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At the Edge - a Decolonial perspective of the Digital World

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This dissertation describes a relational and decolonial research project between 2017 and 2020 at the Institute of Information Systems and New Media at the University of Siegen[1]. I am grateful for what I was able to do and I am continuously looking for ways to contribute to the process of dialoguing in a regenerative way in rural communities and in the academy. My dialogue with friends (or informants) were frequently easy and joyful. However, in the academy the exchange were usually painful and difficult. It took me some years to build my social capital in the academy. Nevertheless, I found colleagues who supported me in the writing process, in showing me the academic way of thinking, and holding my hand when everything that I wanted was to quit the PhD. For all those years, I thank friends I encountered and offered me their time: Angelika, Ana, Anne, Claudio, Katka, Katta, Midas, Mika, Tanja, and Toeless.

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dialogue that was also a tool of restoration of trust. I have learned that knowledge can only be built through the encounter of two or more corpora of knowledge and that encounter takes place in a social and political transformational commitment. That way, dialogue presupposes change, discomfort, conflict, at the same time that it ruptures prejudices, habits, and thoughts.

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Abstract

Some places remain on the periphery of the World System (Wallerstein, 2004), participating in it but not fully absorbed by it. However, it is argued that there is almost no place in the planet in the 21st century left untouched by global capitalism (Moore, 2016; Moore, 2017). This dissertation delves into the economic life of two *pericapitalist* (Tsing, 2015b) community in the Amazon rainforest. One is a traditional rural village in the Brazilian Amazon region, caught between tradition on the one hand and modernity, coloniality and development on the other. The other is a community of former members of the Colombian guerrilla group Armed Revolutionary Forces of Colombia - Popular Army (FARC-EP), who are faced with the difficult task of building a new economic, political and social life for themselves after the peace agreement, and build relations with the modern world system they have formerly been in armed rebellion against. Through ehtnographic inquiries into the practices of the community members, the dissertation details how these two distinct rural Latin American communities meet the spread of the capitalist world system and manage their positions in relation to it. It pays special attention to the role of digital technologies, like mobile phones and internet, in these processes. To make sense of the practices of these communities, it engages with conceptual and analytical tools and theories that attempt to explain the global situation, including decolonial theory and the concept of coloniality/modernity, Immanuel Wallerstein's World System Analysis, and Anna Tsing's concept of Pericapitalism. I aim to describe what can be done about this global condition that decolonial writers address, by combining these ideas with ethnographic description, and outline specifically what it means for the interventions of HCI activists-scholars and designers.

The contribution of the thesis is as follows: Firstly, it provides a detailed analysis of the material practices of two communities at the *edge* of capitalism. These include

a wide variety of economic practices, but also political and social practices. Secondly, it draws attention to the heterogeneous nature of responses to global capitalism, formed from the relationship between specific material practices, new technology and elements of cultural identity. Through the different practices, community members manage to keep their distance from aspects of the World System and globalised capitalism, even resist it, but seek closeness in other moments. Thirdly, building on my ethnographic study and my engagement with the concepts mentioned above, my thesis makes several conceptual contributions, appropriating existing concepts, which include a) the idea of counter-appropriation as a means to describe the practices of FARC-EP members to evade the appropriation of digital technologies against them by the national Colombian army, b) it builds on the idea of social capital to describe how how communities deal with the economic pressures of development (in the Brazilian case) and re-integration into mainstream modern/colonial society (in the Colombian case), and the supportive role of digital media, and c) it addresses lacunae in WSA and decolonial thinking by describing how colonliality/modernity and global capitalism actually spread and encountered by local specific communities, highlighting also the notion of resistance, which especially Wallerstein underplays. Fourthly, it argues for an increased sensibility towards these different relations to capitalism when considering design implications. Consequently, it indicates the need to investigate the economic assumptions contained in HCI initiatives, as well as inside ourselves as HCI researchers, as they might clash with the different ways in which local communities wish to relate to global systems. It argues that close attention to material practice goes some way towards resolving those tensions and, further, provides for an appeal to a more pluralistic views of culture and development (Escobar, 2018).

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List of Abbreviations

ASM	Artisanal and Small-scale Mining
APC	Association for Progressive Communications
APOBV	Association of Producers of Organics in Boa Vista
CMP	Colonial Matrix of Power
COP	Coloniality of Power
COT	Coloniality of Technology
CSCW	Computer Supported Cooperative Work
DRC	Democratic Republic of Congo
ESI	Entrepreneurial Social Infrastructure
ETCR	Territorial Spaces for Training and Reincorporation
FARC-EP	Armed Revolutionary Forces of Colombia - Popular Army
HCI	Human-Computer Interaction
HCI4D	Human-Computer Interaction for Development
HCI4T	Human-Computer Interaction for Transition
ICT	Information and Communication Technology
ICT4D	Information and Communication Technology for Development
IDIN	International Development Innovation Network
IDP	Internally Displaced People
IPEA	Institute for Applied Economic Research
IS	Information Science
LASS	Latin American Subaltern Studies Group
LGBTQIA	Lesbian, gay, bisexual, transgender, queer, (questioning), intersex, asexual, and (agender)
M/C	Modernity/Coloniality
NAU	North American University
NGO	Non-Governmental Organization
OSM	OpenStreetMap
PAR	Participatory Action Research
PCC	Colombian Communist Party
PD	Participatory Design
PI	Principal Investigator
PR	Participatory Research
QDA	Qualitative Data Analysis
SIGCHI	Special Interest Group on Computer-Human Interaction
SASS	Subaltern Studies Group
UDHR	Universal Declaration of Human Rights
UNHCR	United Nations High Commissioner for Refugees
UFPA	Federal University of the state Pará
UN	United Nations
USA	United States of America
WSA	World Systems Analysis

List of Publications

The present thesis consists of an accumulation of publications accepted and published in several outlets. Chapter 5 corresponds to P1, Chapter 6 to P2, Chapter 7 corresponds to P3, Chapter 8 corresponds to P4, Chapter 9 corresponds to P5, and Chapter 10 to P6. The complete list can be seen in Table 0.1 below.

No.	Publication Details	Outlet	Status
P1	Débora de Castro Leal, Angelika Strohmayer, and Max Krüger. 2021. *On Activism and Academia: Reflecting Together and Sharing Experiences Among Critical Friends.* Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems. Association for Computing Machinery, NY, USA, Article 303, 1–18.	Conference Proceedings	Published
P2	Débora de Castro Leal, Max Krueger, Kaoru Misaki, David Randall, and Volker Wulf. 2019. *Guerilla Warfare and the Use of New (and Some Old) Technology: Lessons from FARC-EP's Armed Struggle in Colombia.* In Proceedings of CHI Conference on Human Factors in Computing Systems Proceedings (CHI 2019). ACM, New York, NY, USA, 10 pages.	Conference Proceedings	Published
P3	Débora de Castro Leal, Max Krüger, Pedro Reynolds-Cuéllar, Amparo Caicedo, Carlos Gómez, Dave Randall, and Volker Wulf. 2021. *Growing together, remaining apart: The role of digital technology in former guerrilla fighters' social capital.* Proc. ACM Hum.-Comput. Interact. 5, CSCW2, Article 331 (October 2021), 24 pages.	Journal	Published
P4	Débora de Castro Leal, Max Krüger, Vanessa Teles e Teles, Carlos Antônio Teles e Teles, Denise Machado Cardoso, Dave Randall, and Volker Wulf. 2021. *Digital Technology at the Edge of Capitalism: Experiences from the Brazilian Amazon Rainforest.* ACM Trans. Comput.-Hum. Interact. 1, 1, Article 1 (January 2021), 37 pages.	Journal	Published
P5	Débora de Castro Leal, Ana Maria Bustamante Duarte, Max Krüger, and Angelika Strohmayer. 2021. *Into the Mine: Wicked Reflections on Decolonial Thinking and Technologies.* Proceedings of the 10th International Conference on Communities & Technologies - Wicked Problems in the Age of Tech (C&T '21), June 20–25, 2021, Seattle, USA. ACM, NY, USA, 12 pages.	Conference Proceedings	Published
P6	Débora de Castro Leal, Max Krüger, Michael Ahmadi, Jason Appiah, Ricardo A. Baquero Gómez, Daniel Courtney, Ata Daee, María Belén Giménez Ciciolli, Lena Hieber, Md Shakhawat Hossain, Jeongmin Lee, Ramona Plogmann, Liliana Savage Pinto, Sasmitha Sinnathurai, Darinka Yepez, and Volker Wulf. 2021. *HCI's Role in the Capitalocene: Lessons Learned from an HCI Master Course Across the Globe.*. In LIMITS '21: Workshop on Computing within Limits, June 14–15, 2021.	Conference Proceedings	Published

Tab. 0.1: List of publications part of this thesis.

Part I - Foundations

This first part of the dissertation presents the personal motivations to engage in the academic world, and the reasons for why I chose to write my thesis on my work with communities in the Amazon rainforest. I outline the context of the region and the pressures to *develop* the region. In the sequence, I introduce important concepts like decolonial thinking, World System Analysis, Capitalocene and Pericapitalism, and I present reflections about the methodology underlying this work.

1

Introduction and Motivation

This thesis is the result of not only four years of academic work, but also of a decade of activism, which preceded my engagement in academia and continued during my doctoral research. Furthermore, as it deals with specific Latin American experiences and I am a Latin American, it is impossible to disentangle my academic work, my activism, and my own biography. In fact, my own family's history is a central motivation for my activism and my academic work and is interwoven with the colonial history and present day of my home country, Brazil. It is not easy task to separate my thesis from my families' history. Due to this entanglement, I will draw and build extensively on the work of South American decolonial thinkers in this thesis. But since my family's history is so central to this thesis, I will begin by telling something of this history. As I heard from an Indigenous friend: *"you have to know where you come from, to know where you are going."*

1.1 Navigating on a Colonial Path

From my mother' side, my whole family was always proud of being European descendants. I was exposed to colonial attitudes early on. In school, I learned that Brazil was discovered, and that the Portuguese brought progress. My grandmother, at the age of 93 years old, decided to confide her real ancestry to me. In 2014, after a long talk with her, she told me about her Portuguese military grandfather Perciliano and her Indigenous grandmother, who he *caught by the lasso*. My first reaction was of complete joy, it was like finding a precious map that I had a lot to

discover. I was finally connected to the *Pindorama*[1] roots, a rhizome that connected me to this country, instead of only to Europe.

However, the sentence *caught by the lasso* meant that the union was not consensual. My great-grandmother was imprisoned to be either lover or slave, maybe both. Her Indigenous ethnicity was *Puris* but her name was Western, Rita Fausta. In my research about Puris, I learned that Puris was the first Indigenous ethnicity to be decimated by the Portuguese. The reasons for the near genocide were because they were peaceful, and slow, so they were easy targets for the officers. Lands, in Southeast of Brazil, were demarcated for the Puris Indigenous people, but they were more or less worthless because the takeover, purchase, land grabbing and other forms of occupation were pushing them to more distant and less fertile areas. She had one son, who received Portuguese nationality, however, he could pass the nationality on to only his male children. My grandmother did not receive Portuguese nationality but took pride in being of Portuguese descent and hid her Indigenous roots.

From my father's side, when I was a child, I loved listening to my grandma's stories about the time she lived in the Amazon rainforest, where she was born. She would repeatedly tell me details of her way of life. The house without doors she lived in, the area to keep the animals, the baths in the *igarapé* [2], the way she would grow cassava, produce dishes out of it, and have it as the main dish for every meal throughout the day. She also had experienced living as a community, where she could count on the support from Indigenous midwives while delivering the 17 children she had, or when she would need prayers from Shamans. She would also tell me about the encounters she had with the spirits of the forest, some of which did not result in a happy ending. She had so many mystical stories, and so much knowledge about how to use the forest as a resource for their daily lives, that it is hard to imagine that they would ever feel hunger. However, she was sure that there was no perspective for her and her family if they stayed there. She would like her kids to have access to formal education, and after many years of insistence, in 1953, she convinced my grandpa to move to the capital of Brazil at that time,

[1] Name of the region called home by the native population of Brazil.
[2] Small ponds that frequently exist in the Amazon region.

Rio de Janeiro. She thus rejected her former, traditional way of life in favour of the promises and pressures of modernity, and thereby also denied it to her family - including me.

In the city, everything was new for her and her children. She had never seen such big houses, so she thought the entire building was for her family. However, a 50 m2 apartment they were assigned would have to fit 10 kids of all ages, a pig, dogs, a parrot, and chickens. Even though the buildings were part of public housing with extended green areas with grasses and trees, she could not use the soil in those areas to grow food nor to put the animals outside. She was ashamed of her ignorance, the lack of money, the lack of food to provide, the lack of jobs, and the violence and drugs that surrounded her kids in the neighbourhood. The depression, sadness and homesickness for the forest were reasons for my grandfather to return to the Amazon. But my grandma stayed as she was, confident in supporting the formal education of the family. In the same way as my grandma, my father wanted the best education for me and my siblings. I grew up believing that the best path to happiness was having a formal education and finding a well-paid job. For 15 years I worked with web development when, in 2012, I decided to stop what I was doing and go the Amazon in search of the life that my grandparents had. Although my grandmother had passed away, I saw her life in the lives of other people I met. I observed and talked to people about their lives and their wish to stay or to move out from the rural areas. I tried to work together with them, to support their ambitions and visions for communal life. This what this thesis is about.

More than sixty years have passed since my grandmother left the forest, and the struggles I observed were still the same. People often live in houses without electricity, running water or sewage systems. There is no public transport and the only way to get around is on small boats. There is no reliable phone signal, so there is no cellphone coverage, and no internet. People are physically isolated from basic and public services. However, they have strong bonds with the inhabitants of the neighbouring area, which makes life less difficult because they can count on people when there is a need for help. In my interactions, I was always interested in learning about their ancestors' path and how to make their lives easier and with more

alternatives than simply migrating to the capital. The elders would say that they feel like their work is undervalued and migration to the city is the best option for young people to study and find a proper job, just like my grandmother. Digital technology has come to play a crucial role in these processes, influencing the desires and wishes of people in leaving or staying in the community, as I will show in this thesis. Having said that, my own participation in the lives of people in the community led me to understand that the role of new technology is multifaceted.

I do not think my grandma would ever imagine how strongly she influenced my path when telling me about her life in the jungle. If she would not have left the Amazon, it would have been my life too. As much as she made me value formal education for the sacrifice she made, she also made me resent it, because she left her way of life for one that she felt was somehow superior. Together, the desire to understand, reflect on, and come to terms with a personal trajectory through education and hence, ultimately, into academic life, explains much of the positioning of this thesis - while at the same time reflecting on and being influenced by my own cultural heritage and the desire to preserve it.

Mine and my grandma's worlds illustrate that there is no straight path to the good life, no single path to development. While her move might have enabled my parents and myself to be financially wealthier, with better access to health care, to formal education, to different jobs and opportunities, it was also full of sacrifice, suffering, and discrimination. After all the sacrifice my grandma's family went through, from my privileged place, I still suffer the discrimination of being a Latina academic in Europe. It is still the life, as Spivak (1988) calls it, of the subaltern. How many generations are needed to diminish the pain of not feeling part of a collective? This involves a personal struggle and the struggle of subaltern communities at the same time. The transitions involved carry with them major challenges. The skills and knowledge that my grandma or I bring during the transition to being accepted by the *other* community are not enough. The transition from an *inferior* to a *superior* culture brings isolation and individualism becomes stronger, as it is easier to keep the pain to ourselves and move away from each other. As my friend Carlos Gomez, ex-combatant from FARC-EP, said: *"For our disgrace, individualism contaminates*

much faster than the collectivism. Because the collectivism demands more sacrifice than individualism. And to become individual is easy."

Discovering my diverse heritage made me think about every detail and behaviour pattern of my life. I finally could be proud of being a descendant of a native tribe in Brazil. However, I felt hurt to imagine that my ancestors were killed and expelled from their land. A fear that is not part of my family's life anymore, but still happens in many other families' life in Brazil, increasingly so, for example driven by mining in the Amazon, which I address in chapter 9. In exchange of this imposition of having a formal education, and a professional career, I became a perfect outcome of Western culture and with colonial thoughts for the most of my life. At the same time, for many years, this feeling of sadness, pain, and beneath consideration, made me change the route of my work. I had to go back to my roots and start a dialogue with people that lived in the same way as my grandparents (from my father's side) and my great-grandmother (from my mother' side). My ancestors changed their behaviour and migrated for a better life for them and the generations to follow. For me, for all these reasons, it is important to reflect on my own positionality and the influence my own, and my family's biography has had on my academic interests.

My interests changed throughout the PhD process and my activism became stronger when I met ex-combatants in Colombia. A community that used to focus on agricultural practices but that had chosen the guns to defend the ownership of their land from private settlers. After the Peace Agreement, I had the opportunity to meet many of those ex-combatants and critically analyse their use of telecommunication before and after they handed in the weapons. Those communities, in Brazil and in Colombia, were the opportunity to gain a better understanding of their knowledge and their social capital. Paraphrasing Tynan (2020), "undertaking a PhD is also an exercise in coming to know and navigate [between] the dominance of colonial knowledge production [and others ways of knowing]." In that sense, the Socio-Informatics approach of the Siegen School (Wulf et al., 2018), although never linked to decolonial HCI research, has proposed a similar type of active, grounded and transformative work in real-world settings where different knowledges can be found.

1.2 Amazonian Development and Destruction

As I explained above, my direct grandparents were not Indigenous, from my father' side my grandparents lived like and surrounded by Indigenous people. They were descendants of the Brazilian Northeast who migrated to the Amazon to find work and escape from drought. They were migrants who have occupied the Amazon for two generations and who have had to deal with prejudice while moving to that region, as well as afterwards, when moving from the Amazon to the Southeast. The Amazon region has also generations of families from the South, *quilombolas* (former slaves), and of course, Indigenous peoples. Even though the Amazon region was populated by natives and migrants from different parts of countries of Latin America, the hegemonic development vision persists. In Brazil, the region's resources are seen to be provided to the rest of the country and the world: its energy, water, mineral, timber and agriculture (Pinto et al., 2020). The model followed is based on primary goods for export, which require complex infrastructure for the logistic and no basic infrastructure for the population of the region. The strategy of occupying the Amazon territory and generating *progress* was deploying mega-ventures (dams, mining, and opening roads) in the region, impacting the naturally diverse social, environmental, and cultural fabric of the Amazon region – without consulting, listening or dialoguing with the populations affected by that violence, which includes lack of public and basic services while mega infrastructure are/were built instead. Legal and illegal actors, with extensive connections to national and global supply chains, are part of development model responsible for the dramatic expansion of different types of crimes in the Amazon.

Research shows significant damage to both the environment and the populations who live and work in communities close to or are dependent on big enterprises, like for example mining (Freitas et al., 2016; Watson, 2020). Both artisanal and small-scale mining (ASM), and large-scale mining have devastating effects on nature and on the population around it. These effects include deforestation (Jacka, 2015), resulting in erosion of land which makes reforestation difficult, in addition to the toxic leftovers in the soil (Rodrigues et al., 2004; Peterson and Heemskerk, 2001). Mining is also poisoning water, damaging the water resources through heavy metals

(mercury and cyanide). Mercury affects the water, land and air quality, accumulating in all organisms, including humans (Lynas, 2018, p. 155). The large amounts of water needed for mining efforts also drain local water resources. This is the case even when the water is fed back into the environment as part of the mining process, which further heightens the risk of contamination. The environmental impacts last hundreds and possibly thousands of years, and the areas affected do not, most of time, recover even with environmental rehabilitation (Jacka, 2018).

Population crimes also happen to communities near large-scale extractivist projects. People in locations, mostly Indigenous areas, often face risks of attacks and violence when trying to defend their territories (Rorato et al., 2020; Sánchez, 2021). The Atlas of Violence 2019, produced by the Institute for Applied Economic Research (IPEA), highlights the high lethality in Southwest of the Amazon region, where estimated homicide rates were always above 56 estimated homicides per 100,000 inhabitants, and Indigenous homicides have increased 21% in the last years (Cerqueira et al., 2021). Moreover, in Brazil for example, the suicide rates in areas with extraction of minerals are higher than those of the Brazilian population in general (Souza et al., 2006; Rocha et al., 2018).

Such dynamics resulted in part from social disorganization. For centuries, projects' infrastructures in the Amazon rainforest, either in Colombia and in Brazil, have been developed regardless of what that territory is, without any connection with local development and much less with the populations' interests. Those power relations are rooted in colonialism, which relies "on the imposition of a racial/ethnic classification of the world's population" (Quijano, 2000, p. 342). The racialization and the formation of capitalism in the 16th century produces and reproduces some instances until nowadays, where the relations of exploitation/domination/conflict are still consequences of it. The ideas of development and capitalism are tied together and have inspired substantial criticism, especially from a decolonial perspective.

While HCI and computing technology, in general, have played a crucial role in development studies, especially in discourses such as Human-Computer Interaction for Development (HCI4D) or Information and Communications Technology for

Development (ICT4D), little to none of this critical and detailed description of the situated material practices has played a role in the wider HCI discourse. Over the past 5 years I have worked with two rural community where I witnessed these economic *development* processes in detail, and right up to the present day. Both communities can be described as being on the frontline of development. To make the increasing violence, pain and pressure they experience more visible, in Brazil and in Colombia, the internet has been - some of the time - a tool that allows those voices to be heard. The Universal Declaration of Human Rights (UDHR) of 1948 says that "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers" (Nations, 1948). However, frontiers and gaps in the Amazon region are getting wider as the challenges associated with environmental, economic and social factors contribute to a low digital inclusion. The rural Amazon areas present one of the lowest percentages of households using the internet, where connectivity is available in only 33.1% of households (Lourenço et al., 2021).

I am especially interested in the role digital technologies play in these development processes, what it means to be positioned there and how digital technologies are employed to manage rural communities' relation to global capitalism. Through the lens of the decolonial thinkers from Latin America and their allies, both communities that I worked with can be described as being at the periphery or at the edge of capitalism - in a state of pericapitalism. When using the terminology of the periphery it is also crucial to point out that what some consider the periphery is the center for others. Using this terminology is thereby not to affirm the division of the world into centers and peripheries, but to criticise it. My thesis therefore makes central the experiences, practices and positions of those who are otherwise considered to be at the periphery. Furthermore, I show that *the periphery* is not only a place where some people are pushed towards in a form of marginalisation, but a place that is willfully assumed, occupied as a form of tacit or explicit resistance to the center. Some people prefer to be part of the periphery rather than the center of the World System.

1.3 The main contribution of this thesis

The main contribution of this thesis is a detailed description of the practices of the two rural Latin American communities. My thesis investigates the different ways in which they relate to globalised economic systems, deal with the expansion of the modern/colonial world system (development) and manage their position in relation to these systems. I pay special attention to the role digital technologies play in managing and mediating these relationships. My study finds that the ways in which community members engage with development are specific, divergent and nuanced, and range from armed resistance in the case of FARC-EP to incorporating traditional agricultural practices into multinational enterprises. Such detailed ethnographic investigations are a crucial component of the Socio-Informatics approach (Randall, 2018). For my investigation I take serious various theories that try to make sense of the global situation, most importantly decolonial theory and the idea of modernity/coloniality (Mignolo, 2007a), Immanuel Wallerstein's World System Analysis (Wallerstein, 2004) and Anna Tsing's notion of Pericapitalism (Tsing, 2015b). By combining these theories with ethnographic description, I try to outline what is possibly to be done about this global situation that decolonial writers address, and specifically what it means for the interventions of HCI activists-scholars and designers. My ethnographic study thereby serves as a pre-stage to design (Randall, 2018). Without making specific design recommendations, the study shows that how people relate to global economic systems is specific and significantly differs from context to context and any attempts to design for *development* needs to take these differences into account. Furthermore, it also shows that design interventions carry the risk of replacing or destroying local practices, relationships, and social capital.

