, and creating safe spaces were central values we aimed to establish when setting up the method space. In particular, both Labs' long-term approach aided this massively since trustful relationships are not established overnight. Instead, the partners in both Labs have been forthcoming about their concerns more and more over time. Our user-centered methods aided this process. The iterative process helped us understand contexts better and revise some of our impressions with a critical eye, which also meant learning from our experiences of previous events to enhance the egalitarian modus of intergroup communication mentioned above. In the Older-Adults HCI Lab, trust-building to make the participants feel safe was also a crucial point. Therefore, we

aimed to be a helping partner to cope with their technology, which often became relevant late in the evening or during the weekend when we got a call. Also, the informal talk via chat groups caused that we mainly were always available. Community building also turned out as highly relevant to keep the motivation of the older adults high. Therefore, we tried to make regular assistive workshops as familiar as possible by offering some cookies and coffee. We also planned some mutual events, such as visiting the yearly Christmas market.

In the feminist HCI Lab, we found that signing an NDA (see management space) was the first step for building trust, but it was also essential to build a trustful atmosphere and rapport in interview situations and gatherings. In one organization, a female interview partner, e.g., asked, though more rhetorically: *“You’re keeping it to yourselves, don’t you?”* Said female employee became an important partner throughout the project as she revealed, also in informal talks, many incidents in her company from her perspective, which often were (unsurprisingly) in contrast to statements representing perspectives from male interview partners. It was also she who emphasized the importance of the researcher’s long-term engagement in the field as well as their continuity as a contact person: *“You already know the people now. You have different glasses on (...).”* The process of trust-building also involved accepting boundaries. During one interview, a participant was unwilling to talk about certain aspects of employment contracts; therefore, we were eager to emphasize that we are not forcing him to give any statement about a topic he is not comfortable with. Group constellation in focus groups was also essential to create genuine results. As hinted, openness towards our topics depended on the individual attitudes of our participants. Focus group discussions in, e.g., the video game company, seemed more insightful and profound as attendees seemed to have a much higher intrinsic motivation to be there in the first place. In Organization C, on the contrary, a focus group consisted entirely of men (often with lead responsibility) plus our female contact person.

11.4.4 Management Space



The management space mainly deals with coordinating stakeholders; this, among other things, includes communication with organizations, managing several trade-offs regarding different expectations of various parties (including legal aspects), measures of trust-building, and maintaining participants’ motivation. The latter is essential when researching sensitive areas (Waycott et al., 2015). Therefore, especially mediators have a vital task here.

11.4.4.1 Managing Relationships

Both projects dealt with rather sensitive topics that required ‘management by perception.’ In the feminist HCI Lab, where we cooperated with organizations, an agreement on basic terms was important. We negotiated, e.g., aspects of legitimation (and sanction, including signing a non-disclosure agreement (NDA)), handling sensitive data, and anticipated the frequency of research activities. The latter means balancing time and other constraints against keeping engagement and motivation alive. While organizations shared the will for change, one of their central values is, unsurprisingly, to maintain daily operative business routines and financial stability. In the feminist HCI Lab, we relied heavily on one central contact person for each organization to thoughtfully address our requirements. Such ‘allies,’ mainly from the HR department, were crucial (and occasionally provided genuine insights, as shown before). However, despite their efforts, we found that communication and organization were frustrating and laborious at times. We observed the pattern that – despite ‘best intentions’ proclaimed at the project start – more conservative organizations (that we experienced as being ruled by a high degree of masculinity and androcentric structures) put additional barriers towards the research collaboration’s success. In such organizations, responding to our inquiries took a long time; appointments were canceled on short notice or continuously postponed. Also, in one organization, our contact person quit her job throughout the early stage of the project, and after this, no one felt in charge. It took some effort from our side and constant ‘nagging’ until the cooperation continued. In another organization, on one occasion, a contact person called us one hour before our appointment, telling us the CEO believes that our presence “*today makes no sense,*” without stating exact reasons. In this context, our planned focus group was postponed so often that we could only hold it shortly before the project ended. The said organization also never participated in the symposia. Undoubtedly, resource reasons such as time and monetary issues played a part here (Dachtera et al., 2014) (as well as for other organizations). Nevertheless, their behavior was in stark contrast to the impression they initially conveyed. While other scholars had similar experiences regarding decreasing engagement of participants in Living Lab research (Logghe et al., 2014; Ogonowski et al., 2013)), in our case, we saw clear indications that engagement correlated with a commitment to its values. Priorities, seemingly and for reasons unknown to us, have shifted throughout the project, or the dedication has not been that strong in the first place. At the said organization, a male participant has, e.g., not been informed about our attendance at a team meeting internally. Such mishaps arguably do not

increase sympathy for initiatives someone might not have the highest affinity for in the first place. We also had to react flexibly to unforeseen circumstances affecting the work carried out in the other spaces. Organization B was very engaged initially, and the research focus was different from that displayed in table 5. We decided that this company's research endeavor should focus on the gender-sensitive design of a prototype they recently started to develop. However, throughout the project, those ambitions were halted as the companies faced some patent issues which restricted the possibility of following the designated path. When it turned out that these issues were not to be resolved shortly, we decided to switch the topic to investigating 'gender and organizational measures.' Being the smallest organization of the three covering the same topic, both the company and we believed their small company perspective might add an infesting touch. Indeed, they found our presentation of insights from the other contexts enlightening, and their CEO also took part in the last symposium. All the mentioned examples show that, in terms of co-design-project management processes, researchers have to be patient about aspects beyond their control and react to unforeseen circumstances to address the values of diverse stakeholders.

In the Older-Adults HCI Lab, we served as trainers and also as a help desk. For instance, we regularly needed to provide support in (re-)setting passwords, meaning that we frequently had access to their personal information, which required an adequate level of trust between the participants and the researchers, which often became relevant late in the evening or during the weekend when we got a call. Also, the informal talk via chat groups caused that we mainly were always available.

In both projects, to reflect on our progress, our roles as organizers of the labs, methodology, and comparability, we held regular internal meetings to avoid bias. Furthermore, the feminist HCI Lab was accompanied by biannual meetings with a steering committee, which consisted of a network of additional company representatives and gender researchers. Their input, e.g., helped us to determine topics for the symposia and guide fieldwork.

The last point is that value conflicts can occur with multiple stakeholders and partners: interdisciplinary and academia-industry-based consortia are often prerequisites for funding. The 'alignment' work needed to create a common reference frame and make the collaboration work not accounted for in project plans. In the case of conflicting interests and variegated contributions, this may create problems when, e.g., industrial partners are mainly interested in testing and further developing their products, forcing the design choices in this direction.

11.4.4.2 Managing Sustainability Issues

The learning process within the Labs is a necessary but not sufficient condition to keep the service and the related activities alive beyond the end of the projects. For example, in the feminist HCI Lab, several stakeholders signaled a willingness to commit to the Living Labs' goals and values, while other organizations showed not that much enthusiasm. On the one hand, with the video game company, to state an example, we initiated a COVID-19-related study during the summer of 2020, also expanding our user space within the company in the process. On the other hand, and somewhat ironically, the CEO of a less dynamic organization asked us shortly before the project ended about further activities and was (suddenly) especially interested in the networking opportunities. The first author hinted that the creative space activities were meant for such networking purposes and that the company never made use of them, despite always having received an invitation.

In the Older-Adults HCI Lab, this issue concerns both the social and technical aspects of keeping a design outcome alive in the user's real world. The community had to be prepared to invest in the social and organizational infrastructure necessary to continue. From the technical point of view, we can make a similar argument for maintaining the technology in the long run. In our case, we managed to offer a temporary solution by engaging volunteers. However, this cannot be an adequate solution to guarantee an acceptable service level in the long run. Other factors beyond our control hindered technical sustainability: in the same project, since some institutional rules prohibited the researchers from keeping the devices configured and used during the project after it ended (this had to do with insurance issues which we were able to resolve by drawing up donation contracts with each user. This solution relieved the university's responsibility for the devices. Such donation contracts are now a common practice in upcoming projects. This issue is problematic from a psychological standpoint, as the elderly participants were accustomed to them, and new devices would require an additional learning effort; from the economic standpoint, most of them could not afford a new device. This problem becomes even more challenging when the technical solution is innovative and builds on components developed and maintained by several project partners; hence, it is more complex and riskier to be maintained.

11.5 Lessons Learned and Discussion

Although co-design research is resource-intensive, we found it beneficial to address values in design endeavors: it does, we believe, provide practical implications for empirical, value-driven fieldwork by making implicit factors more visible from the outset. VSD as an orientation was helpful for making certain decisions regarding our Living Labs' initial setups and their maintenance, as "the strength of the VSD methodology derives not from a unique perspective on the design process (...) but from the analytic space it opens for understanding trade-offs between human values, systems design, and social forces that emerge (...)" (Le Dantec et al., 2009, p. 1141). It is crucial to note that a Living Lab (in the PRAXLABS tradition in our case), or any kind of research infrastructure, is not a systematic, axiological approach to design research in itself. Infrastructures are not per se value-driven, *but* VSD was instructive for us in creating a "space for discovery and reflection on a variety of values across diverse contexts of investigation" (Le Dantec et al., 2009, p. 1145). Having said that, we believe that our Living Lab approach encompassed characteristics that were especially beneficial in addressing some open issues in VSD research (Borning & Muller, 2012; Le Dantec et al., 2009; Weibert et al., 2017): a deep immersion in the field, a long-term ambition, broad stakeholder integration, and methodological flexibility are all prominent features of our Living Lab infrastructures. This allowed engaging with the situatedness of values and their emergence over time, adjusting our actions if necessary. There are several takeaways from our study: We were able to set up initiatives that addressed values that were vital to our project partners and us, such as reducing hierarchies by offering safe spaces for trustful collaboration. Also, the methodological flexibility allowed us to adapt our methods to the settings we entered. In the following, we will discuss our lessons learned from comparing two projects from different application fields in detail.

11.5.1 Negotiating and Managing Values Over a Longer Period

Co-design work seems to offer the potential to mitigate possible problems resulting from having a pre-defined set of privileged values over values empirically discovered (Le Dantec et al., 2009). In this context, we cannot stress enough the benefits of building trustful, long-term relationships (Friedman & Yoo, 2017) in such co-design partnerships. During our ethnographic fieldwork over three years, researchers and study participants became thoroughly acquainted with the field's context, culture, language, and basic structure (Fetterman, 2010). Seeing this

'broader picture' and understanding the context helps negotiate values and address how design might be shaped concerning situated values over time (Weibert et al., 2017). Through the constant negotiations, reflections, and the use of methods adapted to situated contexts (see 11.5.3), we analyzed the values of the involved stakeholders at the inception of our Labs and throughout their maintenance.