I also make conceptual contributions for which I appropriate other concepts. The first one is the notion of counter appropriation. While the term already existed, I use it in my thesis to describe the practices of FARC-EP guerrilla to evade the technological war fought against them by the Colombian army with the support of the USA before the Peace Agreement. I also highlight the role of social capital in how communities deal with the economic pressures of development (in the Brazilian

case) and re-integration into mainstream modern/colonial society (in the Colombian case), and the supportive role of digital media.

2

Related work

I situate my work in large discourses that address in a theoretical manner the global situation of the periphery. These include theories of modernity/coloniality (M/C), taking a decolonial perspective of the world (Mignolo and Walsh, 2018; Quijano, 2007), the post-Marxist concept of the (capitalist) world system by Wallerstein (2004) or Anthropologist Anna Tsing's idea of pericapitalism (Tsing, 2015b). I have also been, throughout my academic career, trying to combine those theories into my activism practices. During my theses, I examined that relationship through theoretical and methodological lenses. Below, I will outline each one of them and their relation to my own work as well as the wider HCI community. These works form not only a crucial backdrop to my work but leave a gap that I hope to address. While they describe the global situation in relation to the periphery, they say very little about what we, as engaged researchers in HCI and other disciplines, can do about it. That is the gap that my thesis aims to fill.

Influenced by my supervisors in Germany, the starting point of the related work of this thesis was based on the reading of many academic thinkers from Europe or USA and understanding different methodological approaches to the investigation and design of digital technologies, such as the Socio-Informatics approach (Wulf et al., 2018). However, I was looking for more diverse perspectives and, in the context where I work, the notion of *development* was always very present, especially the relation between digital technologies and design - as it is embodied in the HCI4D approach. I consistently felt uncomfortable with the idea of development and wishing for Latin American views on the concept. One of them was Arturo Escobar's book "Encountering Development" (Escobar, 1995), through which I could understand the creation of the Third World and which opened the path to learn

more about alternative ideas for the postdevelopment moment. Following Escobar's thread, in his other book, "Design for the Pluriverse" (Escobar, 2018), I had the encounter with radical thinkers. There, I was introduced to Emmanuel Wallerstein, a Western author but an ally and collaborator of decolonial thinkers, who in his analysis has structured the world and the global economic system into centres and peripheries through what he called World System Analysis (Wallerstein, 2004). I also learned about the Peruvian Aníbal Quijano (who wrote an article together with Wallerstein) (Quijano and Wallerstein, 1992) and a whole new world opened to me. The decolonial thinkers had both the anger, and the explanation for it, that I was repressing inside of me. I understood, perhaps for the first time, the history of colonialism, coloniality, post-colonial studies, decoloniality, epistemic coloniality (geopolitics of knowledge) and the coloniality of power, I was able to dig into Indigenous and/or female (not only Brazilian) philosophers (academics or not) (Smith, 1999; Krenak, 2019a; Wilson, 2008) to understand better the social construction of the Americas. In short, I was able to make good use of academic insights in my efforts to understand my own position and of others.

The most important paradigm to be challenged is the view that the continent of America was discovered. It was not. Brazil and all the other countries suffered from the invasion of their territory. It is important to mention that Pindorama was the native name of Brazil, the land where the Tupi language people lived. Brazil was a name given by Portuguese colonisers, after the arrival of Columbus. Brazil and the Americas were "invented, mapped, appropriated, and exploited under the banner of the Christian mission" (Mignolo, 2011, p. 7). The colonization lasted 300 years, and for that period, natives, natural resources, and lands were exploited for the Western benefit (Fanon, 2021).

The process of Colombia and Brazil's independence brought together the racial whitening of the territory. To make it easier to understand, I will focus only on Brazil's history, where I come from. Whitening was an ideology widely accepted in Brazil between 1889 and 1914, as the solution to the excess of black and Indigenous people[1]. Skidmore, 1993, in his book, shows the effort to reconcile social realities

[1]In recent genome research, it showed that miscegenation in Brazil occurred asymmetrically: maternal inheritance is a predominance of African (36%) and Indigenous (34%) populations. On the other

with the doctrines of scientific racism and social Darwinism, where European immigrants were recruited to travel to Brazil to falsely claim that Brazil had harmoniously combined a multiracial society of Europeans, Africans, and Indigenous peoples. That was the strategy the Portuguese Crown found to promote the creation of colonial urban centers, having at the head Portuguese people or Portuguese descendants (also known as Mamluk) (Brandão, 2013).

There were few native Portuguese established in Brazil, so the process of *patrilineal reference* was adopted. It meant that people originated from Mamluk fathers and native mothers were considered Portuguese, even though their male Iberian ancestors were already distant for generations. These Luso-Tupis preserved, through patrilineality, a relationship of loyalty with the Crown and allowed them to largely occupy the social spaces reserved for whites [Ibid.]. Despite the *decolonization* of Brazil and Americas, the thought and imagination of colonization continued throughout the social, economic, and political civilization. In the last five centuries, we have gone from soul saving to forced civilization, to forced development, to forced democratization (Grosfoguel, 2011, p. 28), and the processes continues in the academy. As Ibarra-Colado said "forms of knowledge ordered and simplified the world by means of instrumental rationality"[2] (Ibarra-Colado, 2006, p. 464). To talk about forms of knowledge is the opportunity to talk about the existence of different voices and diverse methodologies capable of supporting reflexivity, dialogue, and the understanding needed to transform the world.

The understanding of the political genealogy of discourses on post-coloniality and decoloniality might be of great utility to better situate ourselves, both in showing us that the questions that concern us today are not new. They are important to illuminate how past movements and discourses can help us to answer present questions. Even though my background is in data processing, and project management, it is from the geohistorical multi- and interdisciplinary approach that borrows from a humanities perspective, that I engage with in the dialogue with the Social-Informatic sciences. From Wallerstein, 2004 to Gramsci, Hoare, et al., 1971, moving towards

hand, 75% of the paternal inheritance is of European origin (Odorissi Xavier, 2020). This data reflects my own history.

[2]It is a pursuit for economic efficiency without taking into account the non-economic consequences.

Global South through Spivak (1988), Fanon (2021), and going to Latin American through Quijano (2000), Dussel et al. (2000), Pinto et al. (1969), Mignolo (2000), Escobar (1995), among others. Lastly, but most importantly, encountering, at the end of my PhD path, the Indigenous philosophers like Krenak (2019a), Rivera Cusicanqui (2020), Kopenawa and Albert (2015), Wilson (2008), among others.

For all those reasons above, my arguments and literature will try to not follow the linearity of Western modernity, but the modern/colonial world system. Which means that there is no linear succession of modes of production or modes of knowledge creation and there is space in the world for multiple forms of living that co-exist simultaneously. That is an opportunity to read and write with a local epistemology, trying to bring local and traditional knowledge and history to the formal academic institution. That way, I "legitimize the border epistemologies emerging from the wounds of colonial histories, memories and experiences" (Mignolo, 2012, p. 37).

2.1 Decolonial Thinking

With the work of Anibal Quijano (1928-2018) on coloniality at the end of the 1990s, a series of studies emerged that have aimed to reopen historical and social concerns in Latin American social sciences. Considering the category of coloniality as the antithesis of modernity, a review of the historical structure and power of modernity in Latin America was the node from which these concerns were articulated. Decolonial thinkers of Latin America (Mignolo, 2000; Quijano, 2007; Grosfoguel, 2011) provide an perspective from the periphery of the world system (Wallerstein, 2004). They argue that the global, and heterogeneous, structures of coloniality did not disappear with the juridical-political decolonization of the periphery (Grosfoguel, 2011). This means colonial dynamics remain in place, and are being reinforced, even though the legally compulsory colonial control that existed from the end of the 1400s to the end of 1800s (and often to the middle of the 1900s), no longer exists. This process of Eurocentrification of the new world imposed a racial criterion on the world population on a global scale (Quijano, 2007). The word race was first used at the end of 15th century, to make the distinction between, on the one hand, the sense of nation and, on the other, ethnic group (Quijano, 1995). This was the

foundation of power relations between Europe and the populations of the rest of the world, and it was the start of the process of silencing and eliminating knowledge, ways of living and ways of producing in the Americas - transforming the world into a set of racist social relations. The uneven relationship, the construction of an *otherness*, and the exploitation of the colonies' natural resources, arguably, provided the foundation for Europe's industrial revolution and for the rise of capitalism; while preventing development elsewhere (Blaut, 1993), which means that there could not be a capitalist world-economy without the Americas (Quijano and Wallerstein, 1992). More than extracting tribute, goods, and income from the countries it conquered, colonialism rebuilt the colonies' economies, dragging them into a complicated relationship, allowing a flow of humans and natural resources between colonised and colonial countries. Slaves and indentured labor, as well as raw materials, were carried to Europe for consumption by the metropolis, while the colonies were kept as markets for European goods. As an example: slaves were transported from Africa to the Americas, where they would extract great quantities of enriched ores. These ores were transported from the colonies to the West, where it was consumed or processed into goods and then sold back to colonies, for example in the form of technologies for mining and refining or ingredients, like mercury, to increase the speed and effectiveness of the process (Brown and Bakewell, 2021). Profits always flowed back to the so-called *mother country* in whatever direction people and goods traveled (Loomba, 2005).

This direction of development, civilisation and progress of the world is motivated, in this view, by a Western idea of the direction progress should take. To have a better understanding about the direction of progress through decolonial lenses, I will give more details about World System Analysis, Modernity/Coloniality, Coloniality of Power and Coloniality of Design.

2.1.1 Postcolonial Studies and Decolonial Thinking

Before giving more details about decolonial thinking, a differentiation from Postcolonialism is needed. Both theories criticize Western colonial rule on the so-called undeveloped countries, and both were influenced by Marxist Dependency

Theory. However, each theory emerged in different socio-historical contexts, and decolonial thinking takes on a deeper approach to Colonialism than Postcolonial Theory. Postcolonialism, which was developed in the Middle East and South Asia and tied to the Subaltern Studies Group, seeks to give a voice to the *subaltern* or those of *inferior rank*. The Indian scholar Guha (1989) reworked the subaltern term, elaborated first by Gramsci as a subject to the dominant and hegemonic ideological and material forces (Gramsci, Hoare, et al., 1971), to initiate the Subaltern Studies Group (SASS). Spivak (1988), along with Said (1978), have developed this idea in the USA to deal specifically with power and resistance in the postcolonial context.

SASS had influenced some Latin Americans in the USA, leading to the creation of the Latin American Subaltern Studies Group (LASS). However, Latin American scholars, who would like to guarantee their own agency in scrutinizing its specific ideas of regional identity and development, decided to form the decolonial Thinking group. They used the world-systems theory from Immanuel Wallerstein at the outset for the argument and the subaltern studies from the Brazilian, Darcy Ribeiro's, perspective (Ribeiro, 2007). To end this brief introduction regarding their differences, for the Postcolonial thinkers, the colonial relation of power started during the Enlightenment (18th century), while for the decolonial thinkers, that started with the expansion of Europe by colonialism and imperialism into the Americas (16th century) (Mignolo, 2000).

In short, both argue that the humanities and modern social sciences created an imaginary about the social world of the subaltern (the mestizo, the Oriental, the black, the Indian, the peasant) that not only served to legitimize imperial power at the economic level and political, but also contributed to create the epistemological paradigms of these sciences and generate the distance and identities (personal and collective) of colonizers and colonized.

2.1.2 World System Analysis (WSA)

Theories concerning global capitalism are represented by the likes of the Marxist, Wallerstein (2004), who attempted an historical and complex examination of the

development of capitalism. His work sparked great interest in the commodity chain as a unit of analysis (see e.g., Bair, 2014). According to World Systems Analysis (WSA), there is a process of universal commodification, connecting supply and commodity chains in a single world system, extracting resources from, and selling goods to even the furthest corners of the globe. In world systems theory, notions of the *core*, the *periphery* and the *semi periphery* were central. The concept tries to explain globalisation and how it has worked since colonization, where colonies became peripherical states and the colonisers the core states (Quijano and Wallerstein, 1992). As consequence, Western epistemology influences and oppresses any different way of thinking. WSA criticises the universalism that came together with the Enlightenment (Wallerstein, 2004).

In the 16th century, the entire earth was circumnavigated for the first time in history. The visual representation of lands and water masses was provided through cartography. In 1600, Christian theologians travelled during the formation of the firms of British East India and Dutch East India. British and French settlements developed in Africa, and British immigrants established themselves in India by the mid-century (during the Opium Wars) after 150 years of commercial operations. Although the framework for globalisation was already in place, this was not titled globalization or Westernization at the time, but Europeans dominating the seas and exporting their own ways of doing things to the rest of the world enabled economic ventures and political solutions. Non-American regions were not colonised but did not escape coloniality (Mignolo, 2020).

Based on that configuration, decolonial thinkers bring forward the idea of the colonial/modern world system. It claims to explain how global supply chains were formed and how profits accrued in an exploitative relationship, with Europe historically at the center of the international market and able to establish colonial supremacy everywhere on the planet (Quijano and Wallerstein, 1992; Quijano, 2000). America was not only the first periphery of the world-system but also the first opportunity for the primitive accumulation of capital (Dussel et al., 2000). This resulted in on going asymmetric power-relations in the physical world, but also in the digital world, culture and academy. Homogenization is mostly caused by the

migration of commoditized culture from the center to the periphery. As a result, according to this perspective, the impending uniform world culture will mostly be a version of contemporary Western culture, with the loss of local culture manifesting itself most visibly at the periphery (Hannerz, 1991).

2.1.3 Modernity/Coloniality (M/C)

Modernity is a Western concept, widely understood as a powerful collection of cultural, political, and economic interactions that have profoundly affected the nature of social life, and the economy. It stresses humanism, individuality, and self-consciousness; it emphasises rationality and science over tradition and myth; it has a close association with the emergence and growth of market capitalism; and a significant reliance on the state and its legal institutions are some of the general characteristics and unlimited reach of this concept (Linehan, 2009).

As explained before, coloniality is a decolonial concept, which did not emerge in Europe but in Latin America. It shows that all narratives and celebrations of modernity are only half of the story. Grosfoguel describes how this process of coloniality has sustained old hierarchical structures which follow the dynamics of current capitalist accumulation processes and global division of labor (Grosfoguel, 2011). This continuous reinforcing of hierarchies creates a condition of coloniality, where coloniality is seen as constitutive of modernity and is often referenced as a combined notion: *modernity/coloniality* (Quijano, 2007; Mignolo, 2007b; Escobar, 2004). It means that different epistemologies that do not fit modern/colonial global designs operate in the border of the modern/colonial world frame of mind, for which the rhetoric of modernity was and continues to be a crucial factor of justification and legitimization for oppression (Mignolo, 2020).

2.1.4 Coloniality of Power (COP)

The coloniality of power is a concept originally developed by Aníbal Quijano, in 1989, and widely used by the group of decolonial thinkers. For them, race, gender

and work were the three main lines of classification that constituted the formation of the modern/colonial world capitalism in the 16th century (Quijano, 2000). It is in these three instances that the relations of exploitation/domination/conflict are ordered. The concept of *coloniality of power* (COP) or *colonial matrix of power* (CMP) brings the reading of race as "the organizing principle that structures all the multiple hierarchies of the world-system" (Grosfoguel, 2008, p. 123). Along the same lines, Dussel argues that modernity justifies an irrational praxis of violence (Dussel et al., 2000), where coloniality of power enforces specific hierarchies, creating a condition of coloniality – a fundamental element of modernity (Quijano, 2007).

COP proposes that modern capitalism imposes a racial/ethnic classification of people around the world as a basis of its power structures. This is impacted by universalism being promoted as the main conceptual notion through which Western way of life and knowledge structures have hegemonically been entrenched over the world. It is a complex structure of on-going and intertwined levels, like control of economy, of authority, of environment and natural resources, of gender and sexuality, and of knowledge and subjectivity (Mignolo, 2010). For more than five centuries of civilization and development by "Capitalist/Patriarchal/Westerncentric/Christian-centric/Modern/Colonial World-System" (Grosfoguel, 2011, p. 28), most of former colonies in the Americas are still considered sub-developed and reproducing the hierarchical patterns. Decolonial thinking reveals the need for detachment of the apparatus that controls knowledge, determines the way in which it is distributed and naturalizes the salvationist rhetoric of modernity (Mignolo, 2008).

2.1.5 Coloniality of Knowledge (COK)

Coloniality had far-reaching implications for the formation of Latin American communities, as it modelled institutions and replicated historical-structural dependence. This resulted in the development of a socio-racial stratification paradigm between *whites* and *others* deemed inferior. Even though whites were only a small percentage of the total population, they dominated and exploited the Indigenous, Afro-descendant, and Mestizo populations. Because they lacked control over the means of production, these majority (minoritized) groups were forced to subordinate

their epistemology to the copying of European cultural models. The coloniality of power and knowledge has traditionally prevented a true process of independence in many countries.

Since the 16th century, the university/academy has been a driving force behind the globalisation of everything else: governance, economy, art, aesthetics, technological instruments, and so on, all of which have resulted from the globalisation and coloniality of knowledge. In the process of forming the idea of Western civilisation, the master platform of knowledge and ways of knowing, local Amerindian's knowledges were depleted, and Latin American's academic contribution ignored (Mignolo, 2020). To engage into those perspectives, even though the local one has been suppressed for many centuries, is fundamentally important to think in terms of "dichotomous concepts rather than organizing the world into dichotomies" (Mignolo, 2012, p. 126). In that sense, Mignolo [Ibid.] revisited different concepts like: "double consciousness", "new mestizo consciousness", "frontiers of theory", "thinking from the margins", etc. to propose *critical border thinking* as a critical examination of the modern world system, via the lens of coloniality of power and specific and local histories of modernity/coloniality.

Critical border thinking is the subaltern's epistemic response to modernity's Eurocentric project. Border epistemologies redefine the emancipatory rhetoric of modernity from the cosmologies and epistemologies of the subaltern, located on the oppressed and exploited side of the colonial difference. Beyond the restrictive limits given by European modernity, border thinking results in a redefinition/subsumption of citizenship, democracy, human rights, humanity, and economic ties. Border thinking is not anti-modern, it is the "a decolonial transmodern response of the subaltern to Eurocentric modernity" (Grosfoguel, 2011, p. 26). And this kind of thinking is central to my thesis.

2.1.6 Coloniality of Technology (COT)

As argued above, colonialism and the colonial matrix of power have structured the world and the global economic system into centers and peripheries. The centers

are countries focused on high-wage and high-skill production, and the peripheries of the world focus on labor-intensive, low-wage, and low-skill production and exploitation of raw materials. This structure has been developed since at least the first century of colonisation in Latin America, where natural resources are extracted. Until the year 1660, 185,000 kilos of gold and 16 million kilos of silver landed at the Port of Spain, exceeding three times the total European reserves (Hamilton et al., 1934 cited in Galeano, 1987). This exportation continued for five hundred years during the colonial era and has left its impacts on our contemporary world as a part of modernity/coloniality (Aráoz, 2020).

Due to the importance of minerals and metals that are needed to the development and that are still extracted from the Amazon rainforest, my research has also focused on examining mining, its practices, and its disastrous impact on nature, including humans (see e.g., Jacka, 2018; Aráoz, 2020 for an overview). According to Maria da Conceição Tavares (2000) these economic dynamics enable *growth outward*. This means, for example, that countries in Europe use their primary products to grow inward, using their internal and external natural resources for internal growth. At the same time, countries in the peripheral would use their primary products to be used for growth outwardly, exporting their natural resources to the center, while importing most of the technological goods which are also produced by the center (perhaps from their same resources that they first exported). Several Latin American countries have gone through phases and developments such as these, resulting in unbalanced power-relations in the physical and our current technocentric world.

Underlying technocentrism is a technologist mindset, a concept coined by Doig Klinge (1997), that places disproportionate value on technology in contemporary society. The impact of this phenomenon on people's lives is determined by how much each society values it. The technological mindset, according to Klinge, emerged during the modernity, where the purpose is to recreate the world according to technological rationality. In that mindset, Badimo (2005), Baumüller (2012), and Furuholt and Matotay (2011) argue that a *lack of technologies* and/or access to knowledge may be part of the cause for poverty at the systemic rather than individual scale, and that access to technologies can, in turn, reduce issues like poverty.

Furthermore, the positioning strategies of the Global North and their one-size-fits-all, center-focused, and techno-solutionistic approaches, market them as being successful around the world, including Latin America. However, for Vieira Pinto (2005), technology transfer from one community to another can also be a mistake, similar to how importing technology does not directly lead to development. Bringing this approach to technologies together with an understanding of *growth outward* helps us to see how those countries in the center try to develop countries in the periphery with technologies that aim to solve local problems, even if those problems were caused by the exploitation of local resources to build those same technologies in the first place.

This also directly links to the mining of minerals and metals in the periphery destined for technological advancement in the center, which impacts industry, research, and academic HCI practices. HCI has started to grapple with issues of colonialism at least theoretically through explorations of post-colonial computing (Irani et al., 2010) and decolonial computing (Ali, 2014) but have also started to apply some of this thinking in various countries such as Bangladesh (Sultana and Ahmed, 2019). Building on this, and by looking into advanced technology and mining as part of modernity/coloniality through the lenses of decolonial thinking, helps us get a more context-based and grounded perspective of it. It allows us to explore the power relations embedded, not only among humans but with the natural environment, along with its (direct and indirect) dynamics and effects. It also allows us, for example, to understand more carefully where technology production is placed within this ecology. Lastly and importantly though, it helps us reconfigure our roles as HCI researchers in modernity/coloniality.

To tackle technology's role in coloniality, Varsavsky proposes to first define the kind of society we want to live in: a *people-centered* or *business-centric* one (Varsavsky, 1974). Each of these societies then must have their own technological style, if we want to get out of the problem represented by Western, solution-oriented and capitalist technological practices (which may include cultural domination, economic dependence, or environmental pollution, etc.). Instead of relying on inward and outward growth, he suggests for the periphery to design their own technologies and

technology-related and -oriented policies [Ibid.]. Vieira Pinto, in 1973, defended that "whatever the degree of development, every social group has enough technology to face nature and obtain from it the necessary production to live" (Vieira Pinto, 2005, p. 297). He believed that cultural diversity contains the intellectual and creative conditions to incorporate modern science and create their own advanced technology, no matter how crude the technological stage may seem.

The work discussed in the two previous chapters on the coloniality of knowledge and technology has certain similarities to the work of feminist science scholars such as Harding (2004) and Haraway (2015). They have both proposed that there are different ways of knowing, depending on ones standpoint, and no single way of knowing the world is universally true. If technology is the physical manifestation of knowledge (Suchman, 2002), it follows that there are also different ways of *technologizing*, which is similar to Vieira Pinto's argument. If, however, technology rooted in a single way of knowing the world, such as a Western perspective, comes to be dominant, this is a form of colonialism/coloniality, which is exactly what the works discussed in the previous two chapters. However, where Harding hoped for a greater objectivity resulting from combining the different standpoints, Vieira Pinto rather argues that technology resulting from a single standpoint is sufficient for those who hold that standpoint, without the need to combine but to value what is in the periphery.