Identifying and distinguishing engaged and less engaged stakeholders in this context and addressing their values remains a significant challenge. In both labs, our stances explicitly demanded we put marginalized people at the center of our activities and address gendered injustice in organizational contexts, or, respectively, to prevent ageism, as is cautioned by Van Deursen & Helsper (2015). In the feminist HCI Lab, a degree of homogeneity with like-minded participants helped the building of safe spaces for exchange, which is a significant value of our project. Opening up places for communication, however, does not necessarily create safe spaces on its own. Hence, the concept of safe spaces deserves a more profound discussion in this context. Safe spaces in the literature (Bustamante Duarte et al., 2018, 2021; Flensner & Von der Lippe, 2019; The Roestone Collective, 2014) have been described as places that provide safety from a certain kind of harm for mainly vulnerable groups and allow them to act freely. They often aim for a respectful discussion culture where people can express views and positions openly without fear of judgment or sanction. Their symbolic meaning has the potential power to form collective strength and actions for resistance. For qualitative research, safe spaces offer the potential to empower marginalized identities and encourage their voices to be heard (The Roestone Collective, 2014). We acknowledge inevitable design trade-offs when cultivating safe spaces as an organizer, walking the thin line between exclusion and inclusion as well as foregrounding or reinforcing differences. This means that "cultivating safe space is simultaneously reactive and productive work, reconfiguring existing and context-dependent social norms" and "we recognize that safe spaces are contextually embedded" (The Roestone Collective, 2014, pp. 1360–1361). From a VSD perspective, one could argue that how to flesh out the different aspects of a safe space, involving questions of what kind of harm is the safe space protecting from and for whom, rather depends on the values of a project (and hence negotiations with its participants) (Flensner & Von der Lippe, 2019; C. Fox, 2007; The Roestone Collective, 2014). In this context, different value systems, interests, and stakeholders' perspectives might potentially work against a safe space (Flensner & Von der Lippe, 2019).

We saw ourselves confronted with a broad range of such tensions in the two project contexts (yet more so in the feminist HCI Lab). This situation was, among other things, because of different stakeholder requirements (office workers vs. older adults) and spatial factors (offices and symposia as fieldwork grounds, and the domestic space and the university setting, respectively). With the concept of safe spaces having its foundation in the women's and LGBTQ+ movement (Flensner & Von der Lippe, 2019; The Roestone Collective, 2014), we can already draw on various works of literature for our discussion. In this context, the corporate world in IT can be regarded as potentially hostile towards women whose "presence is often unwelcome, and where power is increasingly enacted through the demarcation and policing of spaces" (K. Smith et al., 2020, p. 1302). While the women in our context probably are not in physical danger in their workplaces, they are potentially harassed in their career progress. The need for a safe space was strong as some lamented a lack of "legitimization" to address their interests in overly masculine environments (Ahmadi et al., 2020a). Hence, we were faced with questions of whom to invite to focus group discussions or symposia. As stated, our effort was not to limit participation to women only to get broader perspectives and allow male 'allies' to play a role as ambassadors. While we were not excluding men in general, we saw that gatherings gained a different kind of momentum when people with shared values attended them. This fact showed that what constitutes a safe space meant different things to different organizations, as we did not always influence the acquisitions of attendees. In addition, we saw success in broadening the value perspective gradually in each iterative phase (though the main value of establishing trustful spaces should still be prioritized). The office space as a ground for interviews and focus group discussions furthermore involves spatial considerations since it, on the one hand, makes participation more visible onsite, while on the other hand, being aware that companies and their employees have limited resources, conducting interviews and focus groups within the offices came with practical benefits. Overall, we are confident that we could establish safe spaces at all our feminist HCI Lab gatherings, based on the feedback we received from employees and symposia attendees (see Ahmadi et al., 2020a for a case study).

In this regard, we also had positive experiences in the Older-Adults HCI Lab. Just as in the feminist HCI Lab, the project offered the participants a sense of belonging. Older adults often face stigma regarding age-related impairments and a lack of motivation and skills (Chan, 2015). Literature shows that cultivating safe spaces for older adults in co-design projects can contribute to the success of the research process in general (Haufe et al., 2019) and helps refine

technological competencies in particular (Khalili-Mahani et al., 2020). The participants of the Older-Adults HCI Lab often stressed how vital a friendly mutual exchange in such safe spaces was for them. During the final interview, one of the female participants expressed this as follows: *“I’d never thought that a group like that would work like that. For me, that was really a great experience to see and that these people that probably would not have come together in another way could support each other in such a nice way. That really supported me”* (woman, workshop protocol from April 2016).

As VSD should also pay attention to less engaged stakeholder’ impacts, we must stress that each perspective we received was valuable for understanding the broader picture. For example, in the feminist HCI Lab, while we surely could not expect an affinity for our feminist topics from all our interview partners (to whom which we talked in the first place to understand personal sentiments and diverse lived experiences), the certain willingness and ability to reflect on current, often taken-for-granted structures was hence by times challenged. Thus, receiving broad and, at times, surprising perspectives (e.g., via the integration of students) is a massive benefit of our approach since it opens up space for articulating issues. In this context, to state an example, a male participant hinted that care work involves child care and taking care of older family members. Several participants also referred to aspects of age discrimination. Admittedly, we have not taken these perspectives into account before. It also helped to understand different women’s diverse perspectives. For instance, several women propagated their willingness to act as female role models in the video game company. However, a participant at the first symposium stated that she is somewhat unwilling to do so as this would put her under too much pressure and “just wants to do her job.”

In the case of the Older-Adults HCI Lab, we found that we could benefit significantly from having to involve community or user organizations, such as local authorities or help organizations since these are the ones that can offer the know-how and resources. They also function as gatekeepers or door-openers. However, these organizations often do not have experience with the rules and goals of academia or industry (Altman, 1995). Therefore, it was essential to take on a mediating role where organizations were made aware of the topic on the one hand, and spaces for technology appropriation could be created on the other. In this way, a regional senior club, which already offered computer courses, also offered smartphone use courses. Further, we found that community-building was very important for the older adults in generating inclusivity when learning smartphone usage. Community building is also significant

for older adults because there are no established structures for appropriation in their everyday lives. While other social groups grow up with new media ‘naturally’ and use them with their peers at school, older adults lack this social experience in their studies or on the job. Therefore, we have observed that new technologies can also be experienced as exclusion from the social group. However, it can also be expressed as ‘pride’ in having ‘made it’ and being appreciated as an achievement by other older adults.

As suggested, building trustful relationships over time is a major benefit of such co-design work, not only in relation to interactions between researchers and users in ‘micro settings’ (e.g., in organizations) but also between all stakeholders (Mastelic et al., 2017; Morel et al., 2018) in open communication structures (Weibert et al., 2017). This value is also key to negotiating potential design trade-offs (Friedman et al., 2006). This fact, in turn, requires a specific commitment to participate, as we will discuss in the following.

11.5.2 Values of Participation and Intervention

Most of our project partners were very engaged at the beginning. However, for some, there was a drop-off in engagement over time, which is a pattern that other Living Lab researchers have encountered as well (Logghe et al., 2014; Ogonowski et al., 2013). Higgins & Klein (Higgins & Klein, 2011, p. 33) suggested that “the Living Lab itself can give a symbolic meaning to the process of facilitating broader collective action” and can, therefore, “signal commitment, momentum of change, and the opportunity to act and take charge of developments that are critical for the development of the participating parties.” Based on our own experience, we can only partially share this view, since we felt that the projects’ shared values were not always upheld by all stakeholders with the same level of commitment – despite statements to the contrary at the outset. This fact then left us, with some organizations, with a bitter taste of ‘purple washing’ (the propagation of a gender-friendly image by the mere call for gender equality).

Admittedly, our industry partners treated successful business and economic stability outcomes as overriding other considerations. With this in mind, it is understandable that research projects were not always the highest priority for project partners, especially if they came from an industrial context (Dachtera et al., 2014). This lack of commitment from vital partners sometimes clashed with our values as researchers and designers (Borning & Muller, 2012). We were eager to avoid unduly disrupting industry partners’ daily business routines, and, at the

same time, we had an ambition for transformative action and wanted to promote social change. We also had concerns about meeting the funding agencies' requirements (managing successful projects) and disseminating insights within our research community. Promoting convergence between the different worlds of the stakeholders and meeting the multitude of demands and associated values that came with these various cultures was thus challenging. Crucially, for pragmatic reasons, we had to decide to shift our resources to more engaged stakeholders. We know that other VSD researchers have faced similar issues before, following a "strategy for prioritization" (Borning & Muller, 2012, p. 1131). Nevertheless, we believe such an approach is justifiable, also from a VSD perspective, as "a commitment to participation is also part of the approach" (Weibert et al., 2017, p. 721). As Becker (1967) argued, at certain times, researchers have to take a position regarding the question of "whose side are we on?" Overall, VSD needs to remain a "practical method" (Borning & Muller, 2012, p. 1128), which, of course, does not relieve us from the responsibility for constant reflection and critical questioning.

Regarding this problem, Friedman & Kahn (Friedman et al., 2006) state that "in the real world, of course, human values (especially those with ethical import) may collide with economic objectives, power, and other factors. However, even in such situations, VSD should be able to make positive contributions by showing alternate designs that better support enduring human values." We believe that we were at least able to achieve this for our participants: in the feminist HCI Lab, stakeholders considered the academic input and access to networks which we brought to the process to be valuable and relevant to their problem areas (which we hinted at through our fieldwork in the first place). Furthermore, design interventions at an organizational level linked with the exchange at dedicated creative spaces were beneficial to initiate modest beginnings of change as stakeholders used such offerings. In turn, a lack of commitment to the Labs' activities cost some organizations considerable potential. In the same vein, working in the Lab with older adults shows clear benefits of long-term, frequent and regular participation. It allows insights into the appropriation of technology over the long run and the older adult's capabilities to actively engage in Participatory Design workshops to contribute to the mobility platform. Hence, we found that the long-term perspective allows insights into the development of values, beliefs, experiences, and user practices.

Overall, we think that the higher the buy-in and commitment of stakeholders, the more participants benefitted from our offers. Thus, living Labs have proven to bring benefits in initiating change via their value networks, especially for organizations that lack specific

resources, including human resources (Van de Vrande et al., 2009). Still, there is something to learn from this meta-cross comparison: as laid out, some stakeholders raised concerns about symposia as the main ground for stakeholder interactions because of resource issues (time resources and travel expenses). Retrospectively, and with a positive experience of the formats for exchange deployed in the Older-Adults Lab, we could have designed the creative space differently in the feminist HCI Lab and opted for additional physical formats nearby (e.g., at our local university, as five of our six stakeholders are from our city) or digital formats (to reduce travel and time expenses).

As stated, though modest, we were able to act as initiators for social change with our activities insofar as we planted new ideas and noticeably broadened up perspectives for our participants. In such research infrastructures, we can confirm that participants are more likely to break down existing attitudes and stereotypes, adopt a constructive mindset, and be inspired to find creative solutions (Higgins & Klein, 2011). In the context of the feminist HCI Lab, one day after a focus group at organization C (which, as reported, consisted mainly of men), we received an enthusiastic email from our female contact person stating that the attendees were still talking about our topics (e.g., matters of serving stereotypes) and that a male colleague advocated presenting the insights to a broader audience within the company. She concluded, “I believe this is also a confirmation for you that your commitment contributes to raising awareness of the gender issue.” Collaborating with the video game company in a different, pandemic-related study, we contacted some participants half a year after the project ended and asked them about the impact of our collaboration in the feminist HCI Lab. They acknowledged matters of raising awareness for the issues internally and externally via dissemination and that the collaboration was especially important to people who directly participated (and who were given a space to share sentiments). Thus, the Action Research-oriented process in raising awareness of diversity issues in the first place is already part of the destination and also leads to sustainable impact in organizations that showed a certain degree of commitment. Research of this kind does not solely lie in designing an artifact or organizational measures; it is also based on the approach (D’Ignazio et al., 2016).

11.5.3 Role of the Researcher and Choice of Methods

In value-driven PAR endeavors, researchers have to take responsibility for their roles and make their ambitions clear. For example, although we are Action Researchers and not consultants

(Baskerville & Wood-Harper, 1996) (though we understand ourselves as ‘external change agents’), employees can become confused about our role. Showing empathy (P. Wright & McCarthy, 2008), dedication, and care for our subjects’ concerns were as important as communicating our ambitions and values from the very beginning. With this in mind, we also have to stress that this required a certain degree of self-disclosure. Overall, also less engaged stakeholders seemed to be convinced of our work. In the feminist HCI Lab, the standpoint-driven research aimed at creating research for women with women did not necessarily imply that the research had to be done exclusively by women. The leading researcher and first author of this paper, who identifies as a cisgender, heterosexual male, communicated his values and ambitions right from the start. We saw no reluctance of (female) participants to express viewpoints, especially after trustful relationships were established over time. The researchers’ standpoints, backgrounds, and experiences can indeed have a beneficial impact on the approach to the fieldwork in VSD projects, concerning methods and beyond (Alsheikh et al., 2011) and can “become both a powerful tool of inquiry” (Borning & Muller, 2012, p. 1130). It can, for instance, be argued that, in the case of the feminist HCI Lab, with the primary researcher “being a male, (he) may have to be more reflective and empathetic to understand the women participants’ sensibilities; however, this sexual opposition of the author enables him to be more interested and curious to explore the experiences of the women” (Safdar & Yasmin, 2020, p. 4) (for similar experiences of male researchers conducting feminist research, see, e.g. Bird, 2019; Bruni & Gherardi, 2001; Levinson, 1998).

Furthermore, our VSD studies have also shown “the need for methodological support that spans a wide range of user experiences, social and cultural backgrounds, and of equal importance, doing so over extended periods of time” (Weibert et al., 2017, p. 733). Indeed, we had to invest much effort in empirically driven co-design work because “(u)nderstanding contexts, needs, and requirements from different stakeholders requires a structured approach” (Ogonowski et al., 2018, p. 349). The choice of methods inherently influenced our positive encounters. Methods in Living Lab research have to reflect conditions in the setting (Ståhlbröst & Holst, 2017), and we had encouraging experiences with the Living Lab infrastructure in this respect. For instance, FPAR and feminist HCI (Maguire, 2001) translated an otherwise abstract feminist epistemology and the associated values into an iterative research approach. As already noted, we generally sought to use methods to give voice to participants like in the Older-Adults HCI Lab. In particular, in the last-mentioned Lab, we found that formal structures and methods help

work processes progress, but they are not always optimal from the users' perspective. We learned to set up occasions for specific events and informal exchanges in order to maintain motivational levels. Therefore, we also address the mentioned activities to support community building as methodical work. We were sensitive to addressing the older adults as valued participants in the projects who are the experts of their everyday-life experiences that we wanted to understand better. We also wanted to understand mutual learning practices, in that we can teach them smartphone use, but in that, we want to learn and understand their use in return.

We found that our methods were most rewarding when applied in settings where the overall commitment to the projects' shared values was the highest. At the same time, our findings indicate that not all methods were suited equally for all our encountered settings. Thus, we encourage VSD researchers to lean towards methodological pluralism and become especially well-acquainted with methods that serve long-term objectives and help build trust over time. We also advocate initiating regular meetings (Weibert et al., 2017) for the sake of self-reflection on one's roles and methodology, comparability, and avoidance of bias.

We also found that trade-offs, by times, challenged the role of the researcher regarding initial project values, adapting to certain situations to 'serve' the project, and the necessity to draw boundaries. For example, in the feminist HCI Lab, the first male author occasionally felt the need to adjust his stance in specific contexts to reach a particular male audience, even though this required behavior he was not entirely comfortable with in order to establish a relationship and get someone 'on board' to ensure the project's success. Thus, he engaged in discussions about gender-sensitive language or made 'male' jokes on rare occasions. On one occasion, a male participant proclaimed to "*stop this 'diverse' nonsense!*" during a focus group. Though put off by such a statement, the first author did not respond to keep the discussion going. Regarding the researchers' roles, they undoubtedly have a responsibility to consider long-term effects beyond the end of (usually terminally funded) projects. We discuss this aspect in the next section.

11.5.4 Values of Sustainability

Time and budget issues and other factors can limit research activities, impacting their sustainability. Other scholars have argued that researchers need to consider what happens when they are 'leaving the wild' (N. Taylor et al., 2013) and that 'walking the last research mile' (Nunamaker Jr. et al., 2015) includes careful considerations about what should happen when

research projects are coming to an end. First, when opening up safe spaces (see chapter 11.5.1) and offering ‘legitimization’ to address controversial topics, we must acknowledge that participation might come with risks of stigmatization or harm for our subjects. Office settings, e.g., are not uncommonly shaped by certain masculinity ‘regimes’ (C. Fox, 2007); this means we also have to be careful about adverse effects for them in the long term (DeVault & Ingraham, 1999), especially when the ‘banner’ of a research project (in case this is possible in the first place) is not able to protect them anymore. In this context, we at least saw some success in making the values of our research projects visible to a broader audience via presentations. Second, sustainability heavily depends on how it can be implemented and maintained after the project funding stops. This issue concerns the social and technical aspects of keeping a design outcome alive in ‘real use.’ On the one hand and irrespective of the success of creating a community dimension during the project, the community itself or the organization that supports it have to be helped to maintain the same initial impetus after the project team has left; in Bødker’s (1994) words – “the less they ‘miss’ the researchers, the better.” The learning process in the Older-Adults HCI Lab put in place is a necessary but not sufficient condition to keep the service and the related activities alive. The community or the organization must be prepared to invest in the social and organizational infrastructure; this is necessary for them to continue. The time pace of the projects hardly leaves time to plan for that, and the funding schemes are in general more oriented to the transferability of the project outcomes to other contexts (for instance, if the researchers gain more from the collaboration than the participants) than to make them sustainable for the community and organizations that were involved in the projects. We cannot deny that such a viewpoint was also very time- and work-intense; still, even after years that the Older-Adults HCI Lab ended, the community is active, which can be observed in the what-app group chat. Here are still questions asked or inventions made, even that we as the researchers have become ‘quiet’ readers of the chat.

Our findings show that co-design work such as ours, in principle, can offer a more sustainable way of realizing VSD projects, especially if the stakeholders understand it as a strategic positioning of a research group or department (rather than as a one-off activity). Furthermore, a more systematic approach to knowledge and resource exchange could be very beneficial for maintaining VSD projects by building upon an existing user space, as discussed in the following.

11.5.5 Methodological Considerations, Limitations, and Future Work

Throughout this paper, we laid out our ambitions to address VSD through a co-design approach. With our long-term, broad, and user-centered perspective, we hope to expand existing knowledge on value-driven co-design spaces with stakeholders (Yoo et al., 2013). The work we are engaged in could easily be considered “outside of the field of design” (D’Ignazio et al., 2016, p. 2614) but has relevance to its contribution to design and elsewhere. We have been at pains to show how Living Lab research infrastructures and their main characteristics, namely a long-term, broad, and user-centered co-design approach, can be guided by VSD, but at the same time provide for a more practical and nuanced sense of how values are manifested on specific occasions over time. We found the PRAXLABS framework provided helpful, practical guidance across our projects’ whole duration as it proved to be a powerful tool for drawing attention to cross-cutting issues confronting certain occurrences, decisions, and reactions. By way of an example, in the feminist and Older-Adults HCI Labs, we found that establishing trustful relationships with contact persons (in the management space) or senior organizations can have a significant impact on the acquisition and selection of participants (in the user space) and, in consequence, enhance the effectiveness of interviews as well as focus groups (in the method space). This also means that the framework is beneficial for understanding the *contingencies* of potential value conflicts.