The creation of this work provided me with a safe space to contain these conflicts and better grasp the violence we as HCI researchers contribute to inside global technological supply chains, as well as its long-term consequences. Modern colonial mining and technological advancements, according to Araoz, "are, in fact, the perfecting of the art of war" (Aráoz, 2020, p. 9) that has contributed to the current environmental problem. This dilemma pushes us to recognize and accept the presence of interrelated worlds; to admit a worldview that is fundamentally different from that of our forefathers in the West. Following their lead, we must rethink design and technology as design for various ontologies (Hui, 2019; Escobar, 2018), as well as recognizing the pluriverse as an alternative to one world's singular universal ontology: a "world in which many exist" (Cadena and Blaser, 2018, p. 10).

2.2 Capitalocene and Pericapitalism

The analysis made by decolonial thinkers about modernity and the strong critique embedded in it also found purchase outside of their immediate circles. Arguably, the notion of the *Anthropocene* (Zalasiewicz et al., 2011) and alternative conceptualizations, especially the Capitalocene (Moore, 2016), could be considered sister terms to modernity/coloniality, sometimes drawing actively on decolonial ideas, although they originate in Western academic discourses. In the following I will introduce a range of such related concepts and elaborate their importance for my work. I will start with a brief introduction of the Anthropocene.

The notion of the Anthropocene is a contestant for the official title of the current geological age (Gradstein and Ogg, 2004). Popularized by Dutch chemist Paul Crutzen (2006), it aims to describe the influence of humanity on planet Earth and its atmosphere. Humanity, so the term suggests, has become a geological force, shaping the planet so significantly that human and planetary history have become indistinguishable. This influence is manifested through climate change, reduction of biodiversity, homogenization of ecosystems worldwide through the introduction of invasive species, deforestation and erosion through farming which change the sedimentary record and more. Even though the term has so far not been accepted as the official term for the geological age, the concept has very quickly found wide purchase in many domains including academia, especially anthropology (Haraway, 2015), and the arts (Welt, 2021) and has become a useful tool to think with for many. It has, however, also spurred significant critique, which becomes manifest in the Capitalocene (Moore, 2016), the *Chthulucene* (Haraway, 2016), the *Plantationocene* (Haraway, 2015) or the *Necrocene* (McBrien, 2016). While each of them provides unique critique or extensions to the idea of the Anthropocene or becoming their own tool to think with about specific aspects of the Anthropocene, the Capitalocene might be the most poignant and developed of them all.

The term Capitalocene was coined by Jason Moore (2014). It aims to be a corrective to what they perceived as a crucial shortcoming of the idea of Anthropocene: its silence on how we arrived in this age. By using the Greek word for human, anthropos,

the term seems to suggest that all of humanity is equally responsible for the planetary destruction of the Anthropocene. The Capitalocene, however, lays the blame firmly with a specific way of being on this planet: capitalism, and its need for *cheap nature*. In line with World System Analysis and the decolonial thinkers, the authors argue that the roots of the Capitalocene lie in colonialism and the exploitation of natural resources, including human labour. This, Moore argues, is due to the pervasive Nature/Society dualism (Moore, 2016) - a critique reminiscent of e.g. Grosfoguel (Grosfoguel, 2011) and a central element of modernity/coloniality. This dualism enables on the one hand to render nature cheap in actual price but also in its ethical and political value as inferior to society. At the same time, it has historically served, and continues to do so, the exclusionary nature of the human, and the subordination of women, colonial populations, people of colour by considering them somewhat less human, closer to Nature, which facilitates their exploitation, together with the rest of the natural world.

Within the Capitalocene and the Capitalist World System there is thus hardly a place left in the world that is untouched by, or outside of, capitalism, with supply- and commodity chains spanning the globe, connecting peripheries and centers. In this world system, anthropologist George Marcus argued, there is thus also no culture that can be understood just as unique in itself but needs to be seen always in relation to this world system in a multi-sited ethnographic approach (Marcus, 2012).

Understanding this global connectedness has become a central concern for much of contemporary anthropology. Anna Tsing has delivered especially compelling examples of supply-chain studies as methodological and analytical attempts to grasp globalisation. In her book "The mushroom at the end of the world" (Tsing, 2015b) she follows the Matsutake mushroom across the world, from its origin in North American, Chinese and Japanese forests and its relation with other species there, to its state as a highly-prized delicacy and gift in Japan. While the mushroom is the central actor of this story, she encounters many others in its journey, from pine trees to elks and foresters to mushroom pickers and vendors at various stages of the supply chain to scientists studying Matsutake and the (im)possibility of cultivating it. The book makes clear, however, that such supply chains and therefore the capitalist

world system has an edge. Some of the pickers, she points out, are located at this edge, as they introduce the mushrooms into the supply chain, but at the same time value their freedom more than a stable income. She terms this pericapitalism, which is connected in many ways to the capitalist world system, but is often guided by other, non-capitalist and non-growth-oriented values. While pericapitalism might offer hopeful glimpses into a possible non-capitalist future, the edge of capitalism is also a risky and destructive place to be for rural communities, as Anita Say Chan demonstrates in her account of a rural Peruvian village (Chan, 2013). Known for their pre-Colombian practice of pottery-making, a series of interventions and tools such Denomination of Origin turn these items into commodities to be traded on the global market, the artistic practice into mass production, craftspeople into global entrepreneurs and at least some relations between villagers into hostile competition.

2.3 HCI

A central infrastructure of the modern world system of the 21st century and of processes bringing the periphery closer to the center is the internet. The expansion of internet connectivity is often accompanied by a rhetoric of development and has been a central concern of HCI4D or ICT4D. A goal of my thesis is to add a reflective lens to this discourse by studying how communities at the periphery of the world system manage their position, using digital technology. In this chapter, therefore, I will outline work form within the HCI discourse on internet connectivity and expand briefly on the specific accompanying ideas of development and the lack thereof. To begin, I will present work reflecting on HCI's role within and relation to the global (political) economy.

2.3.1 HCI and the Political Economy

"The alleged beneficiaries might be lured into a promise of development even at the cost of eroding their traditional values," write Díaz Andrade and Urquhart (2012, p. 289), citing HCI's *modernity bias* and a tendency to promise better liv-

ing conditions, which may be embedded in researchers' believes but alien to the traditional communities. This thesis argues that HCI interventions should include more detailed studies and more engagement with those who will be affected by any activity, as it is already argued by the Socio-Informatics approach (Wulf et al., 2018). In that sense, ethnographic and participatory research should be conducted to inform HCI interventions, as well as critically examine the economic assumptions, models, and knowledge systems embedded in HCI projects and within ourselves as HCI researchers. Below I will bring some inspirations in this field.

The relation between the global political economy and computing has been only scarcely studied within HCI and related disciplines, although with growing frequency and has been tackled from different directions. In a series of publications, Bonnie Nardi & Hamid Ekbia have explicated the political economy of computing (Ekbia and Nardi, 2015; Ekbia and Nardi, 2017; Nardi and Ekbia, 2017; Ekbia and Nardi, 2016). They outline the importance of value and the creation of wealth for capitalism, the hidden role of class and increasing social control for computing. They argue that these aspects of the capitalist system are only poorly grasped by HCI scholars and argue for a stronger engagement with them and inclusion in HCI theories and systems design. Possibly examples include future approaches such as "class-conscious design" or "labor-friendly design" (Ekbia and Nardi, 2015). They have paid special attention to social inequality in their work, pointing to the consequences for HCI of Marx's contention that consumption patterns are social productions, not givens, and that technology design caters for specific consumption patterns and needs (Ekbia and Nardi, 2016) (see also e.g., Zuboff, 2019). It is up to us as designers to decide which ones. To allow HCI to take up a political economic perspective and deal with its relation to social inequality, they recommend taking into account historical developments outside of HCI itself, gain a broader perspective on context and become explicitly political. A special focus has been given to the notion of labour. In a recent book they introduced the term *heteromation* to deal with the changes to labour brought about by systems that do not eradicate labour through automation but rely on it as critical input yet make it invisible. This invisible labour has been termed the human infrastructure of AI work, addressing *human-in-the-loop* approaches such as Amazon Mechanical Turk or ScaleAI (Mervich, 2020). Even though narratives

of automation, AI and robotics are filled with promises of new high-skilled jobs, research suggests that such high-skilled tech jobs might be outnumbered by newly created low-skill tech jobs such as those that keep the AI systems running (Casilli, 2021). Authors also notice that the creation of such digital labour largely takes place in the Global South, representing a value extraction from the Global South to the Global North, and suggest that the idea of coloniality needs to be taken into account as an analytical lenses to make sense of these process, in order to make invisible work visible (Casilli, 2017). Despite the critical role of labour for such systems, those that provide it are usually not (fairly) compensated for it. Such concerns about the future role of labour, however, are only rarely discussed in the HCI community in relation to the design of these systems.

Despite their observation that HCI has an insufficient grasp on these issues of political economy, a growing subset of the literature examines the role HCI and related practices play in larger economic and political contexts, often critically dealing with innovation. Such works have for example focussed on practices of making and makerspaces in regional economic developments and imaginaries. They have for example examined *making*, makerspaces and hardware startups as sites of HCI innovation, located outside of academia (Lindtner et al., 2014), as well as the values that underlie and inspire such activities, including the wish to democratize technology but also technosolutionism (Lindtner et al., 2016). Similar studies have explored the narratives of innovation and design in global economic development. They point out the force with which ideas such as design thinking overtake global imaginations of design, although their origin in Silicon Valley culture and economy often does not fit with local contexts and hide what other design practices exist locally. Such Silicon Valley-rooted ideas and models for innovation, including design thinking, incubators, accelerators, hackathons etc. are increasingly portrayed as the universally successful template for innovation processes, and are taken up, promoted and enforced by design agencies. This has colonial overtones, hides local difference and risks to eradicate other appropriate models. Furthermore, they largely benefit Silicon Valley companies and their allied organizations, yet do little to support local innovation attempts (Avle et al., 2017; Avle and Lindtner, 2016). This has also been confirmed by Csikszentmihalyi et al. (2018). Studying the political economy

of technology innovation in sub-Saharan Africa, they point out how a tremendous amount of hope has been pinned on IT technology to support the achievement of development goals, resulting in support for the IT sector - for example through the creation of hubs all over the continent, yet how they obscure the role of global monopolies, race, international power dynamics play, for example in limiting access to capital. Their study found, for example, that investments have predominantly been made in companies headed by white, foreign CEOs, not by Africans, or that data plans are still prohibitively expensive for many that were supposedly benefiting from smartphone apps.

In a lengthy critique, Lily Irani (2019) takes the prevalent belief in technological innovation and individual entrepreneurship as sources of welfare and development to task. She focuses on how innovation in India has come to be portrayed as a tool for every citizen to address social issues such as poverty and improve their life. This often includes topics or projects very close to HCI, especially HCI4D narratives. Developing goods and services (also digital goods and services) *for the poor*, open source, appropriate technology, and citizen science. Developing such goods and services enriches middle class entrepreneurs. Focusing on entrepreneurship and technological innovation as sources of development and welfare, Irani writes, removes such issues from the eyes and hands of the state and puts these matters in the hand of entrepreneurial citizens without accountability. Since especially middle-class citizens strive as entrepreneurial citizens, their dreams and aspirations become embedded the goods and services they develop for others. The book therefore holds plenty of cautionary lessons for any HCI researcher wanting to engage with development-related issues through innovation and digital technology [Ibid.].

2.3.2 HCI4D and the edge of capitalism

As I have already briefly mentioned above and as is probably already obvious, over the last two decades the internet has expanded across the globe rapidly (Zook and Shelton, 2017) and become a central element of the capitalist modern-colonial world system. Not only it is crucial infrastructure for economic, political, and cultural activities, including marketing and transactions, but also it has become a tool for

the extraction or *mining* of information about all human and more-than-human activities and the translation of this data into financial value (Couldry and Mejias, 2019; Zuboff, 2019). Given this crucial role for economic development, it is not surprising that tremendous efforts have been and continue to be made by various actors to expand internet connectivity across the globe (Badimo, 2005). However, issues of politics in HCI research continue to be rarely debated. As such, it has been a central concern of the HCI4D discourse. In the following then I will outline core works within this discourse and reflect on the idea(s) of development it explicitly and implicitly embodies.

Very early attempts of the HCI4D community to expand internet connectivity have been in the form of what has been called *tele-centers* (Gomez, 2014), and were established in Africa, Asia and Central and South America. In the form of physical spaces that provided access to computing equipment and internet access they aimed to improve communication, economic activities, education, or personal development of their users (Reilly and Gómez, 2001). Such centers, however, were plagued by a number of challenges, including financial unsustainability, political barriers, a lack of customer service or simply content that proved irrelevant to the user groups (Toyama and Kuriyan, 2007; Best and Kumar, 2008), making them rather controversial.

The advent and diffusion of mobile phones made them an alternative and much more prominent means to provide internet access and tele-connectivity in general. Several studies have pointed out, for example, their positive influence, on health, social relations and economic practices in Africa (Aker and Mbiti, 2010) and their supposed role in decreasing inequality worldwide (Asongu, 2015). This has led large actors including the World Bank to announce *the mobile revolution* (Demombynes and Thegeya, 2012; Steinbock, 2005). More recent studies, however, cast doubt on this universally claimed success. They have shown that even many years after the pronouncement of this revolution and the subsequent inclusion of mobile technologies in a myriad of development projects and funding, mobile phones and usage costs are still prohibitively high in many African countries (Csikszentmihalyi et al., 2018).

Due to the economic consequences of globally expanded connectivity and its potential for value creation for example through the accumulation of data from users, technology companies themselves have been very active in providing internet access through a variety of means. Facebook's project *Free Basics* for example aims to provide free access to a number of selected online services through a mobile phone application (Sen et al., 2017). While it does not provide access per se - users still need to have access to the internet through, e.g., a WiFi network - it eliminates usage costs for the selected services and websites. Perhaps unsurprisingly, this initiative has faced strong criticism due its clear violation of net neutrality principles [Ibid.] and has been termed a Walled Garden (Romanosky and Chetty, 2018; Best, 2014). India has withdrawn from the project in consequence, but many other countries remain (Cellan-Jones, 2016; Bin Morshed et al., 2017). Facebook achieves an even wider reach with Facebook Zero, which is realised through partnerships with local internet provides and gives users free access to a trimmed-down version of Facebook. To be able to provide internet access themselves, Facebook has also been working on project to provide access via a network of Satellites. Similarly, Google developed a project titled "loon", which aims to provide internet access in rural and remote regions, including the Amazon region, via high-altitude balloons (Loon, 2018). However, the project was shut down in early 2021 due to a lack of commercial viability. Another project called Starlink, operated by Elon Musk's SpaceX company, also aims to provide affordable internet to underserved areas via a large number of satellites (Stalink, 2022). This central role some of the biggest companies from Silicon Valley play in providing internet access around the world has been met with deep scepticism and critique, pointing to their often monopoly-like positions, especially in regions where governments lack the resources and will to provide infrastructure themselves, and these companies interest in extracting data from users, which has been pointed out as a form of digital colonialism (Pinto, 2018). In light of such problematic constellations, several authors have asked HCI4D and ICTD community interrogate and critique the imaginaries these companies put forward and actualise with these developments, and question the role HCI plays here (Smart et al., 2016; Graham and Mann, 2013; Nardi and O'Day, 2000; Toyama, 2015; Graham, 2019; Graham et al., 2014), and whether digital tools are alleviating or amplifying inequalities.

Despite the large role such companies are aiming for, they are not the only actors and studies have described a variety of local approaches to internet provision, for example in Palestine (Wulf et al., 2013a) or Bangladesh (Bin Morshed et al., 2017). Several studies have specifically looked at internet connectivity in Latin American contexts (see e.g., Medina, 2006; Dye et al., 2018; Nemer et al., 2013; Nemer and Freeman, 2015; Nemer et al., 2013; Nemer, 2016; Silva et al., 2020). They illustrate an interesting approach to connectivity from Cuba, countering the problematic efforts of large corporate of government actors. For many years, internet access in Cuba was hard to come by, due to a mix of international economic politics and embargos as well as the worries about worries about previously mentioned digital colonialism. Considering this lack of connectivity, residents have developed the infamous Street Net (SNET) (Dye et al., 2019), an island-wide community network, and have found other offline means to access internet content through the *paquete semanal* (Dye et al., 2018), a weekly and widely distributed selection of online content. In recent years the Cuban government have slowly opened up internet connectivity for example by providing internet access via WiFi in public parks (Dye et al., 2017). Especially the local bottom-up efforts, however, provide glimpses into alternative imaginaries of large-scale information networks. Similarly, a range of NGOs aim to promote and facilitate the development of bottom-up and community-led networks. Coolab (2017) and Rhizomatica (2018), for example, aim to support the deployment of internet infrastructure and offer additional trainings for the management and maintenance of community networks, with a strong focus on Latin America. Experiments with such constellations in the Amazon rainforest have led activists and authors to "question the paradigm of inclusion as an imperative for underserved third world/global south areas" (Caminati et al., 2016, p. 171). There is a historical precedent for such alternative imaginaries in Latin America, as Medina's work makes clear. She investigated what Project Cybersyn, a computer network in Allende's socialist Chile to support the management of the growing social property and production. Nevertheless, and despite the efforts of companies, governments, activists or HCI researchers, the studies in this field also make clear that simply providing access to the internet or infrastructure is not enough to facilitate connectivity or any of the supposed benefits of connectivity one might hope for (Poveda, 2016). For example, a study in Bangladesh showed that digital inclusion

was dependent on a variety of factors apart from internet access, including gender, socio-demographic context, and physical proximity to the capital (Genilo et al., 2015). Others found that shared physical spaces, such as provided by tele centers and especially libraries facilitate inclusion through the services and assistances these spaces offer (Donner and Walton, 2013).

If connectivity is however insufficient this begs the question: how exactly does the internet create change and development? In line with its tremendous economic role in the world system, one answer to this question is that is supports the economic practices of, for example, rural populations and their agricultural activities (Oduor et al., 2018; Wyche and Steinfield, 2016; Crabtree and Chamberlain, 2014) or generally facilitating some kind of entrepreneurship (Darwin, 2017; Darwin et al., 2018).

The ICTD community has provided considerable nuance in studying processes of use and the appropriation of mobile technology in a variety of regional contexts (see e.g., Furuholt and Matotay, 2011; Patel et al., 2010; Uduji and Okolo-Obasi, 2018; Baumüller, 2012), finding for example that very specific use patterns emerge in specific conditions (Wyche et al., 2013; Bidwell et al., 2010; Axup et al., 2005). Such work has shown how specific cultural factors mediate the use of mobile technology. Furthermore, mobile phone use and specific applications have played an especially important role in agriculture, and have been shown, for example, to affect the entire annual farming cycle and the livelihood constructs that come with it (Furuholt and Matotay, 2011). A limited amount of research has concerned the local Internet practices of marginalised communities in Brazil and Latin America. While observing LAN Houses in Brazil, Nemer et al. (2013) argue that the role of digital technologies must be understood through the socio-economic and socio-cultural context. Spyer (2017) explores the use of internet by low-income Brazilians from different perspectives, including education, relationships, work, and politics. In Latin America, through the development of a web-based application for cooperative technicians and coffee farmers, they realised that the whole process is of low profitability for smallholders compromising the sustainability of the coffee industry (Leshed et al., 2018). Others

examine the use of Facebook to report crimes and safety-related data in Mexico (Alvarado Garcia and Le Dantec, 2018).

Despite the central role internet connectivity as a goal, and as a prerequisite for other applications, has played for the HCI4D and ICTD community, the idea of development itself has not been given a lot of attention and has remained under-conceptualised. The discourse has not engaged strongly with the question of what exactly we want to achieve when we talk about development and its relation to global capitalism and the modern world-system to which it clearly belongs, as has been pointed out by several authors (Thapa and Sæbø, 2014; Walsham, 2013; Avgerou, 2010). As we have already mention above, decolonial thinkers have made it clear that development is a deeply problematic idea, central to modernity/coloniality and eradicating local economic practices and relations in favour of global-capitalist relations. Without questioning development and conceptualising it sufficiently, HCI4D and ICTD interventions thus run the risk of perpetuating the hegemony of capitalism, coloniality and modernity within their perhaps well-intentioned projects, rather serving to dominate local practices and values with Western assumptions (Díaz Andrade and Urquhart, 2009; Díaz Andrade and Urquhart, 2012).

Outside of the larger HCI4D discourse, however, post- and decolonial thought has begun to infiltrate our discipline, leading to a variety of critiques. Borrowing heavily from the language of Wallerstein, Dourish and colleagues have reflected on the colonialist impulse embedded in notions of *ubiquitous computing* (Dourish and Mainwaring, 2012), pointing out that computing knowledge is assumed to be universal, but in facts migrates from centers of power to the peripheries, and is thus clearly not universal, but in service of centralised power. A well-cited paper by Lilly Irani and colleagues has put forward the notion of postcolonial computing (Irani et al., 2010), although what exactly post-colonial computing actually looks like remains unclear. Others have built more strongly on the decolonial line of thinking and have critiqued the euro-centric modern philosophies of technology underlying much of computing (Ali, 2014). Several studies have also tried to investigate practices at the edge of the modern world system, for example those of political activists (Tan et al., 2013; Soliman et al., 2019; Sen et al., 2010; Waddell et al., 2014; Ngidi et al., 2016),

the solidarity economy in Greece (Vlachokyriakos et al., 2018), or various food- and farming-related practices and communities (Bødker, 2015; Landwehr et al., 2021; Berns et al., 2021), yet also none of these explicitly try to analyse their findings in relation to the idea of the world system and decolonial thought.

It is here where I believe my dissertation makes its greatest contribution. The work in this thesis brings together and investigates explicitly (and through detailed ethnographic field work) the digital practices of peripheral communities in the Latin American Amazon region and through a decolonial lens analyses how these digital practices serve to manage their position at the periphery of and relation to the capitalist world system.

3

Context and Setting

Rural communities in Latin America, more specifically in the Amazon region, exist in relation to national and global pressures. In my research, I have used relationships built before entering the PhD program. Both community relationships were results of several months' preparation for a two week-long social design workshop, in partnership with local institutions. From 2012 until 2015, through design and hands-on activities organised by International Development Innovation Network (IDIN/MIT)[1], I facilitated and developed low cost and sustainable technologies in areas with no access to basic services around the globe. However, in 2015, I felt the need to go back home and share my recent knowledge gained. In the following two years I organised several design projects together with the small rural community of Boa Vista do Acará, supported by the IDIN network, and have been working with the community in various capacities since then.

The second community I engaged with is in the Colombian Amazon region. In 2017, just after the Peace Agreement between Colombian Government and FARC-EP, Colombian colleagues from the National University of Colombia, in partnership with United Nations (UN) and IDIN, would plan visits and activities in one of the 24 areas around the country used as a transitional space to receive the approximately 7,000 FARC-EP ex-combatants. These spaces were named and will be referred to as Territorial Spaces for Training and Reincorporation (ETCR), as my visits happened during the year of 2018.

Both communities are in the rural, remote, and unconnected (physically and digitally) Amazon rainforest. In the last years of my PhD, my contact with the

[1] http://idin.org/

members of the community was reduced to monthly chats on social media. Below, I will describe both communities and how my engagement with them occurred.