Nonetheless, our study has certain limitations. What we have presented here is a highly contextualized picture. Its value lies in how the approach we have used addresses growing claims that VSD needs to pay attention to the situatedness of values (Le Dantec et al., 2009). For this reason, the transferability of insights and best practices from different project settings is vital for advancing the field of VSD. Making contextualized experiences relevant and applicable beyond their specific settings can be addressed by careful documentation and comparing different (design) case studies (Rohde et al., 2017; Wulf et al., 2011). Long-term ethnographic studies such as the ones at hand can offer a robust resource for VSD to gain detailed insights into how initial commitments to values are translated over time and how a confident approach to the research work can support associated processes in individual projects. In this context, the advantages of co-design projects are that they allow a variety of communication, the development and promotion of a longer-term, more honest relationship between co-researchers, and the use of participatory techniques. With a cross-border meta comparison of different (Living Lab) projects, we have been able to present critical reflections

on the explicit and implicit results of our projects (Ogonowski et al., 2018). Such comparative work can probably help researchers to sharpen their mindsets regarding, e.g., issues of exclusion and other aspects important to VSD. For instance, researchers in the feminist HCI Lab might have already been more aware about the aspect of age discrimination (to which a research participant hinted) if a cross-comparison of this kind (with the Older-Adults HCI Lab) had taken place before. Of course, knowledge exchange and transfer are not straightforward tasks (Ackerman et al., 2013), but we found the PRAXLAB framework helped cultivate such research objectives and to constitute core competencies for co-design or, more specifically, Living Lab work in a strategic and coordinated way (Ogonowski et al., 2018). This way, it is argued that useful comparisons for VSD are made across settings and similar use cases (Borning & Muller, 2012). Our future work, therefore, focuses on encouraging experience sharing across different value-driven co-design projects.

11.6 Conclusion

This paper presented two long-term case studies involving the sensitive contexts of feminist HCI and HCI research work with older adults, both dealing with emancipation and empowerment and, therefore, were fundamentally concerned with values. Having said that, and as we have argued above, ‘values’ can refer to any number of different things. Two things, then, influenced our perspective. The first was that we were concerned with a specific subset of the term, which has to do with ethical positioning, and where axiological commitments had to do with emancipation and egalitarianism. At the same time, and following a pragmatism associated with John Dewey (1939), we saw values as always and inevitably being made manifest in specific and evolving circumstances. The case studies presented both the establishment and maintenance of a co-design project and allowed for the gradual contextualization of (moral) values. We described how we used values in a situation-specific way and translated initial commitments over time into a pragmatic co-design space, including collaboration with various engaged and less engaged stakeholders from different fields. We also showed how our approach helped us reflect on these values during our research efforts and manage potential value conflicts. The values in our two projects contextually emerged and changed throughout their runtime. For this reason, the long-term nature of our infrastructure and its integration of a broad stakeholder base – while challenging and resource-intensive – was vital. Our socio-technical research infrastructures allowed us to negotiate and manage expressions of value-based

commitments over several years of work, establish safe spaces, and adapt methods flexibly to specific contexts.

Against the background of the long history of work at HCI that has brought computing and technology design into the critical focus of cultural, participatory, and feminist computing, our goal was to support expressions of research that promote deliberative self-awareness and diligence in research, design, and development by strongly advocating the inclusion of different voices, perspectives, and participatory approaches. We offered lessons learned from two archetypical projects dealing with stakeholder interactions and critically discussed our assumptions, power positions, social injustices, the role of technology, and technology-oriented practices in maintaining and improving them.

Part III: Lessons Learned and Discussion

This part will summarize and discuss the main lessons learned related to the research questions: Firstly, I will lay out the characteristics of a Feminist Living Lab. These are, in the main, an orientation to feminist epistemology and methodology, including an ambition for emancipation and social change, choice of methods that shed light on marginalized experiences, real-life-and long-term orientation, and addressing the sensitivity of the context as well as power hierarchies. Then, I will describe the opportunities of this engaged work, showing how the approach helped engage with gender practices over a longer period of time and how it fueled emancipatory actions. After this, I will discuss the main challenges, which include managing participation, cultivating safe spaces, the role of the researcher, and sustainability issues. Finally, I will lay out reflections on the PRAXLABS approach, limitations, and potential future work. The part closes with a conclusion.

12 Characteristics of a Feminist Living Lab

The first set of research questions of this thesis are: How can the Living Lab approach (in the PRAXLABS tradition) help to translate the broad commitments of feminist HCI into a pragmatic research infrastructure? What kind of methodological considerations must go on within the lab to meet these feminist ambitions? To answer these questions, I will dive into the unique characteristics of a feminist Living Lab that emerged in my context.

As HCI researchers, we are committed to conducting research that offers a *practical* contribution to a more equal society (S. Bardzell, 2014; Light, 2011). This view is in line with the ambitions of feminist HCI (S. Bardzell, 2010) as well as Socio-Informatics (Stevens et al., 2018), both clearly value-driven agendas that deal with socially relevant problems. Indeed, the problems that feminist research addresses are inherently societal, as “feminist scholars have created alternative approaches to research. The overarching goal of feminist research is to identify the ways in which multiple forms of oppression impact women’s lives and empower women to tell their stories by providing a respectful and egalitarian research environment” (Campbell & Wasco, 2000, p. 787). While theoretical discourses on feminist HCI offer general qualities or outlines for research (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011; Rode, 2011a), they remain quite vague regarding practical implications on how to provide such a “respectful and egalitarian research environment,” and how to investigate gendered practices in the field of HCI. As Muller (1997, p. 1062) states, it “takes work, and new ways of thinking, and new kinds and methods of openness, to bring substantively new voices into a conversation.” With an increasing focus in our field on the gendered (design) practices that go on within socio-technical environments, Living Labs seem to address this gap. Nevertheless, how to conduct Living Lab research in a ‘suitable’ and ‘human-centric’ manner (Ley et al., 2015) generally remains a matter for debate, and even more so from a feminist perspective. That said, Living Labs present a flexible approach that can be adapted to the conditions of the settings (Ley et al., 2015; Schuurman et al., 2015), and shaped towards more inclusive HCI research.

My insights reveal several characteristics of a feminist Living Lab (in the PRAXLABS tradition) that is informed by feminist HCI principles, some unique to this kind of research compared to other Living Lab work:

- An orientation to feminist epistemology and methodology, including an ambition for emancipation and social change

- The choice of (mainly qualitative) methods that focus on shedding light on marginalized experiences (working from and for ‘the margins’)
- Engagement with social practices in real-life environments
- A broad stakeholder base and knowledge exchange between these stakeholders in creative spaces
- A long-term orientation to the fieldwork
- Addressing the sensitivity of the context by building trustful relationships and offering safe spaces
- Paying attention to power hierarchies

These aspects are not distinct. Instead, they influence each other, and all provide ‘adjusting screws’ to set up and manage a Living Lab to become feminist. In the following, I will dive deeper into these characteristics.

A feminist Living Lab (in the PRAXLABS tradition) builds upon feminist epistemology and methodology, which deny ‘traditional’ approaches to knowledge production (for overviews, see S. Bardzell, 2010; Campbell & Wasco, 2000). It works from and for people that are marginalized in relation to dominant groups and engages with topics that are inherently feminist, in my context, gendered practices in IT organizations. From a feminist point of view, this shift from ‘lead users’ (Ley et al., 2015) to ‘marginal users’ (S. Bardzell, 2010) seems like a step forward. It requires a transformative, egalitarian and participative approach to the fieldwork. There is some flexibility towards this: Just as there exist many feminisms, a feminist Living Lab could be designed with radical feminist, social feminist, or postfeminist outcomes in mind (see Lindsey, 2015; Lorber, 2011 for different feminisms). In the field of HCI, standpoint theory seems to be the predominant feminist perspective (S. Bardzell, 2010), and it indeed offered a suitable theoretical, epistemological orientation to engage with gendered practices from women’s perspectives (see chapter 13 for more details).

Feminist Participatory Action Research (Maguire, 2001) then served as a means to translate an otherwise abstract feminist epistemology into an iterative and cyclic research approach. It helped to “unmask taken-for-granted social practices that reinforce hierarchies and exclusions while revealing new social change strategies that can directly contribute to the transformative aims of action research” (Frisby et al., 2009, p. 25). Action Research is usually tied to an ethnographic approach to engage with everyday gender practices in real-life environments. Ethnography has a tradition in the field of HCI, where it helps to explore the mechanisms that

shape and reproduce (often taken-for-granted) practices in social-technical systems (Dourish, 2006). The latter, in turn, is regarded as a major mechanism for gender performativity and gender practices, respectively (Tyler & Cohen, 2010). Smith's (1987) notion of 'institutional ethnography' was instructive as a feminist approach to field research. It treats the everyday world as problematic and pays especial attention to institutionalized social interactions in organizations.

This approach to the fieldwork then required methods that accordingly matched these ambitions. There are debates in the literature if the term 'feminist methods' (Reinharz & Davidman, 1992) is potentially misleading. Usually, familiar methods are utilized in line with feminist ideology (Agozino, 1995; Campbell & Wasco, 2000). That said, though quantitative methods are also applied, feminist research leans heavily towards qualitative methods that emphasize everyday, subjective experiences of women (Acker et al., 1983; S. Bardzell, 2010; Campbell & Wasco, 2000; R. Edwards & Mauthner, 2002). In my case, a combination of interviews and shadowing turned out to be suitable methods to unravel, at least initially, what gendered practices in organizations might look like (e.g. Czarniawska, 1997; McDonald & Simpson, 2014). While these methods are, of course, not new in HCI (also not in practice-based research), they are still arguably underused in terms of revealing the gendered nature of practices in socio-technical environments (S. Bardzell, 2010). In my context, both interview guidelines and observations were thus conducted with a gender focus. Using observations, more precisely the shadowing technique, supplemented the interview reports: They gave access to the aspects of organizational life which "are the hardest to research" (McDonald, 2005, p. 457) and allowed to investigate "dynamics of gender practices 'in the heat of the moment'" (Berger et al., 2015, p. 559). Early analysis of this data, especially the interviews, was understood to create 'narratives' (Czarniawska, 1997; Etherington, 2004) which explore individual sentiments of women shaped by their environment. To confirm and enrich our understanding of the context, as well as the data already collected (Campbell & Wasco, 2000), and to provide the participants with a sense of belonging and empowerment (Farquhar & Das, 1999) (see chapter 13.2), the narratives were usually used as hooks in focus groups discussions, and at symposia workshops.

Crucially, Living Lab work does not isolate the findings collected in different settings. Though resource-intensive, providing a 'broader picture' of a problem situation for all involved stakeholders and exchange between them (Almirall & Wareham, 2008; Schaffers et al., 2008)

brings added value compared to, e.g., independent PAR studies conducted within single organizations. In my context, this provided a variety of female (and male) experiences (see chapter 13), encouraged multi-perspective design, and also added to the emancipatory power of a feminist Living Lab. The stakeholder pool, which included a diverse mix of organizations from different sectors and regions, as well as students, and additional stakeholders such as symposia attendees, allowed to include various perspectives continuously over time.