3.1 Acará

3.1.1 Description of community

Boa Vista do Acará has an estimated 200 families that use the land in a mostly informal economy. The community members are *Ribeirinhos*, as they are termed, who are part of Amazon's non-tribal indigenous rural population of approximately 951,000 in the Amazon. Nearly 255,560 ribeirinhos (around 4.6 percent of the population) are in the State of Pará (Oliveira and Fridrun, 2006). They belong to one of Brazil's most economically marginalized groups (Ribeiro, 1995), at the same time a rich local culture where herbs are used as traditional remedies and in healing rituals, where local food plants like cassava and açaí are grown, and where fishing and forest extraction are typical activities. The best way to reach the community from the capital Belem is through the river. In the harbour, people can choose between a boat called *popopo* or a *voadeira* (speedboat). The time of departure is often irregular, but journeys by popopo take around 50 mins and by voadeira around 15 mins. Once the boat departs, there is no internet connection while crossing the river, so online last-minute arrangements must be done before departure. Once arrived at the harbour of Boa Vista, the journey usually continues with a motorcycle ride, a bicycle ride, or a walk. It is rare to see cars on the road.

Electricity arrived in 2010, a year that only 61,5 percent of the Northern Brazilian population had electricity in their homes (IBGE, 2011). Even though the whole village is crossed by power lines that transport electricity from hydroelectric dams to mining, the roads do not have proper illumination and in the community, the phones are used as flashlight to see the road, the holes, to be seen by drivers, and to avoid stepping on any animals that might cross the road at the same time, like snakes. The area also lacks mobile networks and internet connectivity. Programs from the government intent to increase electricity coverage, roads are built, and several projects are expected to bring digital TV and telecommunications access. All of these

influence the local life of the community and interfere in the traditions and way of living. There is a pressure to seek work and education in the capital and outside of the rural areas, resulting in increased migration to cities. This erodes personal bonds among community members, while simultaneously making the internet use essential for educational, social and economic purposes. As one member says: *"The development opened the door for the people of the community to work in the city and many stopped working with herbs, flour, plantation. We left aside the manual labour here to work at manual labour in the city."*

3.1.2 My engagement with them

In 2014, with the support of a network of grassroots innovators called IDIN, which I mentioned above, I began to organise a several weeklong design workshop in the Amazon area of Brazil, where I am from. I visited five communities around Pará (a state of Brazilian Amazon region), until I met one of the members of Acará community during a conversation at an organic fair in Belem, the city where I am from and the capital of the state of Pará. He invited me to visit the Association of Producers of Organics in Boa Vista (APOBV) to introduce me to some members and to the area. After some conversations, we collaboratively planned an event, so I began to work in Acará on a daily basis for the following year.

Through my involvement, I gained an understanding of their direct experience of the tensions between a traditional way of life and developments that include the advent of roads, electricity, globalized markets and the internet. We worked on addressing challenges ranging from internet connectivity to developing a new product out of the seeds of a fruit. As an activist, in every project, I engaged the dwellers of the region in conversations about the possibilities of autonomous progress and how to build trust amongst the community members around us.

As part of our collaboration, we initially ended up organising three events: an Edible Forest Garden workshop, that yielded gardens, planting species following the permaculture principles. Afterwards we organised a workshop on ecological buildings, in which we created a compost toilet system, and a Bioconstruction

workshop that yielded a Humanure management system. Each of these workshops lasted several days. Finally, we organised a two-week long design summit with participants from all over the country as well as abroad, who worked together with community members to address topics and ideas such as shrimp and fish farming, chicken farming, fruit processing, and traditional herbs that many community members collect or even grow. One of these projects addressed the community's wish for an improved internet connection, and developed a community network system, together with the Federal University of the state Pará (UFPA), located in Belém. This project is a central aspect of my thesis and continues and evolves until today, March 2022. It is managed and maintained by a member of the community and provides internet in several public spots as well as a few private homes.

3.2 ETCR

The second community this dissertation evolves around is a group of former ex-guerrillas of Colombian Marxist rebel army FARC-EP. After the peace agreement of 2016, the guerrilla group was split up and members began to live in transitory settlements, as I mentioned above, which were called Territorial Spaces for Training and Reincorporation (ETCR). One of these ETCRs is the community I focus on. To provide necessary context, I will briefly describe the history of the Colombian armed conflict, which is told in more detail in chapters 6 and 7. I then describe the community itself and the history of my engagement with them.

The origins of the Colombian armed conflict are rooted in a longstanding conflict between liberal and conservative parties of the conflict, which after the assassination of Jorge Eliécer Gaitan, erupted into a first armed conflict, beginning in 1948 and lasting 10 years, known as "La Violencia". During this time, many small armed groups formed, some of which continued to exist even after the end of La Violence and during the joint reign of the two parties until 1976. One of these groups would come to be knows as FARC. After the end of La Violencia they had organised themselves into an autonomous but peaceful enclave. After being attacked by Colombian forces with the support of the United States of America, which destroyed the village and their crops, the group re-formed as a guerrilla army, and engaged in an armed

conflict which lasted almost 50 years. During this conflict their membership grew to 18,000 members. While they were central to the conflict, they were only one of many actors next to other left-wing guerrilla armies, right wing paramilitary groups, criminal cartels, and the Colombian National Army. After several failed attempts to end the conflict, FARC-EP signed a peace accord in 2016. As part of this peace agreement, guerrilla members that handed in their weapons were placed into the aforementioned ETCRs, where they received housing, basic income and economic entrepreneurial training to aid with their reintegration into Colombia life for the initial duration of two years. After an extension of this arrangement, most of the ETCRs still exist today. Chapter 7 explores reasons for the continuous existence as peripheral communities as does this dissertation as a whole. While the conflict ended officially, the violence did not. Not all FARC-EP members handed in their weapons, and some continue their fight in different organisations. Yet also many progressive social and environmental leaders have been killed by unknown groups, including former guerrillas in the ETCRs, such as the one in question, where one of my collaborators was killed two months after my second visit.

3.2.1 Description of the community

The ETCR, I focus on, is located in the Colombian Amazon area. It is home to about 400 people, although its population has grown slightly, due to the arrival of new children as well as other family members. Since ETCRs were initially planned as rather short-termed temporary spaces, their infrastructure is basic. Housing consists of wooden huts, which replaced the initially planned plastic tents, at the behest of the community's leaders. Since moving into the space, the community managed to add several communal buildings as well as agricultural structures which supply their food. It is remote from any city or other settlement, and reachable only by dirt road and 4x4 vehicle. The camp relies on electricity supplied by a diesel generator, fuel for which is delivered by a government truck. The group is largely self-reliant in terms of food, but the infrastructure, especially electricity relies on government support, which also affects their agricultural practices that depend on electricity. Although guerrilla members were almost completely cut-off from contact with family and friends outside the group for the duration of the conflict, they have begun to

rebuild family ties, and as a result some family members have moved into the space, and new babies have been born, slowly growing the population. In my view, as I explain further in chapter 7, this together makes it less likely for the community to disband, as foreseen by the peace agreement and more likely for them to become firmly established as a peripheral community.

3.2.2 My engagement with them

I met the community for the first time in January 2018, at the beginning of my academic journey and my PhD. The same network of grassroots innovators that supported me in the organisation of the events in Boa Vista brought me to the FARC community. I was invited to join a two week-long social design workshop in the ETCR, organised by the Universidad Nacional de Colombia and a North American University (NAU), where the process of co-design was used to build trust and contribute to reconciliation in areas of post-conflict zone. During this trip, I spent a total of 7 days in Bogotá where I already met former guerrilla members outside of the ETCR and three weeks in the ETCR, where I constantly interacted with its residents. I remained in contact with several community members including its leader, a former general of the guerrilla group, after this first meeting. Together we planned a second visit taking place in the summer of the same year. That second visit lasted two weeks. Since then, I have been in continuous yet infrequent contact with the community.

4

Methodology

This dissertation brings together a variety of methodologies and methods. As much of my work began before I re-joined the academy, I was often guided in my actions by my own convictions, values, feelings and intuitions, rather than adherence to any formal method. During my academic work I then encountered methodologies that reflected my practice or helped me to reflect on my own practice. Furthermore, I began the work of this thesis as an activist, predominantly interested in offering practical support for the communities I worked with, building relationships and engagement with each other, rather than knowledge creation. This commitment to activism, I believe, has lessons for the HCI community. It provides a bridge, in principle, between academic interests and engagement. Having said that, once I became an academic, I tried to bridge and merge these interests and roles, which was and still is not an easy process. I reflected on these attempts of merging activism and academia, as well as the methodologies I draw on to do so for my work in a publication. This publication is the core of this chapter. As my own practice is rooted in activism, my work is broadly action-oriented and participatory, aiming at doing things together with other people rather than studying them as an outsider or otherwise imposing myself, I will first briefly introduce methodologies that reflect these broad commitments and which I build on in my work, and then present the respective publication in chapter 5.

There are number of ways in which HCI and CSCW and other disciplinary theories are trying to come to terms with the notion of practices and its relevance for research and design. In this thesis a number of strategies have been adopted in terms of design and they included elements that resemble to Grounded Design (Wulf et al., 2018), Participatory Design (Björgvinsson et al., 2010), like doing ethnographical

and observational work (Randall, 2018) before I began the design process and pay attention to long term appropriation.

4.1 Participatory Action Research (PAR)

Overall, my work was driven by collaboration with the communities I worked with, and mutual participation in whatever we were doing together. The deep reference for participation is central to the methods and methodologies that have broadly come to be known as Participatory Action Research (PAR). Two central - and Latin American - thinkers and practitioners associated with PAR are the Brazilian Paulo Freire (1987) and the Colombian Orlando Fals-Borda (2013), whose works have both influenced and helped me make sense of my own practice.

4.1.1 Paulo Freire

Brazilian educator and pedagogist Paulo Freire created foundational work for the approach of participatory action research. In his writings he drew on his own work of several decades with rural communities in Brazil. This work led him to formulate his Pedagogy of the Oppressed and Pedagogy of the Freedom. The focus of Freire's entire work is the liberation of oppressed people through education. Education, however, does not follow the *banking* model of Western school education, but is grounded in experiences of those who interact, enabling the realisation and overcoming of obstacles, part of their oppression. The central element of this process is dialogue, understood as involving love and trust for one another and humility. This is crucial, as learning, in Freire's pedagogy, is always mutual learning. It is not the teaching of content by one person to another, but a mutual process, in which all parties liberate themselves, to avoid that oppressed become oppressors after their liberation (Freire, 1987). The helper, furthermore, does not dominate the helped, does not control them, but helper and helped contribute to each other, help each other with their mutual transformation and liberation (Freire, 2005). Furthermore, crucial to Freires' approach is a conviction that neither action nor words are sufficient alone but need to accompany each other in a practice of action and reflection. Theoretical reflection

without action is impotent, action without reflection is blind, both separately are not desirable.

From this I took early on the conviction that in my engagement in both communities I could not be the helper, the liberator, but that I needed to be opened to be changed by the process, to change myself actively in a process of unlearning and relearning from and with my collaborators, and that our encounters and engagements with each other needed to filled with the feelings of love, trust and humility. I needed to build real relationships and become friends with my collaborators.

4.1.2 Fals-Borda, Senti-pensar

In the 1970's a multidisciplinary group of Colombian activists, educators, farmers, artists and researchers built on Freire's work to develop PAR as an approach to a reflective activist practice specifically for their context. It was developed as a locally appropriate, bottom-up driven and often rural approach to create social change and was perceived in direct opposition to colonialist and failing notions of development driven by the Global North (Borda, 2013). PAR was the attempt to realise *authentic participation* that would do away with boundaries and distinction between subject and object in research. Fals-Bordas and colleagues' idea of PAR was intensely and explicitly political and connected to a variety of institutions including government organisations, where PAR was perceived as an influential, effective, and most importantly appropriate approach. PAR quickly spread through the globe, also because the Colombian group perceived themselves in alliance with movements in many other countries of the Global South as well as North. A crucial concept was the idea of *sentipensar*, a Spanish neologism that translates to feeling-thinking. It highlights on the one hand the crucial role feeling plays in research and praxis, that it does not consist only of thinking, and to honour and center this emotional component. This is especially pertinent in participatory approaches to action research, that embody a mutual encounter between people, who become connected to each other through feelings and thinking together.

In my own work, feeling was central. It started with an emotional connection to my academic and practical interests, the connection to my family's history, my grandmother's former life that I saw mirrored in the lives of the people I encountered in Boa Vista do Acará. Emotions were also central in the emergence of relationships, friendships between the people I met and began to work with and myself. As I make clear below, my goal was not to study people, but to become friends and partners in a shared project. Whatever I think and write as an academic I cannot detach from my own feelings about other people, but also not from their feelings, our relations to each other and our collaboration to create social change together.

4.2 Decolonial methodology - Relational Accountability

Beyond Freire and Fald-Borda I also found conceptual, intellectual, and textual allies in the writings of authors who are broadly part of the decolonial thinkers group introduced in chapter 2. Inspired by the analyses of writers such as Walter Mignolo (2011), Catherine Walsh et al. (2006), Alberto Acosta (2016) and Ramón Grosfoguel (2011), and rooted in their own experiences as indigenous academics, writers such as Linda Tuhiwai Smith (1999) and Gloria Anzaldúa (1991) have put forward proposals for Decolonial Methodologies, which resonate with and mirror parts of my own practice. The work of Shawn Wilson (2008) introduced me to the idea of Relational Accountability.

I found myself with a methodological kinship to Indigenous Methodologies and the concept of Relational Accountability. While I do not claim for my methodology to be Indigenous, reading about it confirmed my way of working, gave me words and thoughts to think about it and to expand it. Relational Accountability is the idea that relationships are central in research and that we are accountable for them. Relational Accountability is rooted in Indigenous philosophies, ways of living, and values relationality over reliability and validity. It casts away any aspiration of objectivity as impossible, in favour of accountability for the relationships within which one conducts research. It thereby can be understood as a response to Western notions of academia and the pressure to conform and adapt one's way of working to Western expectations and norms. Relationality is central to every stage of research,

from selecting a research topic, to data collection, analysis, and presentation of results. Research needs to be *with* the communities that are researched, not *on* them. Topics need to be decided on by and with the community. Data collection, for example interviews, are understood as conversations, transcending the researcher-informant dichotomy, and serve to create relationship. This means that we become co-learners, co-constructing knowledge in relationship with each other, rather than extracting, obtaining, collecting data, discovering knowledge like Columbus. This also means that any knowledge created in relationship belongs to this relationship, the relationship is what gives it meaning and it cannot be detached from it, which also means it cannot be owned. Similarly, analysis happens in collaboration. This is not, Wilson (2008, p. 122) points out, with the aim of triangulation to remove distortions of individual perceptions, but to ensure representation of all voices and to create the possibility to learn from one another. Furthermore, the goal is to strengthen the relationships in which the research is rooted, which is a deviation from Western approach that seek to dissect a phenomena into its minuscule parts. Honouring the approach of Relational Accountability would mean to do the opposite, to take all relations into account and see the whole. Lastly, (re)-presentation of research must also represent the relationships in which the research is rooted, which give it meaning, to which it belongs. This means making explicit the positionality and relationships of the people involved, the context to which it belongs, to prevent it from being taken out of the relational context.

My own work takes up several of these aspects. Even before I began my path of an academic, creating relationships with the community of Acará was crucial to me. I did not contact them to research them or, as an activist, explain to them what their problems are and how they can fix them, but to build relationships and to become friends in as much as possible. We worked together, ate together, lived together, again and again when I visited for extended times, celebrated together - researched and designed together. What we researched or where we intervened in was decided together, and making such decisions took time for relationships to form. Interests and goals also further evolved with our relationship. While I have been working for longer with the community of Boa Vista do Acará and have spent considerably more time there, I tried to do these things in both communities. Whatever counts

as research methods I adapted to the context, or it even originated from it. I did not conduct formal interviews or focus groups, but we had conversations, with just one person or in groups, in setting appropriate to the community. Our goals and knowledge changed and evolved together with our relationships. While academic writing was only of interest to very few of my participants, I tried wherever possible and welcomed to analyse and write together. This was no small feat, since we worked in two or three languages: Portuguese and English in Acará, Spanish, Portuguese and English in the Colombian ETCR. I translated any writings into the language of my collaborators, we discussed and changed texts together, and finally shared authorship of several of the publications that make up this dissertation.

5

As Activist-Academic and Academic-Activist

Some may argue that what I was doing, at least early on, was not research at all. However, without doubt, my engagement became research at the point where reflection on conceptual and theoretical issues began, where understanding the relationship between what me and colleagues/friends were doing, and what, on a wider basis, relationships with the academic community looked like. In this chapter, I will explore some difficulties, such as (1) the risk of perpetuating violence, oppression, and exploitation when working with marginalized communities, (2) the reception of activist-academic work within our academic communities, and (3) social justice issues that exist within our academic communities, through the experiences and reflections of an activist becoming an academic.

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5.1 Introduction

In this paper, we present a discussion between researchers who navigate boundaries between *researcher* and *activist* looking specifically at the grey areas that exist where these two modes of seeing and understanding the world come together. We do this through a written conversation between a person who moved from being an activist to becoming an academic and one who has moved the other direction: an academic who discovered justice-oriented work and is *trying on* the identity of an activist. Together, we explore our thinking, the ways in which it contributes to and jarrs with traditional understandings of research, others' reactions and responses to our research areas, the ways in which our work has contributed to the harm caused by academia, and also the ways in which we can think about research differently.

We see this paper fitting into Puig de la Bellacasa and others' framing of critique of ourselves and others as a caring act (Puig de la Bellacasa, 2017). We do not see this just as a metaphorical or conceptual frame, but present how such critique as an act of care is embodied, and thus felt, and practical. In several of his writings, Paulo Freire, a Brazilian educator and author of *Pedagogy of the Oppressed* (Freire, 1970), has stressed the importance of emotions like love, humbleness, trust and respect to overcome oppression. This mirrors the feelings we have towards the people with whom we work - the emotions we feel for them, in and outside of academia. But out of this love can come anger at the injustices we perceive, also in and outside of academia. Both love and anger are visible in this paper. But this love-anger is not a dichotomy, it is not a binary - it is a mutually transformative and relational way of understanding the world. We do work towards changing what we do as researchers because of the anger and love we feel towards it. We love academia and what it could be. So we see the work we have done to write this paper, and this paper itself as an act of care - an act of critique because we care and because we want to initiate the change from within (Collins, 2013).

This paper sits alongside HCIs ongoing explorations of social justice-oriented, participatory, feminist, as well as post- and decolonial approaches to research. In recent years, we have seen not only the introduction of terminology such as "feminist

HCI" (Bardzell, 2010), "Postcolonial Computing" (Irani et al., 2010), “Decolonial Computing” (Ali, 2014) or "Justice-oriented interaction design" (Dombrowski et al., 2016), but we have also seen the growing debate around the use of these terminologies (see e.g., Rankin and Thomas, 2020; Fox et al., 2017; Sultana and Ahmed, 2019), their applications, and theoretical argumentations of what it means to "do good" (Pal, 2017a; Light et al., 2017a), or to work in a justice-oriented way (Strohmayer et al., 2019a). We draw and build on these theories from within CHI and HCI more widely, but also from more specialist literatures from other disciplines that relate directly to the contexts within which we work.

On top of these debates about research ethos and approaches to design, strides have also been made recently around the political and deeply personal nature of doing this kind of work (see e.g., Asad, 2019 or Balaam et al., 2019). Deeply personal reflections about emotion work in HCI and links to feminist epistemologies relating to reflexivity and extending our understanding of researcher standpoints (Harding, 2004; Brulé and Spiel, 2019; Balaam et al., 2019; Ymous et al., 2020; Williams and Boyd, 2019) have started to document the often-hidden aspects of research processes that have played an important role in developing these practices in our discipline. Following this approach, we describe some of our experiences of discomfort as academics when working with our collaborators *in the field* and at the reception of our work by academic communities, as well as the thoughts that accompanied these. Some of the experiences we describe have been harmful, hurtful, or violent and have shaped our academic practice.

With this paper, we add to an ongoing conversation about emotions and values in the practice of doing research. We introduce the concepts of "community fetishism" to describe the tendency of academics to benefit from the marginality of others and "reactionary superalterns" in opposition to perpetuating terms like subaltern and the oppressed, and tease out specific nuances and issues that arise when we do research with and as activists; contributing another layer of experience to the ongoing discussion. With this, we hope to thicken the existing discourse and provide a new set of lessons learnt from our personal experiences and perspectives of doing research-activism with rural communities in Latin America, with sex workers and about

inclusion in our academic communities more widely. Ultimately, our contributions are twofold: (1) we contribute experiential reflections to ongoing discussions in CSCW, CHI and PD, bringing together disparate conversations surrounding social justice and activism; and (2) provide a series of personal experiences and extrapolated questions as starting points for reflection, inspiration, and (un-)learning for ourselves as well as other activist-academics (or academic-activists), which we have learnt from putting our personal experiences into conversation with existing literature.

First, we present a reading of interdisciplinary literatures on research epistemology, participation, and how these relate to activism. Following this, we present a written conversation between us authors, drawing on our experiences as researchers and activists, and reflect on their meanings for research in HCI. To end this paper, we first complicate our reflections with existing literature, before we untangle this mess to draw out questions for ourselves and other researchers working at intersections between research and practice, activism and academia, or science and understanding.

5.2 Background and Related Work

Feminist and justice-oriented research practices have long explored the standpoint of researchers (Harding, 2004), or how our experiences, identities, and politics impact the research we do. This relates to the kinds of topics we choose to address, the methodologies we employ, and the kinds of questions we ask. These discussions have been picked up by technology researchers and developed into explorations of digital civics (Vlachokyriakos et al., 2016), activism (Talhouk et al., 2018; Bardzell et al., 2020; Fox et al., 2020), and doing good (Pal, 2017a) in HCI, with large increases of publications in this space and the development of new research labs and doctoral training centres.

In this paper, we add to this ongoing conversation on research methodology and how it relates particularly to work around the design and development of digital technologies in activist-leaning research. We critique existing work as critical friends, adding our understanding of what it means to do this kind of work as part of Western

academia. Below, we explore literature related first to the epistemological concerns of action-oriented work that aims to not only acknowledge but also to counter unjust power relations and social injustices. Following this, we explore how this relates to participatory paradoxes (Cleaver, 1999), asking questions about our action-oriented work and how this can or could relate to activist research. Finally, we turn our thoughts towards academia specifically to look towards ways in which researchers in HCI and further afield engage in activist academia; how we engage in activism to improve working conditions, equity, and decolonisation in our own academic communities.

5.2.1 Epistemological encounters: what is an activist academic?

Engaged, activist-leaning research must have a specific understanding of knowledge, of what counts as knowledge and how it is produced. Here, we will briefly discuss some concerns related to the epistemological foundations of activist research. We draw on a variety of existing work to outline a foundation that supports knowledge production in activist research, but also to point to some dangers present in any academic work, including activist work, with regards to perpetuating oppression through knowledge production.

Concerning itself with unequal and unjust power relations, postcolonial literature seeks to make an argument against *subalternity*. Introduced by Italian Marxist philosopher Antonio Gramsci (Gramsci, Hoare, et al., 1971), the term *subaltern* describes those excluded from power and denied a political voice, subject to dominant ideological or material forces. Indian scholar Guha (1989) further developed the term to address power and resistance explicitly in post-colonial contexts, describing those whose knowledge and voices are ignored, silenced or considered myth or folklore.