To gain genuine insights required offering formats (interview settings, the focus groups, and the symposia), where several people with similar concerns and shared values meet. As one female participant put it, this offered a new degree of “*legitimation*” to address feminist topics in environments ruled by masculinity. However, simply opening up places for communication does not, on its own, create ‘safe spaces’ (e.g. DeVault & Ingraham, 1999; Flensner & Von der Lippe, 2019; The Roestone Collective, 2014). Instead, the establishment of rapport and trust (Campbell & Wasco, 2000) was a necessity in this sensitive context (Waycott et al., 2017), and showing empathy (P. Wright & McCarthy, 2008), dedication, and care (Tronto, 1993) then facilitated trust-building (see chapter 14). In this context, the long-term component was crucial for successful cooperation in our feminist Living Lab. As I will discuss later, staying in the field for a longer period of time allowed building trustful relationships with participants to understand gendered practices in a way that arguably would not have occurred with a short-term approach. Building trust and establishing safe spaces also meant acknowledging power hierarchies, not only between researchers and participants (e.g., Oakley, 1981, 2016) but also between stakeholders, including hierarchies within organizations. In a Living Lab environment, these power dynamics can be complex: They involve diverse stakeholders with different expectations, legal status, social status, age, and gender etc. (e.g. Ley et al., 2015; Müller et al., 2015b). When aiming to provide ‘legitimation,’ researchers also need to acknowledge that participants might face stigmatization (Dickson-Swift et al., 2008; Farquhar & Das, 1999; Waycott et al., 2017). In my context, participants could potentially be harassed regarding their career progress (K. Smith et al., 2020).

This chapter outlined the general characteristics of a Living Lab driven by a feminist ideology. In the following, I will dive deeper into the opportunities and challenges of conducting such engaged work.

13 Opportunities of Feminist Living Lab Research

Another research question of this thesis is: What kind of opportunities and unique insights can a long-term collaboration of this kind provide from a feminist perspective? Living Lab endeavors are, undoubtedly, resource-intensive. However, I found that this kind of engaged work provides substantial opportunities for feminist HCI research. It helped to engage with contexts, participants, and practices (chapter 13.1) and work towards changing them (chapter 13.2). The long-term approach of Living Labs was especially helpful in this context.

13.1 Engaging with Contexts and Practices Over Time

A Living Lab that is set up with a feminist ethic from the outset (see previous chapter) is potentially well suited to shed light on the gendered nature of practices in IT organizations (and potentially elsewhere) in different settings. The Living Lab infrastructure allowed ‘broad’ insights to emerge and provided participants with a space to experience common standpoints.

A main motivation for the organizations to join the Living Lab endeavor was to shed light on “*organizational blindness*,” as they faced insecurities about gender issues in their organizations and aimed for ‘doing better’ through their contribution. Indeed, participants praised our activities for ‘addressing things.’ Researchers, also feminist ones, have suggested that the best way to approach a sensitive topic is a long-term strategy (Dickson-Swift et al., 2008). Brannen (1988, p. 553) suggests “allowing the research topic to emerge gradually on its own terms is a theoretical as well as a methodological strategy” when researching sensitive settings. The evolving nature of our activities facilitated a gradual recognition of a shared orientation and trust (see also 14.2) that engendered over time. In this regard, ethnographic research profits from a long-term approach as researchers (and other stakeholders) become continuously thoroughly acquainted with the field’s context, culture, language, and basic structure and can also reverse assumptions (Fetterman, 2010).

Both a mix of methods (Taber, 2010) and the long-term approach were thus vital to reveal insights that would otherwise have been hidden. While our ambition was to use a broader mix of methods that serve long-term objectives, help build trust over time, and reveal insights from a variety of perspectives, we soon realized that their choice had to reflect conditions in the individual settings (Greaves et al., 1995; Ståhlbröst & Holst, 2017). Hence, plurality and flexibility towards methods were critical to understanding women’s experiences (Campbell &

Wasco, 2000): (Participatory) observations, and shadowing respectively, worked well in some contexts (the video game company and the FabLab), whereas in other organizations, it was less rewarding, as we did not find the same openness everywhere we went. Our desired approach of mixing interview data with observations was thus not possible to achieve everywhere. For instance, in one organization, people stopped talking when researchers approached, decreasing the opportunity to collect valuable data. In this case, we then more heavily focused on interviews. Observations were especially rewarding when applied in settings where the overall commitment to the projects' shared values (see chapter 14.1) was the highest. Some insights of seemingly trivial (gendered) practices only became visible via observations and would arguably have been 'hidden' with sole reliance on interviews and a short-term approach. For instance, in organization A, I found evidence that women volunteer to do unrecognized social and emotional tasks (see chapter 7) only after I spent some time observing the field. Furthermore, we recorded very few instances of what might be termed 'harassment' or sources of inequalities early on, but researchers and participants became more reflective about such matters over time. Adding more diverse perspectives (see chapter 14.1) during the processes further fueled mutual learning experiences.

Over time, we thus received an increasingly holistic picture of the problem situation across different settings and from multiple perspectives. To state an example, we found that the intersection of various aspects influenced women's working experiences across all phases of their 'lifetime' as an employee. Though these aspects can take different shapes depending on the context (such as the organizational culture, the sector, the region, the organizational size), they were a matter across all organizations. Furthermore, the long-term approach also helped to reveal that many women seem to face complex dilemmas because of double standards in everyday business life resulting from tacit signals and gender role conflicts. Voicing their opinion, showing agency, fostering their ambitions, and speaking up to matters of discrimination can evoke a certain fear of being stigmatized as "*pushy*" or "*bitchy*" which, in turn, engenders tension and stress.

The topics for the creative space, in the form of symposia, also derived from concerns directly identified via fieldwork within the organizations. Symposia helped to reflect on practices, the situatedness of knowledge, and chances as well as limitations in an inter- and transdisciplinary manner. The diverse attendees gave the organizations access to knowledge that otherwise was out of reach and vice versa. They provided an even broader understanding of how different

cultural contexts, which involve people with a multiplicity of identities, impact gender practices (Maguire, 1996).

13.2 Emancipatory Actions and Driver for Social Change

Action Research and feminist research form a natural alliance, as both are concerned with social justice, equality, liberations, and empowerment (Creswell et al., 2007). For this reason, FPAR (Frisby et al., 2009; Maguire, 1987) was instructive for guiding a fieldwork strategy that was more human-centered instead of androcentric (Hall, 1981). We adopted a collaborative, non-hierarchical mindset from the very beginning, which stressed the participatory stance of the research endeavor. Wanting to meet people's concerns without prejudging the research problem (Brannen, 1988) led us to encourage organizations to define their gender-related research questions based on real-life company problems at the start of the project. Throughout the process, we further balanced our participants' desires, suggestions, and ambitions by changing our approach over time.

As indicated, the lab's activities offered a degree of legitimation to address feminist topics in the first place in organizations ruled by hegemonic masculinity. Hence, the lab's activities offered engaged stakeholders on the micro-level (within the organizations) and the macro-level (the broader scheme of the Lab) a sense of belonging and empowerment. Especially the group activities (focus groups, symposia) offered dedicated formats for egalitarian intergroup communication.

Organizational representatives also gained benefits from the lab's multiple resources. The knowledge we introduced and the symposia as grounds for exchange as well as co-design workshops were considered to be useful. SME, which are not uncommonly facing challenges to foster change and innovation due to a lack of resources, including human resources (Van de Vrande et al., 2009), received access to the Living Lab's value networks (Corallo et al., 2013; Santoro & Conte, 2009; Ståhlbröst, 2013). However, as I will show below, how much the stakeholders benefited from their membership depended on their engagement and commitment. For this reason, some of them did not fully profit from the lab's potential. Dissemination at the symposia was also important as otherwise, the knowledge gained through such endeavors risks remaining at a local level (Frisby et al., 2009).

Crucially, the impacts of Action Research endeavors are not always measurable, but all imply, at very least, a transformative agenda expressed in an iterative methodology (Hammersley, 2004, 2007; Reason & Bradbury, 2008): “The overarching goal of feminist research is to capture women’s lived experiences in a respectful manner that legitimates women’s voices as sources of knowledge. In other words, the process of research is of as much importance as the outcome” (Campbell & Wasco, 2000, p. 783). Feminist standpoint theory then, with its claim to create an alternative objectivity, provided an epistemology that can be a resource for change. In this sense, research as ‘praxis’ is a critical and empowering element for marginalized participants and aims at changing oppressive structures (Freire, 1970; Lather, 1988). Hence, the contribution of a feminist Living Lab does not (solely) lie in the design of an artifact, an organizational measure, or whatever kind of design. Instead, the lab’s value lies in the approach itself, as it offers the opportunity to engage participants, allowing them to exchange experiences freely and build a community (D’Ignazio et al., 2016). The Living Lab’s infrastructure provided formats for reflection and consciousness-raising (Higgins & Klein, 2011; Schaffers et al., 2008), in a sense “to create a space that is flexible enough to keep the discussion open as to who we might turn out to be” (Light, 2011, p. 437). It gave participants a sense of belonging to empower them to understand the reasons for the oppressive structures they are confronted with and approach them (Frisby et al., 2009). This lengthy and admittedly resource-intensive process can thus support the creation of a women-friendly culture in IT organizations and more inclusive technology design as it emancipates marginalized to develop confidence and skills relevant to the gendered practices of design teams (see chapter 7). On a side note, this view seems in line with a practice-based perspective, which understands “design activities as interventions in organizational development rather than as the functional shaping of useful artifacts” (Stevens et al., 2018, p. 30, see also chapter 15). My insights also suggest that the lab’s activities had the potential to raise consciousness and encourage critical reflection among less engaged or critical stakeholders, e.g., some of the male staff (Maguire, 2001). All stakeholders, including us, are aware that the activities conducted within three years can only represent modest beginnings. Nonetheless, they have to be regarded as a process for envisioning a different future (S. Bardzell, 2014), and lead to a sustainable impact in organizations that showed at least a certain degree of commitment (see chapter 14.3).

Apart from that, a feminist Living Lab can also generate practical implications for improving the situations of women in society (Harding & Norberg, 2005). The design implications that

arose from the co-design activities also offered concrete guidelines to address gendered practices of IT organizations: Chapter 6 offers implications to design maker environments for more gender-inclusiveness. Chapter 8 gives recommendations for the design of gender-sensitive external communication measures. Furthermore, we co-designed implications for gender-sensitive onboarding measures (fourth symposium), as well as in terms of talent development, retention aspects, and gender aspects relating to hygiene factors (fifth symposium) at the symposia workshops (see chapter 9 for descriptions of the activities), though these insights are not included in this thesis.

14 Challenges of Feminist Living Lab Research

Having explored the opportunities of a feminist Living Lab, I now dive into the challenges of maintaining its activities throughout the course of a project. This answers the following research question: What challenges do arise regarding the management of the Lab activities throughout the course of a project?

14.1 Managing Participation and Commitment

This thesis revealed a multitude of challenges regarding participation and commitment in a feminist Living Lab. Triggering initial interest was already a laborious task at the start of the project. Most of the approximately 100 organizations that we ‘cold called’ showed general interest in the project. Though recognizing the topic’s relevance, they yet lacked necessary commitment to become a member of the lab. This is already a striking indication of both the relevance and challenge of this kind of work. However, contacting HR representatives as ‘gatekeepers’ was helpful, as our inquiry fell on sympathetic ears. Regarding the latter, making our ambitions clear as researchers already at least created bonds with contacts persons in this early project phase (see Jansen & Rae Davis, 1998 for similar experiences).

Acquisition of initial participants within the organizations and later broadening the pool of participation was another challenge. Our contact points were mainly in charge of acquiring participants within the organizations. In the beginning, as we had little influence on this ‘micro-level’ of participation. As we were confronted with varying degrees of motivation from participants, receiving genuine insights was thus a challenge. Furthermore, the openness of participants regarding Participatory Action Research projects can range from enthusiasm to criticism and is often potentially influenced by their previous experience (Reid et al., 2006). Unsurprisingly, more intrinsically motivated participants were mainly female, but some male participants acknowledged certain privileges working in ‘masculinist’ environments. All of them wanted to add their part to equality and fairness by shedding light on the gendered inequalities within the industry, as they, at times, reported that they felt uncomfortable with the dominant culture. Compared to that, other participants, though mostly forthcoming, seemed ‘obliged’ to interact with us. While not all participants showed an affinity for feminist topics, each perspective generally provided valuable insights to understand the broader picture.

However, a variation in motivation, willingness, and ability to reflect on gender issues influenced our success to reveal hegemonic masculinity patterns.

In this regard, the approach within the video game company can be considered best practice, both from a feminist and practical perspective: Collaborating first exclusively with women via interviews and discussing their narratives (supplemented by insights from observations) in focus groups realized working ‘from the margins.’ Throughout the process, the participation pool was broadened by men with sympathetic views. The insights were also disseminated to an even broader audience via open presentations (see chapter 14.2). Overall, this approach of working from the margins significantly helped the project to gain momentum. It was furthermore beneficial to ask engaged participants about potential newcomers with (a desired) ‘fitting’ mindset via snowball sampling (Jansen & Rae Davis, 1998). This approach was also helpful in establishing safe spaces for reflection (see chapter 14.2).

However, making a collaboration this successful requires an inevitable commitment from the partner’s side. Maintaining motivation and participation throughout the project was thus an additional challenge (Logghe et al., 2014; Ogonowski et al., 2013). Some organizations’ degree of engagement and promised commitment was much higher at the beginning of the project and then decreased. The lack of commitment of some organizations was not only present during ongoing fieldwork but also in the degree of participation at the symposia, which were intended to be a basis for networking: Three of the six organizations did not attend a single symposium, despite being reminded about the events. Admittedly, this can result from a trade-off between our ambition to broaden participation of attendees by diversifying the locations for exchange across Germany and the companies’ lack of resources, such as time and travel expenses (see also chapter 14.3 for the discussion of alternatives). Of course, practical research with profit-oriented companies compromises research and business objectives, as research projects are not always the highest priority for project partners (Dachtera et al., 2014). While this is, to a degree, understandable, there were clear indications that engagement correlated with a commitment to the lab’s values. As Higgins & Klein (2011, p. 33) suggest, “the Living Lab itself can give a symbolic meaning to the process of facilitating broader collective action” and can, therefore, “signal commitment, momentum of change, and the opportunity to act and take charge of developments that are critical for the development of the participating parties.” My findings show that this potential in a feminist Living Lab can only be realized if commitment is authentic. The sharing of these values seemed to be in particular contention in more

conservative organizations, which were ruled by a high degree of masculinity and androcentric structures. This left an impression of ‘purple washing’ (the propagation of a gender-friendly image by the mere call for gender equality), bringing some dilemmas and trade-offs for feminist Living Lab organizers: Of course, the authenticity of commitment is nearly impossible to anticipate beforehand, and I experienced some frustration with this variable engagement. Nevertheless, and given the commitment to inclusivity, it was not for me alone to make judgements about who or what a ‘worthwhile’ participation was. That said, even the participation from committed individuals was bound to restrictions of organizational life, such as balancing time constraints. In this context, organizations have a certain responsibility to encourage their employees’ participation and make it possible in the first place. This required trustful relationships (see also chapter 14.2) with contact persons within the organizations, as we had to rely on them to match our concerns and vice versa. On a side note, (informal) conversations with contact persons, who usually had a ‘naturally’ high commitment to the project’s goals and showed a great deal of reflection, were often especially insightful.

Balancing expectations and obligations of different stakeholders was challenging (Waycott et al., 2017) but crucial for evoking sympathies for our endeavor within organizations: On the one hand, we were eager not unduly to disrupt the industry partners’ daily business routines, but we also aimed for successful project management on the other (Letherby, 2003). The activities’ nature and frequency had to be negotiated based upon the research topic, the organization’s openness, requirements, and resources so that each side could benefit from the partnership (Ramírez Galleguillos & Coşkun, 2020). For instance, the approach with the FabLab differed from those at other organizations, as we agreed that a dedicated workshop week and their participation at two symposia was a suitable solution regarding their research interests and resources. Similar to a call for methodological flexibility (see chapter 13.1), managing participation also involved flexibility from our side when reacting to unforeseen and often pragmatic circumstances in organizational life. At organization B, which was very engaged initially, patent issues restricted the designated path at some point. As these issues were not to be resolved in short order, the research topic was switched to match the one agreed upon with organizations C and D. Being the smallest organization of the three, we felt that their perspective might add interesting insights to the debate. In another organization, our contact person, who initiated the research collaboration, quit her job at an early stage of the project. No one felt in charge for a while, and the collaboration continued only towards the project’s end.

Overall, I am confident that each stakeholder of the lab benefited from the participation in one way or the other (see chapter 13.2), although the potential benefit of being a member heavily depended on individual commitment.

As suggested, the lack of commitment from some stakeholders was problematic, as it clashed with the ambitions of other, more engaged ones. Eventually, to keep the momentum of the project and reward more engaged stakeholders, we decided to shift our resources to more committed partners. This involved some ethical considerations, but, as others have argued, such a “strategy for prioritization” (Borning & Muller, 2012, p. 1131) is justifiable as “a commitment to participation is also part of the approach” (Weibert et al., 2017, p. 721). Similar ethical and pragmatic considerations of whom to include or exclude regarding certain activities are also important concerning safe spaces. The constellation of gatherings can impact participants’ willingness to open up, especially in sensitive settings (Dickson-Swift et al., 2008). This and other aspects will be discussed in the following.

14.2 Addressing Power Hierarchies and Cultivating Safe Spaces

A feminist stance not only includes constant reflection regarding the participatory and egalitarian nature of the participation process (including decision making). It also pays attention to factors that could decrease the likelihood of individual engagement and openness. All of this requires addressing power hierarchies (Frisby et al., 2009) and cultivating safe spaces where rapport can be built, and people feel safe expressing their sentiments regarding sensitive topics (e.g. Jansen & Rae Davis, 1998).

Safe spaces, which have their foundation in the women’s and LGBTQ+ movements, provide symbolic and spatial protection from a certain type of harm for primarily vulnerable populations, allowing them to act freely and speak up (Bustamante Duarte et al., 2018, 2021; Flensner & Von der Lippe, 2019; The Roestone Collective, 2014). Signing an NDA, while a first step to build trust, does not do much for setting up a safe space. Instead, it included paying attention to power dynamics between a variety of interaction partners in different settings and deliberate efforts to mitigate them (Dickson-Swift et al., 2008).

Firstly, concerning the interactions between the researchers and the participants, feminist scholars argue (e.g., Oakley, 1981, 2016) that researchers should adopt a non-hierarchical attitude to research. This includes making their experiences salient to the process and embracing

emotionality, which is considered especially helpful when discussing sensitive topics (Dickson-Swift et al., 2008). In this context, Jansen & Rae Davids (1998) state:

Thus, the meaning of this research for researchers goes beyond considerations of a preferred method for building trust and giving voice. Trust is built not just for the purpose of collecting meaningful data but for a human purpose found in relationships. By gaining a greater understanding of each other, researchers and participants enrich each other's lives. Therefore, the results (the participants' stories in print) can only be a pale representation of what the particular research encounter meant to both the researcher and the participants. (Jansen & Rae Davis, 1998, p. 308)

For instance, regarding my exchange with participations, nurturing relationships involved chatting about personal aspects (such as leisure time activities, heritage etc.). Furthermore, building rapport does not only require empathy and honest interest from the researcher (P. Wright & McCarthy, 2008) but also accepting boundaries if participants prefer not to open up regarding certain topics (Dickson-Swift et al., 2008). In addition, research should not be exploitative, e.g., when working with research data and disseminating research results (e.g. Agozino, 1995; Webb, 1993), and participants should, in turn, not feel put-upon. Admittedly, the degree of bonding was more or less successful, depending on contextual factors. I found that it involved, among other things, the openness of the organizational cultures (e.g., conservatism vs. 'geekiness'), age ranges between the researcher and participants (Manohar et al., 2017; Webb, 1993), and the overall commitment of the organizations (see chapter 14.1). Regarding the latter, bonding was, unsurprisingly, facilitated in organizations that encouraged long-term collaborations rather than one-off experiences.

Secondly, we had to be aware of power dynamics between stakeholders within the research settings, especially internal corporate hierarchies. There might be reluctance by participants to express viewpoints and sentiments if they feel threatened by them. In this context, spatial considerations are not trivial: The office space as a ground for interactions makes participation visible onsite, and the salience of the research process might impact the participants' openness. For instance, one project partner could not even offer a dedicated room (probably because of lack of space) for the interviews about sensitive topics. Conversations were held, e.g., in the break room where people occasionally came in and sometimes even played table soccer. Surely, a less than ideal situation, but our influence to change that was limited.