Postcolonial and decolonial scholars criticize the perception that the production of knowledge in subaltern contexts requires the help of Western academia to become *modern* and adopt Western ways of knowing. Post-colonial scholars such as Spivak (1988), hooks (1990), or Hall (1992) therefore criticise this mode of academic

engagement with the subaltern, non-Western Other, the oppressed, "Indigenous peoples, people 'of colour', the Other" (Smith, 1999, p. 15), and their stance as *expert* and the ongoing colonial power relations in the production of knowledge (Mignolo, 2007a; Grosfoguel, 2013). The attempt of these texts to challenge the worldwide hegemony of Western science (Feyerabend, 1975) has been influential to our own work, especially in our collaborations with traditional communities in Latin America[2]. Especially scholars of the Latin American decoloniality movement have argued to untie the production of knowledge from Eurocentric epistemologies and pointed to the ways in which coloniality is continued, also within science and the academy (Aman and Ireland, 2019). Indigenous Academics like (Pereira et al., 2020; Smith, 1999; Wilson, 2008; Amado, 2020; dos Santos Luciano, 2006), and decolonized ethnographers (Alonso Bejarano et al., 2019) are also references of how to do interventionist research respectfully and for the benefit of the community. HCI researchers have included theories of post-colonialism (Irani et al., 2010) and decoloniality (Ali, 2014) into the context of computing, and continue to work in postcolonial contexts; exploring the role digital technologies can play (e.g., in relation to women's health (Tuli et al., 2020; Mustafa et al., 2020; Sultana and Ahmed, 2019), supporting refugees (Talhouk et al., 2019b; Talhouk et al., 2016), or in peoples' digital representations (Stichel et al., 2019)). This kind of work often relates to not only postcolonial contexts or philosophies, but may also relate to justice-oriented work, participatory processes, and emancipation.

We fully acknowledge our own standpoint in this discourse - we are Western-educated and while one of us is Latin American, she is neither Indigenous[3] nor did she grow up in a rural or traditional context. As such, we must be careful to deeply engage with the communities with whom we work, to work to understand *with* instead of attempting to be *like* them (Bennett and Rosner, 2019) and to ensure we do not fall into the trap of community fetishism.

[2]The terms *traditional knowledge* or *traditional communities* are used to refer to knowledge embedded in the cultural traditions of local and Indigenous communities like fishing, making cassava flour, preparing spiritual bathing with special herbs, and more

[3]Albeit she is great-granddaughter of an Indigenous woman who was *caught by the lasso* - a term related to the capture of Indigenous women like animals - to guarantee miscegenation and ethnocide (Freyre et al., 1945)

As Western and Western-educated scholars, there are many tensions that arise when we work with those who may be seen as subaltern, or when we work with those in postcolonial settings. Feminist epistemologies allow us to explore these tensions rather than attempt to solve them. Concepts such as Haraway's *Staying With the Trouble* (Haraway, 2016) invite us to hold the tensions, reflect with and on them, and develop new ways of understanding them, rather than racing towards finding solutions or singular ways of making these tensions *go away*. In her influential essay, Haraway (1988) addresses the notion of objectivity, questioning science's supposed *neutral* view, the *view from nowhere*, the *God trick*, emblematic of an androcentric understanding of science and instead argues for an epistemology of *situated knowledge* (Haraway, 1988). Knowledge here is pluralistic and rooted in the specific position or standpoint of a subject. It is therefore contestable. Some researchers even go as far as saying that power relations in society make it impossible to understand the experiences of those in other positions: "The dominant ideology restricts what everyone is permitted to see and shapes everyone's consciousness" (Harding, 1995, p. 343). In relation to this, feminist STS (Science and Technology Studies) is also concerned with starting research from the margins (see e.g., Rosner, 2018). But while Harding's point is valuable to point out limits of our own knowledge, we believe that it is possible to understand, to a degree, the situated experiences and knowledge of others, as anthropologists and sociologists such as Peter Winch (1964) have pointed out.

We can arrive at this by choosing participatory ways of researching as a way to include different standpoints into our work or through care for research collaborators and their perspectives and commitment to understanding, which at times might include the *un-learning* of our own knowledge, as we will see below. Bringing together differently situated knowledges, including perspectives and ways of knowing made marginal by Western science in participatory research projects, we can see that we must seek and hold the tensions of different knowledges to better understand our worlds and the technologies we create within them. In doing so we can explicitly take into account and address the dominant social order. It is important to understand not only the slow pace of social science and the engagement of it with praxis (Hale, 2008) but also the pace of each community with which we work.

5.2.2 Participatory paradox: action-oriented or activist research?

Modes of knowledge production matter, as do the ways in which we talk about them. This epistemological understanding then, of course also relates to the practical steps we take in implementing this world-view. We now take a look at precisely this and how the participation of those who are traditionally excluded from decision making in academic research and how the participation of ourselves in the research process influences our epistemologies, ontologies, and research projects. In this, we differentiate between action-oriented research and activist research. Both terms describe research that through participatory methodologies directly addresses social problems. We understand activist research, however, as being more explicitly political, but also taking place outside of established political institutions (see e.g., Asad and Le Dantec, 2015). Activist research aims to understand the causes of oppression, inequality, and violence. It works directly with collectives of people who are affected by these conditions and tries to directly formulate and enact strategies to overcome these conditions (Ugarte, 2017). We do not necessarily understand activist research as separate, novel, or different from concepts and approaches within HCI, such as (Participatory) Action Research (PAR) or Participatory Design (PD), but descriptive of specific work employing such methodologies. This means, for example, that a PD project can also be activist research, but not all PD projects are necessarily activist research.

Providing one of several possible foundations for such engaged academic work, Paulo Freire's theories (Freire, 1970) and Orlando Fals Borda's work (Borda, 1988; Fals-Borda and Rahman, 1991) had a lasting and influential impact on PAR and adjacent methodologies (Reason, 1994). PAR is one approach that enables scholars to put their academic practice into the service of activists, communities, or others' goals; or allows them to become activists themselves. In turn, this enables academics to overcome some of the divides between practice and research. Influenced by Freire's work (Freire, 1970), bell hooks (hooks, 1990), Linda Tuhiwai Smith (Smith, 1999), Antonia Darder (Darder, 2011), Catherine Walsh (Walsh, 2012), and others, are committed to this kind of work, adding further critical, political, and loving layers to this pedagogy and philosophy, and by specifying his work further as for

example in Feminist Participatory Action Research (FPAR) (Gatenby and Humphries, 2000; Maguire, 1987; Reid et al., 2006).

Several scholars in the HCI and CHI community have reflected on such practices, framed under terms such as, for example, Adversarial Design (DiSalvo, 2012), Critical Design (Menendez-Blanco et al., 2017), HCI for Peace (Hourcade and Bullock-Rest, 2011), Postcolonial Computing (Irani et al., 2010), Decolonial Computing (Ali, 2014), New Media Power (Bennett, 2003), Agonistic Design (Björgvinsson et al., 2012), Prefigurative Design (Asad, 2019) and of course PD (Ehn et al., 2018; Björgvinsson et al., 2010).

PD, PAR, FPAR, and associated methodologies are often lauded as practice-oriented methodologies, aiming to raise up those made marginal in society. With seemingly porous boundaries between these approaches of engaging in research, they have been used extensively in HCI research, especially by those researchers and practitioners who wish to *do good* in the world.

As part of this, activism has become a more visible research topic, as for example by investigating activist use of social media (e.g., Rotman et al., 2011; Gladwell, 2010; Li et al., 2018; Simpson, 2018; Rohde et al., 2016; Tadic et al., 2016; Wulf et al., 2013a). Our concern here, however, is with work that explicitly embraces cooperation with activists or aims to make a direct contribution to social change, blurring the lines between activism and academia. Over the last decade a growing number of researchers have engaged in such explicitly activism-leaning HCI studies and design work on issues ranging from homelessness (e.g., Le Dantec and Edwards, 2008), women's health (e.g., Talhouk et al., 2018) and labour conditions in the digital economy (e.g., Irani and Silberman, 2013), solidarity economies (Vlachokyriakos et al., 2018), technofeminism practices (Sollfrank, 2019) or activism in Transgender communities (Lerner et al., 2020), or the role of technologies in improving working conditions for sex workers (e.g., Strohmayer et al., 2017; Strohmayer et al., 2019a) and explicitly activist practices of doing this kind of work (Strohmayer et al., 2020). Often this work applies one of the above mentioned methodologies such as PD.

While PAR is action-oriented and often employed to *do good*, this aim is not without problems (Pal, 2017b). When questioning the rhetoric of PAR *for good*, it is crucial to not only reflect on the possibly oppressive structures of academia that we support (knowingly or unknowingly) by being academics, but we should also explore whose *good* we are talking about. Participatory approaches easily remain activities of the privileged that often neglect challenges that may arise when working with underserved groups, communities, or populations (Harrington et al., 2019). Studies within CHI and related communities have begun to reflect these difficulties arising out of participatory engagements, for example when reflecting on the deployment of Google Glass with people suffering from Parkinson's Disease (Vines et al., 2017), or when working with refugees in Lebanon who are unable to continue their education while their engagement in an academic project serves to continue the researchers' education (Talhouk et al., 2019a). While we believe that framing our participatory work in decolonial, Indigenous and feminist STS epistemologies helps us to amend our research practices to be meaningful for our collaborators, these are by no means a guarantee to achieve these aims. Ethical dilemmas and the danger of hurting research participants will remain abound.

5.2.3 Activist Academia: Who are we to talk about how activism should be done?

So far, we have predominantly dealt with our relations and activities carried out with our research partners, but activist work in HCI can also be directed inwards, at our communities and the issues within them. For example, recent discourses on racism and injustices experienced by a group of scholars working to improve the ACM (Day Grady et al., 2020) was followed by multiple responses of support from others in the community (see e.g., Mankoff, 2020; Harrington et al., 2020). This particular case also is reminiscent of previous experiences of censorship of those made marginal in academia illustrated, for instance, when an article about pleasure in LGBT + sexuality was not allowed to be published in the Human to Human ACM XRDS magazine (Ahmed et al., 2018), by the necessity for researchers to respond to their experiences of marginalisation at the CHI conference through the #CHIversity campaign (Strohmayer et al., 2018a; Strohmayer et al., 2019b), or by the ways in

which disabled authors have experienced epistemic violence (Ymous et al., 2020). There have also been calls for the necessity of including black women's experiences in research (Rankin and Thomas, 2020) and a call for the inclusion of more women of colour's voices in mainstream feminist activism within our discipline (Ahmed, 2018). All of these experiences of marginalisation in or through research, also relate to recent discussions about the use of *intersectionality* as a lens of feminism within the discipline (Rankin and Thomas, 2019; Rankin et al., 2020).

Furthermore, there are also ongoing debates about how we talk about the CHI conference, and how we perceive the work we are doing. For example, Joyojeet Pal (Pal, 2017a) started an interesting conversation in response to CHI's 2016 "CHI for Good" theme. He asks the important question of "whether CHI can engineer good is less answerable than whether working for good does something for CHI" [Ibid., p. 718]. This paper has sparked some more nuanced debate, for example about sustainability (Bates et al., 2017) and working with marginalised populations (Pal, 2017b), but also relates to quiet conversations in conference corridors and informal coffee catch-ups. It is these quiet conversations that shape how we understand research and knowledge (our epistemologies and ontologies) as well as the practical ways in which we carry out our research (methods). Drawing together our epistemologies, the meanings of participation in technology research practices, and the ways in which both of these relate to academia as a whole provides fertile ground for reflection about our practices as researchers; about how we do good or harm with and through our work, or the ways in which our research framing shapes our understanding of what either of those means.

5.3 Methods

Following the reflexive approach to research presented above, personal reflections by Débora and Angelika on their experiences as activist-academics serve as data. Such personal reflections and accounts are gaining in validity and importance as research tools in social sciences, have been used in HCI as well (Ellis and Bochner, 1999; Balaam et al., 2019), and can be considered a form of auto-ethnography (Reed-Danahay, 1997). After meeting at CHI2019 and later again at C&T2019, Débora

and Angelika with frequent participation of Max engaged in a process of regular video call conversations for over a year, exchanging personal experiences about their work, their activist and academic activities, the criticism they shared about their respective academic communities, the criticism they received, and shared readings of texts they had encountered. The findings presented here and the paper as a whole are a result of this extended reflexive conversation. In order to accurately represent this process (including the different positions we hold, and how we have built on each other's experiences and positions) we present our experiences in the format of a conversation between Débora and Angelika, mirroring how the knowledge in this paper has been co-constructed (Berger and Luckmann, 1991; Gergen, 2015). Max participated in the process of grounding the written conversation in existing literature, in reflecting on the conversation and in acting as a mediator between conversation and the writing of this text.

Given the auto-ethnographic yet collaborative nature of the experiences this paper reports and builds on, the conversation format allows us to both represent our individual experiences of our work and the contexts we work in, as well as the collaborative nature of our reflections. These were not done individually, but together, with each of us offering layers of perspective on our individual experiences.

To arrive at the synthesised version of our extended conversation we began with Débora and Angelika individually writing down their specific experiences that they wished to reflect on in this paper. We then added notes that each of us took during our conversations and collaboratively re-arranged the text according to the ideas and reflections that emerged during our conversations over more than a year. This was done iteratively, with reflective conversations in between, until we arrived at the present structure. The process resulted both in the present structure of the conversation, as well as in the list of questions to ourselves and our work, presented in the discussion.

The three authors have distinct experiences and standpoints that are coming together in this paper: Débora is a Latin American woman, educated in both Latin America and Europe and now a researcher and PhD candidate at a European uni-

versity. Before starting her PhD she worked for several years as an activist and community organiser, working with rural communities across the globe but predominantly in her home country. Angelika is a European woman, educated in Europe. After obtaining her PhD she is now a lecturer at a university in post-brexit England. While engaged in activism and social support work for many years, has started using the terminology of being an activist through her academic research. Max is a European man and a PhD researcher at a European University. While he was not an activist before, he came to academia with the hope of being able to do engaged, practical research and design work, focusing on social issues for which a market-based economy only rarely provides space.

Following our many conversations, and reflecting on our approaches to research, activism, and our own personal histories, we all ask ourselves whether we are *activists* or whether we are *activated by* (Esteva, 2018) injustices we encounter, oppressive institutional contexts, and/or experiences of individuals with whom we interact? Learning from epistemological encounters, participatory paradoxes, and activist academia we see the need to further reflect on our own experiences as researchers, as activists, and our involvement in the furthering of hegemonic Western understandings of *science* and *research*.

5.4 Reflections from afar and from within

This section is an edited and constructed dialogue between two women. We are both interdisciplinary technology researchers, working in the service of marginalised groups and one of us has often used Post- and Decolonial literatures to frame our work, while the other regularly draws on feminist HCI and STS work. Both of us work in participatory ways, drawing on HCI and social sciences methodologies. We provide personal reflections based on our experiences as people who work within academia and are involved in a variety of activities.

Since being "critical friends" to ourselves and others is one of the main aims of this paper, we frequently refer to *academia* or *academics* with criticism. While we sometimes refer to the global and institutionalised system of academia as a whole,

more often we mean a specific type of research and researcher, not dissimilar to ourselves: researchers in HCI and adjacent fields such as anthropology and other social sciences engaged in interventionist work with the aim to do good, but not reflexive enough in their work. This, we believe, is not necessarily an individual fault, but rather a structural one. In our own experience at least, researchers receive little education in reflexivity or how to be critical friends for each other, but positive feedback for their well-meaning intentions. As such, our critique of academia is aimed at a certain kind of canonical academic, who may or may not exist in this rigid way. We do this not to generalise, but rather to help us understand and unlearn some of the ethical issues of this Western system, and the role we as individuals play within it. Many experiences we describe herein are not cite-able, but we know that they are the kinds of conversations many others have had with us, or amongst their academic friendship groups. We are hoping that writing them down, even if sometimes in a generalised format, will be helpful for other researchers, and that when they are asked to provide references for certain behaviours, hopefully pointing towards this paper will be of help.

We try to provide thick reflections of our work, to address our whole selves rather than only the parts of ourselves that we want to see. We address various topics, showing how they are connected to give a holistic and realistic picture of our experiences and reflections. For the sake of clarity, however, we have organised the discussion along with four broad topics: (1) Relations to collaborators, (2) Experiencing and Perpetuating Oppression, (3) Relations to the Academy, and (4) Changing Everyday Academic Practices.

5.4.1 Relations to collaborators

Débora: Being Brazilian means coming from a racial, cultural and social mix. It means coming from a country where local resources are exploited, and the ways of life and knowledges of traditional communities are undervalued. My father's family lived with and like Indigenous people in the Amazon region before they moved to the capital, looking for better living conditions and formal education for their children. My family performed well in this opposite society in the capital and so did

I. I had fifteen years of experience in creating business websites and in the four years that followed, I facilitated and developed low cost and sustainable technologies in areas with no access to basic services around the globe. After learning new skills, I felt the need to go back home, to the Amazon rainforest. I wanted to honour my grandparents and offer my work as a way to diminish injustice. I met members of an association of organic farmers from a rural community situated along a big river, and through conversations, we were able to plan several multi-week ecological design workshops. We worked on local challenges ranging from internet connectivity to developing new products out of the seeds of local fruit.

Angelika: As a European researcher who has lived with and experienced various European cultures, and with a background in Education and International Development as well as HCI, I often reflect on the meaning of *justice*. I worked on various projects to promote human rights as a teenager, but as a researcher, I have primarily worked with sex workers, people experiencing homelessness, alcohol addiction peer support workers and people with various intersecting experiences of oppression and stigmatisation. In all of these settings, the meanings of social and criminal *justice* often become muddy and like with so many other topics my political point of view becomes important in my understanding of peoples' lived experiences and understanding of this terminology. Having read the works of Freire (Freire, 1970) and other reform pedagogues during my Undergraduate degree, post-colonial and feminist literatures during my MA, and the works of sex worker rights activists during my PhD, I try to see *justice* from the perspective of those who are made marginal; to use my privilege as a white, middle class, non-disabled researcher to stand with those who are oppressed by unjust systems.

Débora: While I experience life as a racialised immigrant in Europe, in Brazil, I am considered to be a white, and middle-class person. To normalise myself in the rural region and diminish the discrepancy between inhabitants of that riverside community and myself, I decided to immerse in community life and engage with conversations and hands-on activities for seven months. In an oppressive society, I had to look carefully to examine critically the social construction around me and be willing to enter into taboos sustained by social structures. Dialogue is what I was

hoping for and, in my learning, it cannot exist without humility, love, and critical thinking.

I did not know it at the time, but being present, listening, paying attention to my emotions and reflecting daily, I was able to build trust with the community members in that rural region and become friends. I was not the first outsider they worked with, but not all of their experiences had been positive. They would say things like: "*Usually people come here to teach, and you are different, you teach and learn from us.*" Another new friend from the community said: "*You have your hands dirty with us, professionals who come here, just tell us what to do and watch from a distance.*" *In several instances, complaints about academics also arose: "They come here, get all the information for their degree and never return.*"

Angelika: I have had similar conversations with collaborators where I have been told that I (or my research) am *different* to other academics because I genuinely listen and adapt my methods and projects to the arising needs of my collaborators. While as a person, such comments may be flattering, as an academic it is embarrassing to be told this, and it is hard to write about this without it seeming like virtue signalling. The reason I am sharing this here is that I think these kinds of comments show how badly we need to change not just the ways in which we *think* or *talk* about research and action, but how we must change the ways in which we *do research, the ways in which we conceptualise collaborations, and how we train researchers*.

When I was taught research methods at universities, I learnt that we traditionally see them as *research instruments* to obtain what we need as researchers. Taking this to its logical conclusion, it can also be understood that we instrumentalise our relationships with participants, with partners to develop them in a way that suits our needs as researchers. But when we look at the kind of work you have been talking about, Débora, we see the impacts this has on communities and the individuals within that community. After taking into account my readings of postcolonial and feminist STS perspectives, or when I take into account some of the histories of PAR - I am starting to unlearn what I have been taught about research partnerships. For example, instead of seeing organisations as gatekeepers, I started seeing them as

active participants in research projects during my MRes. As I worked with different partners and with one partner for an extended period of time, the boundaries between research partner, colleague, and friend started to blur. I started to care for and love those with whom I collaborate.

In my training, I was taught that I need to develop sustainable partnerships to be able to do genuinely participatory work, but in trying to do this I have become emotionally involved. While some PD literature allows for this kind of political attachment to the research (Dindler and Iversen, 2014; Bødker et al., 2017; Bjerknes et al., 1987), my training had not prepared me for the deeply personal relationships I would build with partners. I'm not really able to keep my whole self out of some relationship anymore. Canonical Western research literature tells me this no longer makes it possible for me to work with them as research participants, but my unlearning of these Western ideas of academic research with the help of feminist and postcolonial epistemologies, I now disagree. I am doing the work I am doing with them because I am angry about unjust systems, and I hope that our work together can help mitigate some of the harms caused by it. This is not an apolitical approach, it is not an objective way of doing research. It has taken me a long time and some unsuccessful projects which have left me (and I am sure also my collaborators) emotionally wounded, that I have learnt that relationships with partners are not a means to an end for me. They are the end. But to get to this understanding, I have made many mistakes along with my learning and unlearning about research partnerships - some of which I am still uncomfortable about.

5.4.2 Experiencing and perpetuating Oppression

Débora: I have heard stories of my grandparents being called savage for their attitudes and appearance. They also had to deny their beliefs of the *spirits of the forest* to be accepted by a religious community around them. Denying my ancestors' knowledge and discriminating against different ways of living is already something that I have done; I have been colonized. Reading about decoloniality helped me understand my conflict to fit my work into existing HCI discourses.

Since the people we work with *cannot speak* (Spivak, 1988) and can speak only if they conform to Western ways of knowing and being, as an academic, I have opened the space to allow them to be heard, and not only *giving voice* to their needs. When I present the progress of my studies at conferences, twice I had the opportunity to invite people that I work with to travel to Europe and present with me. Instead of showing only the struggles they face, they also present all their skills and knowledge. However, opening space for their voice and, at the same time, applying to them terms such as *subaltern* or *oppressed* does not fit well. I do not agree on normalising these terms in our writings, without at the same time introducing a term that critically refers to those who are oppressors, modern, non-subaltern or reactionary superaltern, who create this unequal relation. Instead of working to change the experiences of those who are described as subaltern, perhaps we should turn inwards and change the practices of those who are perpetuating matrices of oppression. This could be colleagues or superiors in academic institutions and organisations that exclude other forms of knowledge or working with people, but it could also be us, when we work with other communities and make them subaltern through our specific ways of working. I have found some inspirational academic work done by a French scholar who built his career *on the back* of Brazilian Indigenous communities. One way of honouring their long-term relationship was writing a book (Kopenawa and Albert, 2015) with one of his Indigenous friends, where he is not the first author and he does not bring Western epistemologies to the book. The other inspiration is the work from Linda Tuhiwai Smith, professor of Indigenous education in New Zealand, where she developed proposals for indigenized methodological interventions while criticizing colonialism in academic teaching and research (Smith, 1999).

While focusing on the subaltern experience makes it clear that the view of those in Western institutions is not universal, that relationships of coloniality and oppression silence others. I think it is crucial for us to also investigate how subaltern experiences are created by reactionary superalterns. This includes how *we* might be creating subaltern experiences, how *we* are ourselves reactionary superalterns and silence others when *we* do research. When I began working with the community in Acara, for example, I thought to apply specific design methods I was familiar with, drawing on the design thinking concept, imposing the specific steps and tools

entailed in such rather formalised design approaches. It took me some time and a lot of reflection to realise that this way of working was very different from how they work; and that I was in fact, imposing my ideas. After all, I was *an expert* from outside the community, and people listened to me and expected something in return.

One more example happened when I was visiting the community for some weeks, and I met Tacopi, an older man who had acquired a lot of experience during his lifetime. From his wheelchair, after one hour of conversation, he told me: "*My grandfather taught my father who taught me that each lightning comes with an important stone.*" In the Amazon rainforest, it is common that lightning hits trees and their roots, creating damage in the surroundings. Some months before, lightning destroyed the trees and the floor of a house a few meters from where we were. He continued: "*I told one archaeologist, who was researching in this area, about the stone that we could not find. However, the academic told me that it was an invention, that there was no stone coming with the lightning.*" His face was a bit disappointed: "*My dear, this knowledge has been passed down from my grandparents to my great-grandchildren. Do you know anything about it?*" I was surprised how academia can so rapidly deny knowledge built through generations. Of course, we do not know what the archaeologist researcher actually said, but we know how it was heard by Tacopi and how I received it from him. This was just one more confirmation of how careful academics should be. Unfortunately, I have heard some other similar stories. When I was an activist, I worked in the same community where many are functionally illiterate, to install a wifi router with community members. The difficulty of a friend from the community to understand some technological explanation was replied to by an academic with a text message: "*How many times do I have to repeat this so you understand?*"

At that time, I became uncomfortable with researchers but the interesting fact is that now that I am one, I have heard pejorative comments from NGO partners that they would not work with me because they do not work with *professors*. I was critical of academic researchers in marginalized communities and, as soon as I became part of it, people started to see me differently and see me critically too.

No matter how participatory I am or how much I adapt my methods, I am building my career on the backs of others - of those who participate in the research without adequate remuneration while I am now employed to do this work (albeit at first precariously). This is something I have to acknowledge, and something that must sit with me uncomfortably. To somehow address this skewed relationship, I always look for ways to be a *stair* for people, to create ways for my friends and collaborators to take a step up towards their goals. For example, a friend of mine is opening a shop in the community to provide access and services related to technology and computers. Through my network and even my salary, I try to help her with this, as she has helped me with my research. I am hoping that like this, some can build their careers also on the back of the work we do together. But these are individual stories, the overall inequality remains and remains uncomfortable.

Angelika: It is strange how depending on how we see ourselves and how others see the label that is given to our job are so weirdly intermingled. My own perception of academia and of academics seems to be malleable and relate to what I am currently reading, who I am talking to, and what I am thinking about. For example, when I worked with one particular charity, I initially encountered hostility against academic research because it was seen as not directly impacting their practice - I often listened to conversations that were started when yet another researcher sent an email asking for access to their database. After being in the office for a long enough time, I understood why they were so upset with some academics - they simply asked for data without giving much in return. Hearing these stories, it makes sense to me why I was met with caution initially, and I understood why it took so much work from both the charity and myself to build up the positive relationship built on mutual exchange we had later on in our collaboration. There are so many issues in academia, like these hidden histories, that we are a part of when we work in non-academic settings. My work and I are now also a part of this history.

Before starting to work with sex workers, I looked towards research that came before me, research in the Global South, research that was carried out with groups that are stigmatised and made marginal in our society. As part of this, I found literature written by sex workers for researchers that outlined good practice guidance.

But I also found examples that were heavily criticised in the affected communities because it does more harm than good or may only do harm. The work I do now, no matter how distanced I think it is from such practices that I would now deem unethical, is built on this legacy. I am not sure how to deal with this, or even how to adequately hold space for the history of how the academy has dealt with stigmatised communities (not just in HCI, but also many other disciplines) when starting new projects or engaging with new colleagues outside the academy.

5.4.3 Relations to the academy: what counts as research, what counts as knowledge?

Angelika: I have also heard critique from other academics about some of the work I do to tackle some injustices and oppressions in our own academic community. For example, my pointing out of harmful behaviours by more senior members of the academy have been shot down by others happy to keep the status quo. Other times I had conversations with those in power where I sensed an attempt at placating my concerns by arranging tokenistic institutional alternatives - insinuating that the work is done, and I can now be quiet. These comments, of course, have upset me but reading Sara Ahmed's *Living a Feminist Life* (Ahmed, 2016) and other related works have helped me place them into a wider understanding of structural oppression. It is not these individual incidents that I am most angry about, but it is the cultures of abuse, the unjust power structures, and the ways in which we continue to engage with non-Western academic knowledge that really makes me want to work towards alternative futures. Reflections about oppression as part of my research seemed to naturally progress to reflections on the oppressive nature of the Western academy as an institution.

While there have been many hurtful things that have been said to me about my work, such as it only being welcomed in the academy because it is a *sexy topic*, or along the lines of it being *stupid creative work*, I have been able to brush much of this aside. But much of the critique I have received from academic and non-academic friends alike has been very influential in shaping the development of my practice - their caring (in Puig de la Bellacasa's thick sense) words have made me stop, reflect,

and change research direction. These critical friends call me out when what I say or do is harmful, hurtful, or going into an uncomfortable direction. I need these academic and non-academic critical friends to enact prefigurative worlds in my own work environments, and to go beyond simply calling out injustices when I see them.

Débora: I agree that receiving this kind of critique hurts. And a critical friend will hurt you, but as an act of love. Giving this kind of critique is also not easy. If we have a truly caring and respectful relationship, we need to critique one another - live with the hurt and change our actions in response to them. Feeling hurt is not a bad thing, it is about listening and reflecting about the pain. Where listening is an active verb. The problem is we are not listening or maybe listening and not reflecting. When I am painfully criticised, I know that I have to go through a process of healing because it opens wounds. To transform into a regenerative criticism, reflexivity is crucial in this process, and hurt can be transformed into empowerment. Our scars and anger about unjust systems gives us the power to talk; but how can we ensure it is not used only to hurt others? I felt lonely and angry in the last years before joining but also during the PhD program. My work was not paid but I recognise my privilege of being able to do this while living in my grandmother's home. Gratefully, in my PhD program, I now have the opportunity to read, study, recall diaries, listen to recordings and write about my years of unpaid activist work.

Now that I am involved with grant writing in Europe, I routinely face academic research projects with a budget of 6- or 7-digit sums in Pound, Dollar or Euro, whereas academics from my home country, NGOs and community organisations rarely work with such numbers. This creates uncomfortable situations when for example large sums are budgeted for activities that make sense from an academic perspective (e.g., prototyping), but not from a local academic position where they usually need to be much more restricted in their expenses or community members that do not need temporary prototypes, but immediate solutions.

Angelika: Reading about theories of justice, especially Nancy Fraser's Marxist feminist approach to this in her work on multidimensional justice (Fraser, 2008)

has had a big impact on me and my activism. Building on her (and others') work, I ask myself three important questions throughout the research process: What world-making effects do I want to have in this project? How can we move towards this aspect of developing more equitable or just futures? And whose voices do we listen to and exclude when making these kinds of decisions? Working primarily in research spaces that sit at the intersections of various disciplines and boundaries, I engage primarily in participatory and/or collaborative projects that aim to not only build better futures but also to begin to answer these three questions to build understandings of what this *better future* could look like. This means the research process matters as much as the outcomes, and the kinds of outcomes we develop depend on the needs of all those who participate, not just the researchers.

As a Western, white, cis woman, this means I must read more scholars who are black or people of colour, it means I must read more non-anglo-centric writers, more trans and non-binary writers. All of us academics must more deeply read more authors with lived experience of the oppressions we write of and about. Perhaps most importantly though, I must do the difficult work of seeing these oppressive systems in myself and my own practices. I must see the white supremacy I have upheld through my own actions, the heteropatriarchy I uphold through my complicity in institutional systems of injustice. I am learning that I must not just raise concerns I see in others or the system, but that I must see them within myself. This is hard, hurtful, and uncomfortable work, but it is necessary work I must do.

Débora: My own course of unlearning was with regards to knowledge I gained about the design process, co-creation, and design thinking. I felt ready to engage with people who lived like my grandparents, to support any desire for change. I decided to live in a community and practice my recent learnings. After some immersions and meetings with rural Brazilian farmers, in which I asked them to form circles, engaged them in brainstorming, design processes, and prototype making, which I had learned in institutions in the USA, I realised that their interest in participating in the meetings was fading. I was frustrated, they were disappointed. I first used foreign concepts as a tool to find out about local practices and how I could combine localized rituals and knowledge with globalised concepts. During those processes, I

understood there was neither time nor resources to waste. Conversations did not have to be in a circle, like I was told when I learned about the design process, but instead could also take place near the community's *igarapé* (a stream or pond in Tupi language, common in the Amazon) or during an *aparelhagem* (specific type of party that happens in the Brazilian Amazon region only) with beer and barbecue. Or drinking açaí after making cassava flour for selling. I did not have to bring extra materials for activities or prototypes, it was shocking for them, to see money spent on things as *useless* as a prototype. We started using only local resources and academics, who would teach or install routers, had to trust the ability of the community to find solutions. For example, we started to use *cipó* (a local kind of sturdy vine) instead of zip ties, *miriti* (a local palm similar to foam) and bamboo to build things, and prize their skills on climbing trees and towers, screwing, and building anything. The experience of exchange is part of the research process and it is one of the most important parts, where we can build trust with the people who have great influence and involvement in the research.

Building trust takes time and it takes effort. So, how about offering hands to do what the community wants and asks for first? In this way, we build trust and engage in a dialogue where academic skills can be entangled with local knowledge. I feel as if we need to learn how to listen and have an equitable conversation to reach trust. Technology is not the only way of helping, it is the collaboration as a whole - the thinking together, the talking together. But that work is not what attracts research money. Funders are interested in funding tools, prototypes, and technologies, but we need to think about the building of a greater community to reach mutually developed goals. Many communities do not have the ability to write grant proposals, leading the money to always come through academics or other external elites.

Angelika: Working with charities in Europe, I have learnt similar lessons. But this learning of local skills and experiences can be a difficult and messy process, one that has no end and that we must continue to work on throughout our careers. Part of this self-education will be learning the appropriate language and unlearning our actions that support institutional oppressions. I write this reflexive piece as

an academic who sits at the intersection of disciplines and worlds. I have come to read about similar topics and issues across disciplinary boundaries, but in the last couple of years, I have kept coming back to Puig de la Bellacasa's work on care and thoughts on science. She writes: *"Ways of studying and representing things can have world-making effects"* (de la Bellacasa, 2011, p. 86). Seeing this as a starting point for the work that I do, I constantly ask myself what kinds of world-making effects the projects I am working on may have. Bringing this together with my strong feminist beliefs, an immediate response I have to this is: moving towards a more equitable, just, and feminist future. But who am I to decide what this future is supposed to be?

Débora: "We are what we do, especially what we do to change what we are" (Galeano, 1988, p. 121). This is a quote from the Uruguayan Eduardo Galeano that tells me a lot about what the future is supposed to be. But more than changing my actions, I have to overcome predicaments, to explore possibilities to work with diverse actors. I live the experience, shaping and being shaped by the world, where I co-created the painful and glorious situations in which I found myself so many times. Being open to listening, allowed the community members of the Amazon region the opportunity to share more than daily events. We built trust that allowed us to reflect on our relationship together and talk about how we talk to each other. There was a woman who said: "*In the first months that you were here, I did not understand anything that you were saying. I agreed with you in every meeting but, actually, I was afraid of telling you the truth.*" It took me a while to realize that group meetings and design workshops in the village happened only to satisfy my wish to call my work *collaborative*. We spoke the same language but we did not understand each other.

In the spirit of social constructionism (Gergen, 2015), my reflexivity process would make me ask myself questions like: Why did urbanites believe rural people were lazy? Why was I afraid of talking to men in the community? Why did a compliment or a sexist comment affect me so deeply? Where did my arrogance come from when I was certain that problems with the garbage disposal in the community were more important than building a church or an internet community network? Why do formally educated people have a more powerful voice? How are those

interactions impacting my life? How is it impacting others? It is a challenge to engage in collaborative projects and be aware of the uncomfortable feelings and behaviours that the exchange can bring to me and others.

Angelika: Working in a way where some of my research could be conceptualised as activism, this reflecting, learning, and unlearning, are incredibly important. It must be mutual and relies not only on good intentions from researchers but genuinely engaging with discussions and following through on them. In sex work research, for example, as academics we often state we support sex worker rights, but how do our projects actually support rights activism? And how do we benefit from this stance ourselves within and outside the academy? This also relates to what happens when we as researchers inevitably make mistakes (in our fieldwork, conversation with others, or do not quite know how to approach a new project yet). On one hand, we must trust our collaborators to let us know when we make mistakes, but on the other hand, they must also trust us to engage in work in such a way that we avoid making mistakes where we should have known better, and that we change our actions after we have made the mistake. How can we best acknowledge what we do not know, and work towards building understanding around these areas? Of course, we will learn from our collaborators, but we must not rely on them expanding energy to teach us everything. Primarily, we should reflect and educate ourselves.

5.4.4 Activism in the academy: changing everyday academic practices

Débora: The PhD program is an opportunity to reflect on my experience and analyze it from different perspectives. Conferences, workshops, summer schools and colloquiums were opportunities for me to learn how academics think and work from inside. And while I already had a lot of data for my PhD from my previous work, I had to combine theories, concepts, methods, and perspectives with my experiences and emotions. It was a deeply dislocating process to learn that I was not at all acquainted with many of the words scholars use frequently, and even more when I noticed that familiarity with the terms does not necessarily mean comprehension (de Castro Leal, 2020). When presenting my first paper, a senior professor reacted to my action research approach: "*This is not science... You are not a scientist.*" Having

an emotional connection to my research partners, trust in them and interest in their account was also not well appreciated: "*So your data is based on your belief in what they told you?*" Others were not so direct in their criticism and did not even intend to be critical, yet their comments left me equally uncomfortable, such as praise I received when my first paper was accepted: "*Congratulations! Your topic is exotic, that makes it easier to be accepted*" or "*It was a great presentation, but maybe too political?*" The reactionary superaltern can also be found inside our own institutions when less direct comments affect us as micro-aggressions, where knowledges or research approaches are *made subaltern*. bell hooks (hooks, 1994; hooks, 2014) also suffered and wrote about similar devaluations.

Angelika: How we talk about research, and the language we use matters, it influences how we conceptualise our research, findings, and collaborators in writing. How do we communicate the work we have done to others in the academy in the publications we write? Débora's discussion of how academic workshops have helped shape her understanding leads me to another important but mundane practice we as academics can use to engage in activism: citation practices. As an academic, writing papers is one of the important ways in which I share the knowledge collaborators and I have produced through our research. In these papers, I refer to previous work, use existing knowledge to contextualise my work and build on this knowledge through scholarship. As such, reading and citations are an important aspect of our work. Drawing on Puig de la Bellacasa's reflections on Haraway's writing style, I too see the ways in which I write my papers as part of a wider conversation with other academics. One where I thicken the discourse, adding a different perspective or thickening existing ways of understanding, part of a non-linear process.

Like others (e.g., Ahmed, 2016 or D'Ignazio and Klein, 2020), in recent years, I have started to acknowledge the power of citations more and more, and proactively subvert existing structures by increasing the diversity of sources I rely on. For example, I aim to include non-academic articles such as books, blogs, or guidance written by activists and practitioners with an equal footing as academic literature. I am also working towards becoming more genuinely interdisciplinary in my scholarship, meaning I include academic citations from various disciplines, alongside and in

conversation with one another, wherever it is useful. However, there are also certain bodies of text I refuse to cite - discourses that dehumanise those with whom I work, or that are built on a lineage of harmful epistemologies. For me, these may include radical feminist literatures related to sex work and trans rights, racist or colonial descriptions of non-Western contexts, or theories and practices that are documented by known serial abusers. Of course, this practice will never be complete, and is always a work in progress and of learning - I am sure I have cited such work in the past, and am likely to continue to do so where I am still ignorant of the dehumanising discourse. Some reviewers and colleagues have told me that I must include citations of differing perspectives and that certain literatures in the canon must be mentioned, even if I disagree with them, but if this is the case, am I not perpetuating the harm caused by these papers? I know I am not the only one who does this (see e.g., Ahmed, 2016). Coupling the inclusion of non-academic writing, genuine interdisciplinarity, and the inclusion of diverse voices, with my exclusion of certain literatures is my attempt at working prefiguratively to develop more equitable and just worlds in and outside of academic publication practices. But it is a complicated point of contention that I do not feel I have a complete answer to yet, but it is a step in the right direction for me if we are trying to decolonise our practices, or are working to bring to light non-mainstream approaches and histories.

Débora: I agree that citations are something we should be careful about. In my work, I also try to expand what *participation* means, for example by involving members of rural communities in more academic activities such as sharing authorship and including them in grant proposals, as a way to transfer more control over the research project to them. For those friends from the community interested in formal education, this is also the first step to join the university. This is not always easy: registering as an author of an academic paper, for example, requires having specific accounts elsewhere, such as Google Scholar, Orcid, etc., but some of my co-authors are not scholars yet, do not have these accounts or maybe not even an email account. Including them in grants is even more difficult for organisational reasons. Even when I tried to register authors who had email accounts, many times they did not have internet connectivity and the confirmation email would expire at the end. So I learnt from failing. Many of my applications had to be done in advance to guarantee

their participation, or I had to create fake emails to guarantee their names in the list of authors. I feel that institutionalised academia often does not facilitate this kind of inclusion, as there are no warnings on the websites; instead it is expected everyone has direct and constant access to email, computers, cellphones, and internet. On the other hand, however, there is a lot of room for work and forms of *inclusion* that I think should be questioned more, not to police our work, but to question its quality, just like we question the quality of each other's writing, to help and improve each other's practice.

For example, when I asked scholars about their reason for being involved in a grant or project to research in the Global South, the answers included uncomfortable responses such as: "*I want to be at the beach,*" "*I have more financial opportunities if I work with them,*" or "*I write about this local movement but I have never been there or spoken to them.*" When trying to go deeper into the conversation about the outcomes for the communities, I heard stories of abandonment: *"I am actually not sure if the technologies are still working,"* "*I do not have contact to any community member anymore,*" "*I never returned and do not plan to go back*" or *"We are applying for another grant to continue the project,"* explaining that until then, nothing more can be done. Bødker and Kyng say that we are "largely missing concerns for the long-term perspectives (of both technologies and the skill development of people)" (Bødker and Kyng, 2018, p. 8).

I also met people who were not involved in any project in the Global South but had an interest in starting something. Some scholars asked me to put them in contact with communities in Latin America. One of them said, for example: "*My supervisor told me that Indigenous cause is in vogue now, it would be great to write about them. Can you introduce me to any Brazilian Indigenous people?*" A European academic said: "*I would like to transform their skills in climbing trees into a fitness program in Europe. And also, design gear to make the climbing easier and sell it to the Brazilian rural population.*" Even if their interest in contributing to the *development* of the Global South would be sincere, in some cases, the ecology in which the community lives is seemingly ignored and the most important point is academics working to improve their curriculum.

Angelika: I continue to be amazed how difficult it is to engage in equitable relationships through traditional funding mechanisms. It is rare to share the Principal Investigator (PI) status, even if in practice the Co-Investigator does the same amount of work as the PI. Last year, I did find an opportunity where we were able to apply as Co-PI - being amazed at this opportunity, I emailed an international colleague with whom I had been wanting to work for a while. We worked on the application together, each completing an equitable amount of work. But even with this official status, the relationship would not have been equitable: in this particular funding scheme, we were each applying through our respective funding bodies, but the final decision rested with the U.K. funder; the U.K. academics had much more resource available to them than the Turkish counterpart, and the types of documentation that were needed for the application seemed to be much more onerous for my colleague than myself. So while we were equitable partners according to our titles and in our work practices, the relationship would not have been equitable.

Débora: Often, this is even harder when partners are not academics. A Brazilian Indigenous friend of mine, whose tribe was *discovered* fifty years ago and has been the focus of research, wrote a manifesto: "We request the inclusion of resources and funding, throughout any research, to at least one Indigenous researcher with traditional knowledge" (Assurini, 2018). He points out that the Indigenous would be responsible to monitor, participate and co-author any research, publication and/or production of knowledge, regardless of whether one is enrolled in a university or not. Unfortunately, it is not so easy to find funds that support this and/or academics willing to collaborate in that way. As an activist, I had to go back to the academic life to be paid through a scholarship for work I did without payment before. All my networks were built and a lot of my data was collected before becoming a scholar, so I could use the three years of scholarship to build on that, and I am extremely grateful for this. I am interested in continuing the academic life. However, the positions available are all related to projects and topics different from my interests. Consequently, I have to work on my independent projects while working on another project in parallel, giving me double work.

Angelika: It is these kinds of thought processes and actions in response to them, the mundane practices we do as academics that build academia and shape the kinds of research that we do. In the U.K., precarity, standardised and national systems to measure research quality or *impact* (e.g., Martin, 2011) foreground certain kinds of scholarship. The need for the quantity of publications (especially for Early Career Researchers) to get jobs or progress in an increasingly commercially driven academic sector makes it more difficult for researchers to engage in caring projects and collaborations. But individual scholars, networks, groups, and unions are countering this model. Together, we are building a prefigurative politic that allows us to build the world we want to see. Ideally, however, I think these everyday actions would be aligned with systematic change in the academy related to workers' rights, accountability for (serial) abusers, etc.

As pointed out by Débora though, we also need to see changes in funding structures, in academic structures to be able to do work sustainably in the way we talk about in this paper. But it is up to us to work prefiguratively to enact that change - we cannot wait. partners and communities cannot wait for academia to change its institutional structures. We must do the work in the now, either outside of or within these imperfect academic systems to the best of our abilities; relearning and unlearning as we go along.

5.5 Discussions to care

As the reflections above illustrate, combining activism and academia in a hybrid professional and personal practice is challenging and complicated by a variety of factors. We are not the first academics who want to carry out engaged research to move towards more just worlds and political and social change. Numerous epistemologies and methodologies have been proposed in various disciplines (including design and HCI) on which such a practice can be based, some of which we have already introduced above. But even if this provides a strong foundation, inspiration and legitimation, they do not solve all practical, emotional or relational difficulties that we have also described above. In the following, we attempt to untangle these challenges by reflecting on relations with the communities with which we

work and on relations to our own academic communities. To end this section, we draw out a list of unanswerable questions that have helped us in our own practice, and that we come back to when we are struggling. We hope that these questions will also be helpful in holding the tensions of the kind of work we describe for other researchers who are encountering similar emotional concerns when working on justice-oriented, community-driven, and/or socially engaged research and academic-activist practice.

Drawing on our own work, conversations with others at workshops (e.g., Strohmayer et al., 2018b; Hansen et al., 2020; Chancellor et al., 2019; Asad et al., 2019) and informally, we appreciate that there is a strong interest amongst institutions like NGOs, academics and activists to work with communities that are made vulnerable by the current socio-economic and socio-technical status quo as an opportunity to design collaboratively and to bring a positive impact to the world (Hecht et al., 2018). However, as our own experiences and reflections above, as well as previous publications in HCI (Pal, 2017a; Harrington et al., 2019) show, there is a real risk of perpetuating violence, oppression, and exploitation when working with certain communities towards justice, as we aim and hope to do.

Some of these risks can stem from the different intentions motivating this kind of work and from our disciplinary limitations. By engaging in activist-oriented work we aim to work towards justice or to *repair our world* as Joan Tronto (Tronto, 1993) wrote in her definition of care. But especially within technology-focused disciplines, such as HCI and perhaps CHI specifically, we run the risk of focusing excessively on neoliberal and Western forms of technosolutionism, imposing our own view of what a *good* solution is (Díaz Andrade and Urquhart, 2009; Díaz Andrade and Urquhart, 2012; Bødker and Kyng, 2018). We have experienced this ourselves, for example when Débora was looking for problems to solve in the community she was working with, putting their wish for an improved internet connection to the side when searching for what she thought were more important problems. This sense of importance was not shared by the community themselves, as she came to realise that she was an oppressor and a reactionary superaltern.