Furthermore, the ambition to provide a Living Lab space where the interests of all stakeholders (also less involved ones, such as critical, male employees) can be represented (Schaffers et al., 2008) might clash with intentions to establish safe spaces. Especially in sensitive settings, “researchers will inevitably face dilemmas that emerge during the research process, where there may not be a clear right or wrong response” (Waycott et al., 2017, p. 246), including balancing matters of inclusion and exclusion and potential foregrounding or reinforcing of differences. As stated, our effort did not limit participation to women. Instead, we intended to get broader perspectives and also allowed male ‘allies’ to play a role as ambassadors. Addressing these ambitions while paying attention to the feminist contingencies that shape our lab was a significant challenge. On the one hand, as stated above, a degree of homogeneity enabled consciousness-raising and building momentum. The insightfulness of the results increased with a discussion culture fueled by genuine interest and a shared ideology. However, at times, it clashed with ambitions to respect diverse opinions and by the simple fact that the researchers only had a partial influence on the acquisitions of attendees as well as the constitution of group gatherings. The latter shows that what constitutes a safe space obviously meant different things to different organizations. It entails determining what sort of harm the safe place is protecting against and for whom (Flensner & Von der Lippe, 2019; C. Fox, 2007; The Roestone Collective, 2014). Different value systems, interests, and stakeholder viewpoints might thus possibly operate against safe spaces (Flensner & Von der Lippe, 2019). It shows that “cultivating safe space is simultaneously reactive and productive work, reconfiguring existing and context-dependent social norms” and “we recognize that safe spaces are contextually embedded” (The Roestone Collective, 2014, pp. 1360–1361). That said, ultimately, a feminist standpoint epistemology commits to presenting less privileged perspectives (Harding, 1986). Thus, a strategy to prioritize engaged stakeholders (see above), taking a position (Borning & Muller, 2012; Weibert et al., 2017), and, if necessary, actively embracing the ‘underdog perspective’ (Becker, 1967), is a justifiable approach in value-driven endeavors. Cain (1986) also believes that certain flexibility regarding such issues does not contradict a feminist ideology. This, of course, does not relieve the researcher from constant reflection and critically questioning their approach (see also the following section).

From a practical perspective, making a project visible in organizations through open communication formats, in this case, presentations to a broader audience, was a valid strategy to support the building of safe spaces. As the need for a safe space was strongly lamented by

some participants because of a lack of legitimation to raise feminist interests in overly masculine environments, we pursued a strategy of transparency. The presentations we held were intended to give voice to our participants' concerns, reduce the potential skepticism of less involved employees, and legitimize employees to become a member in the first place. As was argued in one organization, "*diversity is not a desired mentality*" by some men within that company because of a fear of losing privileges. Working towards change can, in this sense, be intimidating to some employees and requires careful, transparent communication to not endanger study participants (e.g. Yoshihama & Carr, 2002). This is not helped by the fact that management or HR are usually the initiators of organization development processes (e.g. McArdle & Reason, 2008). While I am an Action Researcher and not a consultant (Baskerville & Wood-Harper, 1996) (though I do understand myself as an 'external change agent'), employees of a company may confuse my role, which can create some mixed messages, especially amongst male personnel. Self-disclosure from my side and communicating my role and ambitions was hence also part of the process. Apart from an ethical consideration to include not-so-engaged stakeholders and offer legitimation, such open communication formats increased interest to join the project and, though depending on the audience's openness, could trigger fruitful discussions.

Furthermore, I found that the long-term approach to the fieldwork not only helped to build trustful relationships but also to anticipate potential pitfalls in creating safe spaces and counteract those pitfalls throughout the research process. Additionally, considerations about safe spaces, among other factors, included sustainability issues of research projects. Apart from issues of managing power hierarchies and safe spaces, there are also more challenges to the role of the researcher in feminist Living Lab work. These aspects are described in the following.

14.3 Role of the Researcher and Sustainability Issues

The previous elaborations already showed that with a feminist Living Lab being value-driven and situated in a sensitive context, it bears some ethical and moral issues that researchers have to navigate as organizers of the lab. Unavoidably, the views of the researchers shape the Lab's structures, at least in part. This is important to bear in mind, as Practice-Based Design research is an intervention with the ambition to create change (Wulf et al., 2011) that entails a simultaneous commitment to scientific and moral objectivity (S. Bardzell & Bardzell, 2011).

As argued above, it is justifiable that researchers lean towards more committed participants and ‘take sides’ (Becker, 1967) if necessary. Furthermore, as both feminist (e.g. Haraway, 1988; Harding, 1986) as well as (feminist) HCI (Alsheikh et al., 2011; Borning & Muller, 2012) scholars propose, while our vision of the world is based on an embodied perspective which makes us personally responsible for it, the researchers’ standpoints, backgrounds, and experiences can have a beneficial impact on the research process. The personal, emotional involvement of the researcher, as argued above, is arguably significant when researching sensitive subjects “because of the often intimate nature of the research topics and the resulting subjectivity of the research process” (Dickson-Swift et al., 2008, p. 5).

However, this does not release researchers from adopting a reflexive mindset to avoid bias and ensure that the research outcome does not privilege their social values (S. Bardzell, 2010). As chapter 11 showed, being aware that the contextually of values shapes the research process and that the emergence of values in design research happens overtime was vital. Navigating value conflicts with a variety of stakeholders in Living Lab research is challenging, and it has to involve a constant questioning of the researchers themselves. For this reason, we analyzed the values of all the involved stakeholders, including ours, at the inception of our lab and throughout its maintenance. Again, I stress that the long-term perspective of Living Lab work was beneficial in achieving this.

Regarding my positionality, I extensively described in chapter 3.2 how I aimed to be reflexive when conducting gender opposite and feminist research as a male researcher. I saw no reluctance of (female) participants to express their viewpoints, as they have been forthcoming and reflective about their various concerns, especially after establishing trustful relationships over time. As said above, arriving at this point requires a degree of empathy and honest commitment.

Apart from challenges contained in, and arguably unique to, feminist Living Lab work, there are some general ones for Living Lab organizers regarding what Ogonowski et al. (2018) labeled the ‘management space.’ For instance, they serve as mediators who bridge stakeholder groups, ensure that NDAs are signed, etc. In line with others (Ley et al., 2015; Ogonowski et al., 2013), I found that these tasks can be resource-intensive, laborious, and even frustrating (also for engaged contact persons and other stakeholders). Furthermore, they can significantly slow down the collaboration process. This has to be kept in mind when setting up terminally funded projects. Regarding the latter, the sustainability of Living Lab activities is not uncommonly

a matter of concern (Meurer et al., 2018), as their main advantage lies in long-term commitment (Eriksson & Kulkki, 2005). Not unusual in Practice-Based Design research, terminally funded research projects regularly cut short long-term studies, leading to the ‘Partial Design Case Studies’ (Stevens et al., 2018) presented in this thesis. Furthermore, such issues raised doubts of whether a feminist Living Labs can realize its ambitions in the long run, especially when dealing with ‘stubborn’ gendered practices and tackling historically established structures (Acker, 2006). This involves another set of ethical questions, as researchers have a responsibility to consider long-term effects beyond the end of projects and clear communication throughout (Nunamaker Jr. et al., 2015; Stevens et al., 2018; N. Taylor et al., 2013). Otherwise, participants might feel abandoned when the project ends abruptly (Webb, 1993), which adds another perspective to matters of exploitation mentioned above. As stated, opening up ‘safe spaces’ and offering ‘legitimation’ aims at mitigating the potential stigmatization of participants (DeVault & Ingraham, 1999). However, losing the ‘banner’ of a research project might counteract the achieved successes, especially in office settings shaped by certain masculinity ‘regimes’ (C. Fox, 2007). As described above, it was tried to mitigate such problems with a strategy of transparency throughout the project.

Furthermore, the lab’s learning processes are a required but insufficient condition for keeping the service and its connected activities alive once the project is completed. As described, this first and foremost depends on the willingness of individual organizations to commit to the Living Labs’ goals and values. For this reason, the building of a network of excellence that is self-sustaining beyond the project period was only partially a success. Nonetheless, a retrospective comparison with insights from another Living Lab (chapter 11) helped to find some pragmatic explanations for this phenomenon: As mentioned before, some stakeholders raised concerns about symposia as a ground for networking activities in farther afield cities because of resource issues, such as time pressure and travel expenses. Drawing on the positive experiences of the formats for exchange deployed in the Older-Adults Lab, the feminist Living Lab could have designed the creative space differently: Offering additional physical formats nearby or digital formats to reduce travel and time expenses might have lowered the barriers for participation and fostered regional networking (also in the sense of a sustained, regional PRAXLABS network, see next chapter).

At least, I continued to work with the more committed video game company beyond the project period, when a COVID-19-related study was initiated during the summer of 2020. Having the

opportunity to ask some of our returning participants during this interview study, they acknowledged that our efforts had indeed had a sustainable impact. These impacts were, e.g., visible in raising gender awareness internally and externally. In line with what was said in chapter 13.2, they also stated that the collaboration was of particular value to those directly involved. Furthermore, having submitted letters of intent (LOIs) for project proposals in the meantime, the company has signaled its willingness to participate in gender-related projects in the future.

A more systematic approach to knowledge and resource exchange, especially if a research department understands Living Lab work as a strategic position (rather than as a one-off activity), can help to make Living Lab endeavors more sustainable. While we also asked gender-related questions throughout the interviews in the COVID-19 related study, its main topic was not exclusively to do with gender. Even so, the sensibilities developed during the first project constituted a resource for other purposes (see also next chapter for discussions about the sustainability of the PRAXLABS approach). PRAXLABS, as an approach to Living Lab work, is concerned with such and similar sustainability issues, especially in cultivating research experiences (Ogonowski et al., 2018). In the following section, I will discuss my insights in the light of the PRAXLABS approach.

15 Reflections on PRAXLABS, Limitations, and Future Work

The final research question of this thesis is: What are the lessons learned for the PRAXLABS approach?

My work contributes in several ways to the PRAXLABS approach. I am confident that my insights raise general awareness for potential gender issues in practice-based research and further offer concrete implications for setting up and maintaining a Living Lab with an explicit feminist agenda. In addition, building on comparisons with other PRAXLABS projects (see chapters 4 and 11), my insights allow deriving some general implications for engaged PRAXLABS work with marginalized populations in sensitive, value-driven contexts. Furthermore, I gained experience regarding the practicality of the PRAXLABS framework as a conceptual and analytical hook. In the context of this chapter, I will also discuss the limitations of my work and lay out the potential for future research.