At the same time, in reflecting on exactly such efforts to support communities at the global margins, Irani et al. (2010) note that such a focus can also be part of an attempt to make a market of consumers in the name of empowerment. This is exemplified when academics try to turn a local traditional tool into an innovative product to be sold to the same people they have worked with to create that tool or to develop some product to increase income so that people can buy more. Another example is when scholars easily become engaged in the destruction of other, equally valuable, ways of knowing, as the example of Seu Tacopi and his reasoning of the stones created by lightning shows. Whether this view of the world is supported by a natural science-based understanding of the world or not, this knowledge was clearly meaningful to him, not only because it made sense to him, but also because it was connected to the history and experience of family. By reading and better understanding the works of non-Western critical thinkers (as some ICTD scholars have started to do (Dearden, 2012; Dearden and Tucker, 2015; Dodson and Sterling, 2012)), we want to encourage our future selves and others to think more deeply about the work we are doing, the impacts we intend for it to have, and what unintended impacts the work may have in our academic worlds as well as the worlds we visit and inhabit as part of our fieldwork and collaborative engagements. We need to be very attentive to how our worlds might collide with the worlds of collaborators outside of institutionalised academia. This is not to say that, when confronted with knowledges different from our own (perhaps even incompatible), our own way of knowing, whatever that may be, should be denied. Instead, we argue for humility and a willingness to remain in the discomfort of the confrontation, and explore possibilities to build knowledge together, to adapt to the specific context we want to study (Rouanet, 1993) and to "combine academic knowledge with popular knowledge and wisdom", as Fals-Borda stated (Borda, 1988, p. 88). Similarly, Antonia Darder (2019) argues that each of us has partial knowledge; that we need each other to *understand the world better*.

5.5.1 The means do not justify the ends, they are the ends

Western science has an unjustified hegemonic position in the world, as has been noted by Feyerabend (1975), expressed even stronger by Latin American

thinkers of decoloniality through "epistemic disobedience" (Mignolo, 2009b; Walsh, 2012; Quijano, 2000; Mignolo, 2007a; Santos, 2008; Fernandez et al., 2014) and by Indigenous and Native communities (Pereira et al., 2020; Smith, 1999; Wilson, 2008; Smith, 1997; Assurini, 2018; Amado, 2020; dos Santos Luciano, 2006; Krenak, 2019a). Whether one generally agrees with Feyerabend's epistemic anarchism or not, when working with partners who have different ways of knowing the world, remembering his statement "anything goes" is in our view a useful first step to overcome an often unjust and unequal relationship - and to avoid the "epistemicide" (de Sousa Santos, 2015) has warned of. It is equally important to be open to *unlearn* what one knows already, if specific knowledge is unhelpful or even destructive in a specific context, and to create new knowledge and practice together. This relates, for example, to our own knowledge gaps as academics and our need to "deschool" (Illich, 1971) our own worldviews, as a "permanent decolonization of thought" (Castro, 2014, p. 40). At the same time, we must be aware that the word *decolonization* should not be used as a metaphor (Tuck and Yang, 2012), at the same time that it is indispensable to be attentive to who "is speaking alongside us" (Todd, 2016, p. 19). This relates, for example, to Débora's experience, when she was told that, in the early phases of her relationship with a community, no one could understand her and together they created a way of understanding and talking to each other; or Angelika's experiences with some other academics when talking about her activism. As we learn from these different examples, discussions about challenges and injustices are not born solely out of design goals or workshop activities (Harrington et al., 2019), nor can they be solved by these - no matter how transformative or relational our approach or theoretical framework is.

Similarly, the relation between academic activists (or just academics) and communities we work with is not only troubled by epistemic differences. The very practical structures of our academic communities, the incentives and cultures create further problems. As might be obvious, in such work the research process, the activities one engages in together is equally important, perhaps even more so than the physical outcomes of the projects (such as novel technologies, applications, or implications for design). Several others have reflected on the difficulty to structure the very practice of engaged justice-oriented research in ways that support its goals,

such as prefigurative design (Asad, 2018) and justice-oriented interaction design (Dombrowski et al., 2016). Both of these have been influential in our work, but neither fully addresses the pragmatic issues we have faced when doing this kind of work. We learn from our experiences that studying and working with communities and places that are socially constructed to be in need of help, is perceived to increase the chances of publication in prestigious venues such as CHI. Whether this happens knowingly or not, we use people as sources of data that make for a *good* paper when we do this. Lindtner et al. (2018) have reflected on the difficulty to not give in to the Western discourse of the exotic other. This is of course not to say that we should never do work with those in less powerful positions, but instead, we are calling for an acknowledgement of our academic privilege in publications and presentations; as social scientists and technologists, we might build our careers on the backs of others.

Coming back to our reading of Paulo Freire (1978), we learn that “authentic help” (Freire, 1970, p. 11) is a practice where the helper does not control the helped, they both grow together and contribute with each other’s needs and transformation concurrently, "in which the helpers [do not] dominate the helped” (Freire, 2014). Fals-Borda calls it "solidary self-teaching" or mutual education (Borda, 1988, p. 35), where activists are expected "to make a special effort to achieve modesty, understanding, empathy and a capacity for self-criticism" [Ibid., p. 39]. As academics then, the least we can do is acknowledge collaborators’ and participants’ expertise and input, employing justice-oriented or decolonising methodologies, and work alongside their struggles.

Differences in understanding about the purposes of research within academia and the communities with which we work also relate to publication practices. Academic systems of publishing provide incentives for researchers to engage in more or less covert acts of exploitation, where conversations and activities with communities become raw materials drawn through a process of transformation and delivered as commodities or papers, like an academic supply chain. Taking inspiration from Marx’s concept of “commodity fetishism” (Marx, 1976), we propose community fetishism as a term to describe the tendency of academics to benefit from the

marginality of others, without necessarily paying back to the collaborators. This does not necessarily take the form of conscious exploitation, but can also take place when researchers have good intentions. However, inexperience, ignorance, or the structures of academia, including the field of HCI, can lead us towards exploitative relationships with collaborators.

Looking towards postcolonial and decolonial literatures, community fetishism is reminiscent of neo-colonialist and extractivist attitudes. Such extractivism has for example been explored by Hayden (Hayden, 2005; Hayden, 2010) in studies on pharmaceutical research that draws on local, Indigenous and ethnobotanical knowledge in the production of pharmaceutical products. Similarly, Irani (2019) details how entrepreneurial practices in India transform practices of people's everyday lives and inventiveness (often rooted in necessity and precarity) into sources of inspiration for new entrepreneurial practices, services and products. While these examples illustrate the extraction of local knowledge for the generation of market-oriented products and services, we aim to describe how academics extract value that ends up in academic publications (from which at least authors do not directly profit financially) or recognition and reputation within our academic communities. Furthermore, Linda Tuhiwai Smith (1999) wrote that the word *research* "is probably one of the dirtiest words in the Indigenous world's vocabulary" (Smith, 1999, p. 1) and, expanding another text from her, we argue that Indigenous, rural and marginalized communities are considered "potential market players because they offer unique commodities such as traditional knowledge. [However] they have not yet been 'discovered' in the research sense" (Smith, 2007, p. 78). That statement reinforces that the link between knowledge and power is associated with a series of values based on the power that came with the rise of globalization and capitalism (Shiva and Azevedo, 2003; dos Santos Luciano, 2006). It also refers to the distancing of the ecosystem of the collaborators from scholarly knowledge generation, possibly causing misrepresentations and creating distrust towards the research field, academic or not. The Decolonizing Methodologies, as well as Design Justice framework, provide an alternative to this: "design justice practitioners are working to rethink extractive design processes and to replace them with approaches that produce community ownership, profit, credit, and visibility" (Costanza-Chock,

2020, p. 235). Academic interest in someone's living conditions, even if this learning intended to improve governmental policy or improved public, private, and/or third sector services is not the same as genuine care for another human being; and writing academic articles is different to building knowledge together and sharing this back to relevant communities. The statements we have heard from some of our partners make this clear: *"Researchers come here to get their title."* When we consider the encounter between academics and communities as an exchange of gifts (of which data is one) we should carefully and sincerely consider what we give in return (Mauss et al., 2002), and whether our gift is actually needed or welcome.

Even worse to think that universities in the Global South, not only marginalised communities, provide data and experiences, while the Global North theorizes and applies them (Connell, 2012; Rajão et al., 2014; anonymousdisruptive, 2020) or "the academic equivalent of the renowned maquiladoras [...] that exploit cheap local labour to produce goods for northern markets" (González-López, 2013, p. 40). The accumulation of capital connected to multiple projects in Western Universities in partnership with the Global South Universities is also criticized by community fetishism. It is incredibly rare to have more than one PI on a project (even when these projects are collaborative), they often cannot cost non-academic collaborators into projects, and the amount of funding for each university is starkly different. But the accumulation of capital does not happen only in universities; academic associations have different monetary resources like private company donors, income from the subscription of conferences (that less prestigious and Global South Universities may not be able to afford), and income from the access of the papers by scholars affiliated to Universities (independent scholars or citizen scientists might not be able to pay the amount asked to access each paper).

How is it possible to build trust in such contexts? Understanding what topics, questions and problems are meaningful and welcomed, and learning together requires the building of mutual trust, for which there is no easy or straightforward way. It requires time and effort on all sides. While the notion of needing to build trust with our partners is not new in HCI research, we want to make clear that we are referring to relational trust here rather than trust that is needed for transactional

research processes to take place. In our case, we do not mean we need to build trust with communities for the purpose of being able to research with (or on) them. Rather, we are building trust for mutually positive relationships, for engagement, for reflection, for unlearning and relearning on the part of the academic and for hopefully improved situations for partners. This trust should not be seen as a means to an end, but an end in and of itself.

5.5.2 Relations within our academic communities

The difficulties we experienced with this hybrid activist-academic work do not only come from our relation to our partners and the influence academic structures have on them, but they also stem from relations within our academic communities and the reception of such work. The very structures of academia make the relational and caring encounters with collaborators that we talk about difficult. Academic incentives relate to publications and the stories one tells in them, not to just relationships with research partners. Peer review processes are not designed to adjust this as their aim is to ensure academic quality. Apart from writing and incentives of academia in general, the structure of our research projects is often equally troublesome. The majority of monetary gains are usually directed towards Western academic institutions, creating an imbalanced relationship from the start, and it is often difficult to include NGOs or non-Western academic institutions not just as associated partners, but as fully funded consortium members. In both our contexts such parties routinely have to come up with their own funding for collaborative projects, as their expenses are only covered in part or not at all. Weirdly, money has also different perceived/relative value in academic and community contexts. Such economic differences and conditions make the justice we strive for and the trust that is necessary to work together very difficult. The relationships within *matters of care* (Puig de la Bellacasa, 2017) can easily, despite the best intentions, be deeply unequal and unfair (Tronto, 1993).

When Débora presented a paper based on an ethnographic study to senior academics, she was met with the criticism that her work was too engaged, that she needed to distance herself from her studies in order to provide a better account and

that she should not trust everything her subjects tell her. Almost needless to say, such comments addressing some core aspects of an activist-academic practice as we have outlined above, are harmful and we believe unwarranted. While Western understandings of *science* as objective and distanced are traditionally understood as *best practice*, there are local and traditional practices that are subjective and sensitive, and researchers should understand and respect when engaging in an external community. Furthermore,a long history in various disciplines including HCI make room for (and even argue for) an engaged, critical science. Amongst these is Howard Becker's (Becker, 1967) question "Whose side are we on?", pointing out the impossibility of not taking sides in research, and the feminist epistemology of Haraway (1988), Harding (1992), Rosner (2018) and HCI conceptualisations (Bardzell, 2010; Rode, 2011; Fox et al., 2017) already mentioned.

These kinds of discussions are long-standing and important and need to be taken into account in HCI and design curricula, as well as graduate studies and as part of our continuous learning (and unlearning processes) as researchers and practitioners. With this paper, we add to this growing body of work that brings engaged, critical, reflexive, and emotional entanglements with research partners to the fore. These kinds of relationships require an emotional and personal engagement with worlds and the beings and problems within them. Despite its contradiction to traditional science, this way of working is not a hurdle to the academic notion of knowledge-creation, but instead should be seen as a starting point to this knowledge-building. We have outlined above the importance of trust for an engaged academic practice as the foundation of the co-creation of knowledge, which is by its very nature biased, situated and surely not objective. Adding to this, matters of care (Puig de la Bellacasa, 2017) shows us that there is obviously a place for caring emotions and affection in research and that these relate to holding one another to account over our mistakes as much as it reminds us that those with whom we engage are human.

On top of our engagements with collaborators, Asad (2019) writes that when we talk about prefigurative design approaches, we can also think about how we can become academic accomplices to the communities with which we work - we expand this notion here, pointing inwards to our own academic institutions and

communities. Holding and creating space for explicitly engaged scientific accounts is only one of the necessary steps within our own academic circles. Despite a solid foundation to lean on, creating such spaces can be challenging or dangerous, especially for junior researchers in an environment that is as disciplinarily diverse as HCI and as competitive as academia, as has also been expressed by Almeida et al. (2020) in their introduction of TOCHI on Reimagining Women's Health (Keyes et al., 2020). It means addressing flaws and injustices within our own circles, which can be confrontational, uncomfortable, and dangerous. Racism, ableism and other forms of systematic discrimination and exclusion also exist within the HCI community (see e.g., Rankin and Thomas, 2019; Ahmed, 2016; Fempower.tech, 2020). A possible strategy to eradicate these is perhaps the creation of formal or informal subspaces, collectives, discussion groups, where disagreement/dissent can be voiced and discussed in a safe space, to build a platform from which to address issues in the larger community with more strength. This echoes Nancy Fraser's (Fraser, 1990) call for subaltern counterpublics. It is however an unsolved task, how to move from informal spaces and communities to the larger and more formalised community spaces and tools. It took some centuries until non reactionary superaltern would become professors at the Western academy and propose changes on our way of working and doing research. Many had the responsibility to immerse themselves in the universities to make sure they appropriate the scientific knowledge (Amado, 2020) and somehow use them for the benefit of their communities. Looking towards ACM SIGCHI specifically, instruments such as SIGs or workshops about specific topics can play crucial roles for such discussions, but they rarely lead to the development of new formalised structures. Sadly, even when they do, these new and often more critical or caring structures are then often stifled by remaining power imbalances.

5.6 Conclusions

Our motivations or our good intentions do not stop the risks of creating harm. As academics, we have to unlearn what we have been doing for so long. Even if we sincerely believe that what we propose as a research process will lead to a better life, our idea of a better life can be so radically different from others, even our research partners, that we end up bringing harm. Putting this statement into dialogue with

our own experiences and the texts of feminist epistemologies highlight several points: forms of knowledge and knowledge production that are cultural and non-Western are ignored or devalued in the sciences, including HCI. Thereby, specific *situated* experiences and perspectives of the world are systematically excluded while other standpoints and forms of knowledge production are privileged, mostly the academic *method*. As a result, other worlds are made invisible by the dominant narratives, including academic *authority*, and therefore also disappear as starting points from where to design. Design, by definition, is a form of changing the world and making new ones. But given the systematic exclusion of specific perspectives, we would argue that as researchers in general and HCI researchers and designers in particular, we need a critical sensibility to question our situated understanding of the world from which we set out to design. This, for example, means to ask ourselves, what other ways of understanding the world exist which we might ignore, before we set about remaking the world through design, however modest our understanding of our own design practice and its possible effects is. As we have tried to outline above, we believe participatory forms of research and the kinds of relations we have to our participants are one possible way to include other worlds and check our own standpoint to de-privilege dominant positions.

In this paper, we have reflected on our own experiences of engaged, activist, and justice-oriented research and work within academia. First, we thought through the risks of perpetuating violence when working with marginalised communities, the receptions we have received for our activist-academic work, and the issues of harm and injustice we face within academia. We proposed the concept of *community fetishism* to describe the possible exploitation of communities that are constructed to be in need of help through activist-leaning research. Then, we wove these experiences into wider discussions of research processes not only as part of transactional relationships between partners, collaborators, participants, and researchers but also human connections. We then expanded on the ways in which we work when we work in these justice-oriented ways, impact on academia as a whole, and our standing within this. In the above sections, we have started to do this by raising questions about the kinds of world-making effects we want to have with our projects and relationships, the kinds of futures we want to see created with and through our work. Putting

these questions into context with the risks of doing more harm than good with our research, we provide questions that might be useful for researchers to reflect on when designing new projects with those who are marginalised. While some of the questions existed in some form or another in our heads before we engaged in our conversations, they were formulated as presented here during the process of collaboratively reflecting on our experiences as potentially helpful for our own work as well as those of others.

- What effects or impacts am I wanting to have with this work, as a researcher/practitioner?
- "Who defined the research problem?" (Smith, 1999, p. 175)
- "For whom is this study worthy and relevant? Who says so?" (Smith, 1999, p. 175)
- What are the needs that already exist in the community I am working with?
- What effects or impacts are the participants wanting to have with our joint work?
- Before bringing my skills, what are the skills that I can learn from the participants?
- What pathways forward are there to reach these aims, and which is the most useful for participants; and who is included / excluded in this process?
- How do my and our aims relate to the lived realities, wishes, needs, and expectations of those with whom I work?

The academic elements of our hybrid academic-activist practice are concerned with emotions and the creation and engagement with different knowledges. This means, as academics, we need to ask ourselves:

- What counts as knowledge in our projects and what different knowledge exists in the community I am working with?

- How do we create and develop knowledge and understanding without harming others or ourselves?

- What are the attitudes, words and injustices that affect me emotionally? Why?

- What are the external skills and the network that I can make available to participants and collaborators?

- How might my work be exploiting or oppressing the people and communities that I aim to work with?

Depending on the answer to these questions we could easily become engaged in the destruction of other, equally valuable ways of knowing. By reading and better understanding the works of non-Western critical thinkers, we want to encourage our own future selves and others to think more deeply about the work we are doing, the impacts we intend for it to have, and what unintended impacts the work may have in our own academic worlds as well as the worlds we visit and inhabit as part of our fieldwork and collaborative engagements.

6

Lessons from FARC's Armed Struggle in Colombia Guerilla Warfare and the Use of New (and Some Old) Technology: Lessons from FARC-EP's Armed Struggle in Colombia

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Abstract. *Studying armed political struggles from a CSCW perspective can throw the complex interactions between culture, technology, materiality and political conflict into sharp relief. Such studies highlight interrelations that otherwise remain under-remarked upon, despite their severe consequences. The present paper provides an account of the armed struggle of one of the Colombian guerrillas, FARC-EP, with the Colombian army. We document how radio-based communication became a crucial, but ambiguous infrastructure of war. The sudden introduction of localization technologies by the Colombian army presented a lethal threat to the guerrilla group. Our interviewees report a severe learning process to diminish this new risk, relying on a combination of informed beliefs and significant technical understanding. We end with a discussion of the role of HCI in considerations of ICT use in armed conflicts and introduce the concept*

of counter-appropriation as process of adapting one's practices to other's appropriation of technology in conflict.

6.1 Introduction

Computers and information communication technology (ICT) have become a crucial component of the infrastructure of conflicts around the world: the Islamic State had an extensive social media strategy (Talbot, 2015), for example, using it for recruitment purposes (Berger, 2015). The Nigerian terrorist group Boko Haram employs Twitter to convey their ideological position (Chiluwa, 2015), and thus building a network of followers (Chiluwa and Adegoke, 2013). The Pakistani extremist group, Lashkar-e-Taiba, used Google Earth and mobile phones extensively to plan and coordinate their attack on a hotel in Mumbai in 2008 (Scott-Clark and Levy, 2013; Farwell, 2014). Such technologies are not only used to carry out attacks, but also to coordinate civilian emergency responses, for example following the attack on a park in Lahore, Pakistan in 2016 (Kruger et al., 2017). Over the past decade or so these specific usages of digital and information communication technologies have received increasing scholarly attention, especially from within the CHI and CSCW community (Al-Ani et al., 2012; Wulf et al., 2013a). Such studies show that the use of these technologies is embedded in complex interactions between culture, political conflict, materiality, other technologies and existing social practices. They are appropriated and made to work by actors in distinct ways to respond to situated needs and requirements. In this paper we report on investigations done in Colombia with former combatants and members of the well-known guerrilla group, FARC-EP. The group was one of the main protagonists in a conflict that went on for over 50 years and involved various left-wing rebel groups, right-wing paramilitaries, criminal outfits, the national army and even the United States through the policy agreement called Plan Colombia. The war cost over 200,000 lives („Report Says 220,000 Died in Colombia Conflict“ 2013), generated one of the highest numbers of internally displaced persons in the world (*Estatísticas Del Conflicto Armado En Colombia* 2012), and finally ended in 2016. Previous studies have investigated the role of social media in conflict, and traced the slow evolution of infrastructures, including social media use, in conflictual and post-conflictual situations, as we show

below. Few have, however, detailed the way in which attritional infrastructures, as we term them, engender counter-appropriations, perhaps because of the sheer difficulty of obtaining data in such situations. In what follows, we describe how geo-locating and sensing technologies were used by the national army against FARC-EP and the painful learning process the guerrillas had to undergo to adapt to these new attritional circumstances, and their consequences for the practices of FARC-EP. Where previous studies of a similar kind often made use of or were complemented by online investigations, then, the present case relies solely on empirical data obtained *in situ*.

6.2 Related Works: Technologies of Crisis and War

For several years now, research has examined the role of technology and especially digital media in politically contested and conflict-laden situations or in cases of political activism. Studies have for example examined the role of IT applications in the European Social Forum (Saeed et al., 2011). The political uprisings that have been summarized under the rubric, "Arab Spring," have drawn scholarly attention to the use of social media in conflictual situations (Al-Ani et al., 2012; Kavanaugh et al., 2016; Lotan et al., 2011; Rohde et al., 2016). These studies have looked, for instance, at how platforms such as Facebook and Twitter have been used during protests in Tunisia and Egypt (Al-Ani et al., 2012; Kavanaugh et al., 2016). Many of these studies relied on the analysis of online data such as Tweets or blogs to understand how activists have utilized these media in their protests. This approach enabled the study of potentially dangerous contexts in relative safety. Using online surveys, Kavanaugh et al. (Kavanaugh et al., 2012) studied how young Tunisians used media during the Tunisian Revolution in 2011. Al-Ani et al. (2012) investigated the use of blogs during uprisings in Egypt in the same year. Using both quantitative and qualitative analysis of posts made by Egyptian activists, they were able to identify counter-narratives Egyptian bloggers created in protest against the government of Mubarak. Similarly, Mark et al. (Mark et al., 2012; Mark and Semaan, 2009) focused on the study of "war diaries" that Iraqi bloggers published during the war in Iraq. Their study examines the relationship between war-related posts and other topics, such as posts about daily routines. Exemplifying a quantitative approach to the study

of social media in protest, Zhou et al. (2010) analyzed 3 million tweets made in Iran during post-election protests in 2009. Their account provides insights about how information spreads, specifically on Twitter.