Among many other things, feminist research raises awareness for gender bias in academic work (Campbell & Wasco, 2000; Reinharz & Davidman, 1992; Webb, 1993), while feminist HCI does the same for design research in particular (S. Bardzell, 2010; S. Bardzell & Bardzell, 2011; Rode, 2011a). Paying attention to gender issues in practice-based research can thus lead to more inclusive HCI research and more justice-based HCI design. My experiences can sensitize HCI and practice-based researchers to become more reflective on how to conduct their research activities; including awareness of how their assumptions and design decisions, such as the questions they ask and the participants they choose, can reinforce problematic gender issues and other critical aspects of marginalization (Maguire, 1996). Embracing feminist principles does not necessarily mean that a project needs to follow an articulated feminist ambition: As Campbell & Vasco (2000) argue, “more ‘traditional topics’ can also be researched from a feminist perspective” (2000, p. 778) as “feminist methodologists challenge all social scientists to explore the process of research in more depth, to locate all facets of researchers’ identities – values, beliefs, and emotions – within the research context” (2000, p. 788). In the same vein, Agozino (1995, p. 287) advocates that “feminist research has very useful insights which should be adopted by all researchers whether or not they are feminists especially because such insights often derive from more conventional approaches with which feminist writers do not fully agree.”

My thesis furthermore shows a fruitful alliance between PRAXLABS as a Living Lab approach and feminist HCI. As argued in chapter 2.5, feminist HCI and practice-based notions are both critical of more rationalistic approaches. They seem compatible, as the practice-based approach in the Socio-Informatics tradition has the ambition to address societally relevant problems (Stevens et al., 2018) and has been described as “an intellectual and emotional challenge. It is highly collaborative and requires a high, and sustained, degree of engagement” (Wulf et al., 2018a, p. VI). Randall and colleagues furthermore state:

A practice-based approach, we suggest, should also provide actors (researchers, practitioners, designers) with opportunities for self-reflection and learning. This means – a point that is often overlooked – that the work practices of IT design are just as investigable as the social practices of those actors for and with whom the IT artifacts are designed. Design outcomes are not, in fact, the result of some logical and highly structured process that leads inexorably to a ‘best’ solution. They are influenced by the institutional setting, the engagement of the different practitioners involved, and, not least, the funding sources for the research. The outcome results from negotiations of various asymmetries of power and knowledge, and of different sets of values. It is not enough, however, simply to assert that this is the case. We arguably need a much more systematic approach to identify exactly how such matters ramify in design practice. That way, we will be able to question and develop our research and/though design practices. (Randall et al., 2018, p. 11)

Though feminist research is not explicitly mentioned in this statement, a reader familiar with feminist literature might find cross-cutting topics. A feminist Living Lab provides what Randall et al. call a ‘systematic approach’ to offer spaces for self-reflection and learning and engaging with practices and values from a feminist perspective. As stated before, it translates an abstract feminist HCI epistemology into a pragmatic socio-technical research infrastructure that offers the potential for detailed investigations of partial, contextualized knowledges. My experiences then lay the path for more Living Lab work with concrete feminist ambitions in the future. In this context, a limitation of my study is its understanding of design: Historically, Practice-Based Design notions have been concerned with the co-design of technological artifacts. However, while my work could easily be considered “outside of the field of design” (D’Ignazio et al., 2016, p. 2614), it makes a contribution to the gendered practices of technology development and usage. Furthermore, I see no reason why my experiences should not apply to Living Lab research concerned with co-designing feminist technologies in the ‘pure’ technological sense

of Grounded Design. My experiences with both an engagement with feminist theory (S. Bardzell & Churchill, 2011) and my broader (but still practice-based) understanding of design can also trigger advancement and refinement of theoretical considerations on Grounded Design. Future work could investigate this in more detail.

Another limitation of my feminist work is its lack of pluralistic experiences for pragmatic reasons and the simple fact that it lacked accounts of different intersectional interests. ‘Woman’ is not a unitary category (e.g. Hill Collins, 1990; hooks, 1981), and while the broad stakeholder pool of the feminist Living Lab already recognized a certain degree of heterogeneity, future research should examine Living Labs with more nuanced views of feminist HCI, such as queer HCI (DeVito et al., 2021; Light, 2011; Spiel et al., 2019) or intersectional HCI (Schlesinger et al., 2017). With Living Labs’ flexibility, such notions could probably be seamlessly integrated, even in ongoing Living Lab activities. Furthermore, while the Living Lab’s broad stakeholder base allows for painting a comparatively broad picture, it is still highly contextualized within the German IT field. This ‘Western’ setting is a limitation as cultural and social norms impact the factor gender (Manohar et al., 2017) and, as black feminists (e.g. Hill Collins, 1990; hooks, 1981) demonstrated during the 1980s, ‘Western feminism’ tends to universalize women’s experiences. Nevertheless, there are reasons to think the settings described in this thesis are perspicuous: They present environments of male dominance and plausible insights into gendered practices in representative IT environments.

Furthermore, despite these limitations, my insights also allow deriving some general implications for Living Lab work with marginalized and potentially vulnerable populations. A feminist standpoint epistemology, the predominant feminist perspective in HCI (S. Bardzell, 2010), provided the intellectual apparatus to engage with gendered practices from women’s perspectives. Standpointism argues for the conduct of research from the margins and to appreciate otherwise overlooked perspectives, as they arguably help to receive more objective insights (e.g. Harding, 1992b; Hill Collins, 1990; D. E. Smith, 1992). Feminism is yet only one possible use case in this context, and the values that Bardzell (2010) raises “are not exclusively feminist and not exhaustively so” (Light, 2011, p. 437). Feminism is, first and foremost, about ending oppression and social justice of any kind (Agozino, 1995; Maguire, 1996). Standpoint epistemology could be used for different types of marginalized experience, such as investigating matters of disability (e.g. Sprague & Hayes, 2000; Wilson, 2000). Thus, my thesis

shows that standpoint theory can enrich perspectives on Practice-Based Design when working with marginalized or less privileged populations.

The cross-comparison studies with other Living Labs from the fields of migrants/refugees (chapter 4) and older adults (chapter 11) then shed light on contextual factors of conducting PRAXLABS work in different, sensitive settings. They augment discussions about more progressive PRAXLABS work (e.g. Meurer, 2020; Müller et al., 2015b; Unbehaun, 2020) and shed light on the general challenges within such settings that are not that different from each other, such as the need for an empathic approach to the field, managing participation, addressing power hierarchies and cultivating safe spaces. These lessons learned are in line with the comparative work of different projects by Ogonowski and colleagues (2018), who described the

various ways in which insights from home-based research can be transferred to other contextual settings. Our major insight is that it is a mistake to assume that generalizations are best made within ‘domains,’ it is not always clear how a domain is constituted. Thus, we might have imagined at the outset that our point of comparison would be ‘domestic settings.’ In fact, where useful comparisons are to be made, it is across similar ‘use cases.’ (Ogonowski et al., 2018, p. 353)

The value of such comparative work then lies in understanding different contingencies of project contexts and how the projects can learn from each other in the sense of experience exchange. In this case, they also provided comparisons of the unique challenges between settings that mainly dealt with the corporate world and those with private persons and households involved.

While general project sustainability has been an issue (see chapter 14.3), carefully documented cross-comparison research cultivated my research experiences. These cross-comparisons of different case studies, in principle, allow sustained (gender) expertise within a research department beyond the knowledge of individual researchers (Ogonowski et al., 2018). While knowledge exchange and transfer are no trivial tasks (Ackerman et al., 2013), chapter 11 shows that the PRAXLABS framework provided a powerful tool for this kind of systemization. This way, my work contributes to the shaping of a “more systematic and sustained approach to the reuse of findings in living lab research, transcending the boundaries that otherwise exist” (Ogonowski et al., 2018, p. 325), contributing to the building of “portfolios of design case

studies that facilitate their comparison and allow for bottom-up concept building across cases”
(Stevens et al., 2018, p. 24).

16 Conclusion

Many IT organizations still struggle to realize diversity in their workplaces in general and to integrate female professionals in particular. Masculinity impacts their cultures and the ways design teams work. For this reason, IT design does not uncommonly exclude users or reinforce gender stereotypes. Feminist HCI deals with questions such as whose concerns and interests are considered in design processes, whose voices are heard, how stereotypes are inscribed into technology artifacts, and how to create gender-inclusive HCI research as well as design. However, these academic debates have not translated into substantial changes in IT practice. Adequate ways to translate the broad, feminist HCI commitments into pragmatic, context-sensitive research infrastructures in real-life environments remain open for discussion.

Practice theory, expressed in a Practice-Based Design notion, seems like a suitable solution to engage with gendered practices in IT environments, and this thesis proposes feminist Living Labs as potential research infrastructures. Their long-term, participatory commitment, as well as their 'broad' stakeholder view, provide a step forward in opening up a socio-technical research infrastructure for experience sharing, critical reflection, and consciousness-raising in safe spaces. A Living Lab influenced by a feminist epistemology and methodology gives voice and provides safe spaces to otherwise marginalized groups, this way helping to understand and challenge the dominant, taken-for-granted, and often excluding practices of technology development and usage.

This thesis presents my experiences in establishing such a feminist Living Lab in Germany's gender and IT context. Collaborating with six male-dominated IT organizations, the lab's infrastructure allowed to unravel and engage with everyday gender practices by building long-term, trustful relationships and effectively co-design possible solutions for problems rooted in real-life practice. Receiving a broader picture from a range of stakeholders allowed to reveal structural and cultural drivers of inequality within individual organizations and beyond via the sharing of cross-cutting experiences. I laid out the unique characteristics of a feminist Living Lab and also described the opportunities and challenges that arise when conducting such engaged, value-driven research in a sensitive context. The insights of this thesis have relevance for HCI and CSCW research by offering detailed investigations of partial, contextualized knowledges in the world that inform technology-related gender practices. I also offered reflections on PRAXLABS as an approach for Practice-Based Design.

Just as feminist research adjusted and situated existing methodologies to feminist values, feminist Living Labs are one contribution to methodological discussions in the field of feminist HCI. As cross-comparisons with other Living Labs showed, my experiences can partially also be transferred to similar sensitive research settings concerned with so-called marginalized, potentially vulnerable, or less privileged populations. My insights might serve other scholars as a blueprint, which then needs to be adapted to different affordances and contexts. This way, I hope to contribute to more inclusive and justice HCI research and design.

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