While such online studies shed light on digital technology and media in potentially dangerous contexts, they tell us less about how these technologies are used on the ground. Several studies have tried to engage activists and participants directly and investigate the actual practices. Using telephone interviews, Semaan and Mark have studied how ICTs help Iraqi citizens deal with breakdown of infrastructure during the second Gulf War and maintain a sense of normalcy in new social arrangements (Semaan and Mark, 2011b) as well as build trust and collaborative practices (Semaan and Mark, 2011a). Only few studies have investigated the role of digital technologies in conflict on the ground, for understandable reasons.

Focusing on the protests in Turkey in 2013, Tufekci (2017) explored how political activists were using social media, exhibiting a high level of creativity in their practices to escape known surveillance efforts by the government. Wulf et al. (2013b) investigated how activists in Tunisia used social media platforms to organize protests, share news and mobilize support. In this study they also examined how social media use interacted with more traditional media such as TV, and how both offline and online networks were influential in organising the protests. A similar co-evolution of online and offline practices was observed in a study on the role social media played in Palestinian protests against the wall built by Israel (Wulf et al., 2013a). These studies show how mobile phones and social media are used advantageously by activists in the organization of political protests and the dissemination of information about them. They also shed on light on how these infrastructures enabled increased surveillance of activists by government actors, and the creative practices actors employed to escape this surveillance.

Relatively few qualitative studies investigate the role of digital technology in the context of open warfare. Rohde et al. (2016) have studied the role of digital media and mobile phones in the Syrian civil war by interviewing protesters and members of the Free Syrian Army. Their data provide further examples of how

actors creatively escape surveillance, but also show the need actors face to devise strategies to deal with disrupted digital infrastructure. Shklovski and Wulf (2018) have investigated the use of digital media by civil actors as well as combatants in the Ukrainian-Russian war. Their study shows how mobile phones have become a crucial component of the infrastructure of the war, but also how combatants are forced to mitigate the risks phones pose for their lives by enabling localization through enemy soldiers. Our study presents a continuation of this line of investigation into digital technologies and related social practices in conflict by examining a context of actual war where available infrastructure was radically asymmetrical. By focusing on the attritional use of communication and other technology in the Colombian conflict, and the development of counter appropriations, this paper adds to this narrow canon of literature investigating communication and other technology in warfare. It specifically helps us to understand how guerrilla and rebel groups used technology for their own strategic goals but even more how they evolved methods for dealing with their enemy's use of technology. It does so in a unique context, one where no online traces of behavior are available and hence, only on the ground studies provide for an understanding of events.

6.2.1 The role of technology in the Colombian War

Colombia has been engaged in a conflict that can be described as civil war since the mid-1960s. While there are numerous parties involved, most notably amongst them are perhaps the Fuerzas Armadas Revolucionarias de Colombia — Ejército del Pueblo (FARC-EP), the government and right-wing paramilitaries. Digital and electronic technologies have played a crucial role for one side in this conflict, especially after the involvement of the United States of America through the Plan Colombia (Veillette, 2005). Though originally drafted in 1999, it came into effect in the year 2000, signed by then-President of Colombia, Pastrana, and president of the USA, Bill Clinton. The plan aimed to end the conflict and the related drug trade in Colombia through increased funding for development but especially training and technology for the military and for right-wing paramilitaries. 75% of the funding budget went to military and police assistance (Schonau-Taylor, 2004; Isacson, 2005), the majority of which was given in the form of technology, such as airplanes, helicopters and

surveillance technology (Schonau-Taylor, 2004). This plan was largely considered a failure (Schonau-Taylor, 2004; Isacson, 2005; Veillette, 2005); one of the plan's main goal was to reduce the amount of cocaine, a major income source for FARC-EP and other guerrilla groups, being delivered to the USA. However, the price, purity and availability of the drug in the USA has remained stable. Violence and insecurity decreased slightly but remained the same in the areas of the country most heavily targeted by the plan (Isacson, 2005). While its goal was also to facilitate the peace process, Isacson found that Plan Colombia had a negative impact (Isacson, 2005). The study we report on investigates in situ the role technology played within FARC-EP, but also how the group managed to adapt to the technologies used against them, introduced under the Plan Colombia.

6.3 Colombia: A historical account

Since Colombia's birth in 1886, the whole country has been politically divided into unstable Liberal and Conservative constituencies. In 1948, Jorge Eliécer Gaitan, a promising candidate in the presidential election of 1950, was killed. He had emerged as a popular liberal figure, who defended rural and workers' rights (Pardo Rueda, 2004) and was a promising candidate in the presidential election of 1950. This murder in 1948 set off a ten-hour riot in Bogota where an estimated 5,000 people were killed, (Livingstone, 2004), leading to ten years of civil war and political unrest across the country, known as La Violencia. Around 200,000 people lost their lives during La Violencia (Jan, 1997), even with the National Front agreement between the Liberal and Conservative party, where for 16 years the two parties would govern Colombia together without elections.

Liberal small farmers subsequently rose up and organized in armed groups to defend themselves from members of the rival Conservative Party and defend the ownership of their land from private settlers. This eventually resulted in the formation of Marquetalia Republic, an enclave in rural Colombia, held by communist peasant guerrillas (Arenas, 2000). After the enclave was attacked by Colombian forces in 1964, a surviving combatant, Manuel Marulanda Vélez, together with the intellectual Jacobo Arenas, founded the guerrilla group in 1982. They had

revolutionary Marxist-Leninist political and ideological views and believed in the fight for a New Colombia (Arenas, 2000). FARC-EP was the military wing of the Colombian Communist Party (PCC) and employed a variety of military tactics. In consequence of their actions, they became the target of the Colombian army as well as right-wing paramilitary groups who were supported by the Colombian military, following recommendations made by USA military counterinsurgency advisers sent to Colombia during the Cold War (Chernick, 1998). Popular disappointment with the failure of previous attempts to achieve peace led to the election of Álvaro Uribe in 2002, who was opposed to any dialogue without a prior end to violent activities by FARC-EP. Under his presidency, Colombia and the USA intensified their collaboration under Plan Colombia (Isacson, 2005), which was originally signed in 2000 by the Pastrana administration. The negotiations for a peace agreement were renewed in 2012 by the president Juan Manuel Santos and in November 2016 it was signed by the Colombian government and FARC-EP, after more than 50 years of conflict.

6.3.1 The structure of FARC-EP

FARC-EP was organized into seven main operational areas located in the Caribbean, Northwestern, Middle Magdalena, Central, Eastern, Western and Southern regions of Colombia, known also as blocks. This was the equivalent to 11 regions and 242 municipalities (Pérez and Montoya, 2013), meaning they were present in approximately 20 percent of the country. The guerrilla army's organization followed a strict hierarchical centralized structure. Run by the central Estado Mayor, the hierarchy extended down through several levels to the smallest unit, a squad, consisting of twelve members. The size of the organization varied considerably during its 52-year existence. In the last decade of its existence numbers varied between 10,000 and 18,000 soldiers.

6.4 Field of Research

The context in which the present study focuses and in which it was conducted is a community of former FARC-EP guerrillas. This space is called a Territorial Space

for Training and Reincorporation (ETCR) where around 400 former combatants were located i following the Havana Peace Agreement. After the agreement, around 7000 members of FARC-EP headed to the 26 transition zones around the country and handed in their weapons. The zones were thought to be purely transitional, allowing FARC-EP members to slowly move towards civilian lives over a period of two years, while receiving 90% of the Colombian minimum wage per month (around 250 USD). However, conditions remain fragile. Several ex-combatants have been executed by unknown perpetrators („Colombia's FARC Says Two Ex-Fighters Killed after Campaigning" 2018), creating a strong feeling of insecurity amongst the group. There is little or no development funding for projects in the ETCRs and no strategy for the reincorporation of the ex FARC-EP guerrillas. Most importantly there is no sign of access to or redistribution of land in the country, which was a central point in the agrarian component of the peace agreement. Dissatisfied with the process of reintegration and future prospects, some ex-combatants have recently withdrawn themselves and returned to the forests („Colombia FARC Rebel Dissidents Number 1,200, Military Says" 2018). The specific camp our study is set in is located 3-4 hours by car away from the closest city, only reachable by 4x4 jeep. The area of the ETCR was controlled by FARC-EP for a long time and mostly served the growing of coca. The site has been regularly fumigated with the carcinogenic herbicide glyphosate to inhibit the growth of coca plants. The land is rented by the government from a neighboring farmer. Within a year of moving there, the former combatants were able to build a library, class rooms, restaurants and bars, a small hotel, several small shops, areas of plantation, three greenhouses, some fishing pools, and a meeting hall. The next electricity line is 5km away from the camp and the supply of electricity relies on a diesel generator. The diesel is supplied free of charge by the government but because of access difficulties, the community is frequently without electricity.

6.5 Research Methods

The research methods employed by the authors consisted of an exploratory analysis of observations and unstructured and narrative interviews. These narrative interviews allowed interviewees to tell detailed stories in cooperation with the interviewer. They often did not take the traditional form of question/answer but

are rather like a conversation (Holstein et al., 2002; Holstein and Gubrium, 2000). The data collection took place primarily in the ETCR, with additional interviews and observations made in Bogota. The first author of the paper travelled to Colombia for the first time in January 2018 as part of a several weeks — long social design workshop. The author spent two days in Bogota and three weeks in the ETCR, and was in frequent contact with the communities. At the end of the event she spent an additional five days in Bogotá, where she reached out to persons affected by the conflict. During this time a first set of comprehensive data was collected. In August 2018 author one returned to Bogota and the specific ETCR, followed by authors three and five to collect further data. During this journey she spent several days in Bogota, again interviewing people whose lives were entangled with FARC-EP and the conflict. After this, she travelled to the ETCR, followed by authors three and five, where they spent 7-8 days. During this time the authors interacted with the camp inhabitants, consisting of former FARC-EP combatants as well as their family members and friends. They also engaged in work and social activities. On both trips, comprehensive data was collected by the authors in the form of field notes. In total, 114 pages were collected, and the authors interacted with more than 50 people. Due to the unstable situation, both researchers and inhabitants of the ETCR were forced to treat their interactions flexibly. Some information was obtained in single conversations lasting several hours, some in repeated interactions, some lasted only a few minutes. Author one and five speak intermediate Spanish, and all interactions were conducted in Spanish. On a number of occasions, they were supported by a translator, who mediated between English and Spanish. Given the still uncertain and unsafe situation that many of our informants are in, with several fearing for their lives, it required intensive trust building between the authors and our interviewees. Repeated trips and many informal interactions led, over time, to a mutually trustful and sympathetic relationship that allowed us to present this account. As the information we have gained leaves some of our interviewees in vulnerable and dangerous situations, we took several precautions to preserve our contacts' anonymity: all names in this paper have been changed. Any other information that could reveal a person's identity such as gender or the locations where specific events took place has been omitted or deliberately changed. We also reveal only the most necessary information about the setting of our research, so as

not to reveal which ETCR our informants are part of. Throughout the journey, and upon return, the data was open coded in collaboration with (a strictly limited number of) other colleagues, ultimately resulting in the narrative presented here in this paper. All authors discussed and compared the codes and themes extensively. The authors remained in contact with their acquaintances and informants through email and social media and at times clarified any questions or uncertainties throughout the analytic process. Finally, it needs to be said that the authors are fully aware that we are presenting a one-sided account: there is much to be said about the appropriation practices of the Colombian army and the experiences and sentiments of Colombian soldiers in this war. Unfortunately, we did not have the chance to learn about their positions and therefore only focus on the members of FARC-EP. We make no judgements about the political positions of protagonists.

6.6 Empirical Findings

The FARC-EP operated mainly in the vast and often remote Colombian countryside. Their distributed units were mobile and would move around regularly to control their territory and engage in combat with the Colombian army as well as paramilitaries. All of their equipment, including hospitals, were therefore mobile. Technological progress played a key role throughout the history of FARC-EP, their strategies, tactics and practices: To coordinate the activities of such a clandestine, distributed and highly mobile army, communication inside the organization was key. As a result of the rapidly evolving technologies employed by the Colombian national army, the FARC-EP was forced to develop strategies to deal with this use, even if the technologies at their own hands were much less advanced. We refer to this as counter-appropriation. In the following, we will outline the groups' strategical and personal means of communication. We follow with a description of the introduction of high technology into the war by the Colombian army, and the response by FARC-EP. We will end with a description of how learning was organized as a prerequisite for their adaptation and adoption of new technology.

6.6.1 Telecommunication infrastructure

Laura, a female commander who had been part of FARC-EP for about 25 years, was one of our key informants. While her primary role in the army was that of a nurse, she spent most of her life within FARC-EP as a communication specialist with one of the secretariats.

The Use of Paper

Laura explained that until 1998 communication between secretariats happened via written messages on paper which were en- and decrypted by trusted specialists like herself. By means of different coding schema per secretariat, textual messages were encrypted. Each secretariat's specialist would encrypt messages by translating alphabetic letters into numbers. The sequence of numbers was written on a piece of paper which was then transported by trusted combatants to the respective recipients. Since FARC-EP operated across the entire country, the transportation of messages could sometimes take several weeks.

The Use of Radio

In 1998, after FARC-EP grew considerably in size, the old communication patterns became less effective. To improve their communication and coordination across the large army, FARC-EP introduced high frequency (short wave) radio communication to communicate between the secretariats. Being mobile units, they now needed to carry around a battery and a radio transmitter in addition to existing gear. Moreover, they needed an antenna which they hung over the branches of trees to cover a sufficient territory. At fixed times, each textual message was encrypted into numbers, which were then read out loud and transmitted via the radio channel for each secretariat. Incoming encrypted messages were captured via a normal radio receiver, written down and decoded. If a mistake was detected by the speaker, the message needed to be repeated. This posed a security risk: the Colombian army listened to the encrypted messages, and repetition increased their chances of breaking the encryption key. To deal with this risk, the codification key had to be exchanged

roughly once every six months. At the same time, FARC-EP combatants were listening to transmissions by the Colombian army and tried to decrypt their messages.

Computer-aided encryption

To make telecommunication more efficient, FARC-EP introduced computers to aid with the coding of the textual messages. They identified US American software suitable to their needs. The communication specialist now had to type the messages into the computer which encrypted it and - using a modem and antenna - transmitted via radio. The diminished risk of breaking the encryption by the enemy and the increased ease of secure communication meant that the density of the communication could be increased. After the year 2000, each front had a different cryptography code and was equipped with two computers, one modem, one antenna, two batteries, a compass, and one generator. The radio specialist would be supported by five people to help carrying all the equipment. Each time, it was necessary to find a different place to transmit the data. The communication specialist had to set up the antenna on top of a tree and dig a hole for the generator, to avoid any noise.

6.6.2 Technologies of Sensing, Localization and Targeted Bombing

The introduction of high frequency radio improved FARC-EP's operative capabilities considerably. However, it also made them more vulnerable at the point where a new Colombian government introduced advanced sensor and localization technologies into the war. The use of these technologies by the Colombian army put high pressure on FARC-EP: it enabled targeted bombing which cost many lives among the guerrilla community. A former fighter, Diego, who was also playing the role of a political educator inside his FARC-EP unit described the new mode of warfare in the following manner: "*It was the war of cowards. The government army was not fighting against us but bombing us from planes while we did not have any air force.*" He explained that these bombings were often followed by soldiers arriving with helicopters to kill those who had survived the bombing. Aware of the long-term history of cooperation (Stokes, 2005; Cuellar, 2005), he stated that the technologies were provided by the USA under Plan Colombia. Several former combatants told us

of small electronic devices the Colombian army applied as localization technologies. They called them 'microchips,' and believed they were clandestinely placed in many types of supply such as clothes, food, or even lighters, and aided the localization of FARC-EP. FARC-EP suspected that the intelligence units of the army were able to identify materials which were ordered by the guerrilla through friendly farmers. If a farmer was found by the army to be ordering large amounts, unlikely to be needed by immediate family, the army would suspect a collaboration with FARC-EP and, it seems, added their devices to the order. The consequences of this location tracking and precision bombing were often devastating. A story which we heard from different members was the killing of Mono Jojoy, at the time of his death the second in command in the hierarchy of FARC-EP. Laura told us: "*Jojoy had problems with his legs so he needed special boots. We assumed that the boots which had to be produced specifically for him in Bogota contained a microchip. At the moment of his death he was inside a larger camp with many fighters around him. The bomb targeted him directly. It is hard to believe that this was an accident.*" Another commander called Fabio, a student of chemical engineering before joining FARC-EP, mentioned that the microchips were just one element of the high-tech equipment used by the government against FARC-EP in the civil war. The government's high-tech strategy also included cameras to observe strategically important places, goniometer devices to locate anything that could transmit signals, and sensing equipment to detect the amount of bodies passing in front of it. He also spoke about the danger created by surveillance planes the government used which were equipped with sensors to detect heat emitted from bodies, radio waves from the guerrilla's equipment, and location data from microchips inside their supplies. He called IT “imperialist technologies” and stated: "*You go only in through the front door but they [the enemy] also have the backdoor*". Another commander explained that the technological strategy of the Colombian army was specifically directed against FARC-EP's ability to (tele-)communicate, especially aiming to disrupt their use of radio transmitters. Their actions had two main effects on FARC-EP: 1) localizing radio emission enabled them to detect FARC-EP presence and direct their planes and bombs accordingly and 2) in the case where the local commanders stopped communicating due to the threat of being targeted, the actions of the guerrilla became uncoordinated and slowed down. While the Colombian army's appropriation of advanced technologies impacted the

war considerably, there was a consensus inside FARC-EP that the army was also able to infiltrate FARC-EP ranks directly. Laura explained that however good the USA technology was, the guerrillas learned how to deal with it and developed several strategies to decrease the risk the enemy 's technologies posed for them: To ensure that supplies were not contaminated with 'microchips' they decided to store food outside their camps at a distance. New supplies would be stored away from the camps for several months and the guerrillas observed whether their location was attacked. Boots had their soles punctured with a sharp piece of hot metal to damage any microchip. To avoid detection by heat they cooked food only during daytime and instead of open fires they began to only cook on small gas heaters. The troops distributed themselves during the night over a larger sleeping area to lessen the heat signature their bodies emitted. Night guards no longer used torches but instead encircled the camp with ropes which they could use to trace their patrol routes. Another commander added that FARC-EP reduced the size of their units and moved them closer to populated areas. It took FARC-EP considerable time and effort to understand these technologies and how to protect against them. At a later point they identified technologies to help find and destroy 'microchips' in their goods: A former combatant explained, that FARC-EP received devices to create 'electro shocks' to destroy the microchips. From now on, they would treat all the incoming supplies with these devices to destroy the chips and mitigate the risk of targeted attacks. It needs to be noted that the effect of high technology and targeted attacks had devastating effects on FARC-EP: it cost thousands of lives and the group lost an entire generation of its leadership during the period of high-tech warfare. Nevertheless, in many ways they were able to adapt their tactics and deal with the technology of the enemy to avoid a decisive defeat.

6.6.3 Mass Media Production and Use

It is crucial to note that communication technologies were not only used by the FARC-EP for coordinative purposes, but also served more general communication aims — at times strategic, at times for social and cultural purposes. This included the use of radio as a mass communication medium to gain and broadcast information. Radio was also used by the national army and FARC-EP needed to again counter

radio-based activities by the enemy. In the following we will outline the role ICT played as mass communication media for FARC-EP.

The role of Radio

Radio programs are still important mass media in Colombia and were certainly crucial for the information needs of a guerrilla group permanently on the move. Radio was the main source of information for the majority of FARC-EP members - only very few people had access to TV. Many fighters owned their own radio receiver, and even those taken prisoner by FARC-EP were given radios to listen to news or for entertainment purposes. To influence public opinion and to produce programmes for their fighters, FARC-EP was also running its own radio stations during the civil war. As the urban activist, Maria, told us, such a station was for example based in the high mountains south of Bogota. She explained that the cold weather at altitude made it a relatively safe location as the army would not pursue them there. The elevated location high in the mountains also helped to distribute the programme widely. The group of radio activists was producing a nation-wide program for several hours at a certain site and then would wrap up their equipment to escape detection by the army's localization technology. They would carry it manually to a new location, to build it up again, and start producing the next program. FARC-EP also used the radio communication infrastructure for non-encrypted transmissions of speeches by members of the secretariat. At such events the emission time was communicated beforehand to all units so that everybody could listen. FARC-EP members were generally encouraged by commanders to listen to FARC-EP radio. However, several radio stations in Colombia were controlled by the army, who actively used this channel to reach FARC-EP members. These stations constantly distributed the government's ideology and tried to demotivate fighters. A commander we spoke to, remembered the calls well: "*Demobilize!*" "*Surrender!*", constantly, attempting to destabilize FARC-EP. These stations were sending targeted messages straight to specific commanders or troops, discouraging them from continuing the war. Messages like: "*Your mother is waiting for you at home*", or "*Come take care of your child, he/she is waiting for you*", spoken with the

voice of a child, were often repeated on the military radio stations. Given the limited communication options, listening to it was a default option.

The introduction of internet

At a later stage in the history of FARC-EP, the internet also took on an important role in the group's ICT provision. Since an internet connection was largely unavailable in the jungle or the remote countryside, guerrillas that operated in the urban areas were responsible for the task of collecting internet content such as text, audios and videos files. The data arrived in the fighting units on USB sticks to the communication specialist who would hand it over to the local commander. The commanders would select what would be accessible to their unit. One of the commanders we spoke to admitted that he had a certain interest in controlling the flow of information to his unit. This very restricted access to mainstream media such as TV or the internet created the ground for the emergence of a distinctively independent culture within the camps. Largely deprived of cultural media, FARC-EP members started writing their own songs, developed their own dances style and cultural outfits. Each camp had its own group of dancers which developed and performed specific choreographies for important celebrations.

6.6.4 Informal Communication and Use of Mobiles

Given the secretive nature of the FARC-EP, members were required to cut most of their ties to the outside world and communication happened predominately within the group. Minimal contact with friends and family however was maintained. In addition to contact via public telephones, written messages were also passed on to families of FARC-EP members. The message was transported through the FARC-EP support organization to a certain location and then the recipients could pick them up. At certain points combatants were allowed to go in groups to a landline telephone and make private calls. To ensure their security, they would conduct their phone calls together, and everybody could hear what was said. These informal communication practices changed with the extended availability of mobile networks. The availability of mobile phones challenged FARC-EP's discipline and leadership. We learned that

some FARC-EP fighters, for instance, started to own private phones. In one case a fighter was carrying his private mobile and whenever he got network connectivity, he called his family who were living in another country. When we inquired about security concerns, he explained that they would not mention their location on the phone and that "*the army was mainly behind the big commanders!*" - implying that their practice may not have been dangerous. The technologically savvy FARC-EP leadership was well aware of the risks such behavior theoretically posed to other members of a unit and the organization as a whole. These practices were therefore deemed unacceptable and strictly forbidden, Laura explained to us. Each commander had to check the bags of their soldiers regularly. When a mobile phone was found disciplinary measures had to be taken. However, she acknowledged that an informal use of mobiles existed. Especially in the months before the Havana agreement the use of private mobiles was widely practiced inside FARC-EP. In order to prevent spies from leaking vital information Fabio had ordered that the tower that supplied the signal to the region over about 50 km2 be destroyed. "*We wanted to make it as difficult as possible for them*". He also expressed his general worries about the presence of mobile phones and other devices amongst his troops: "*I would have loved to put all of these devices into a Faraday cage, so nothing, no signal, could go in and out of there!*"

6.6.5 Learning within FARC-EP

Throughout the entire existence of FARC-EP, obtaining knowledge and spreading it amongst its members was a crucial component of the activities of the guerrilla. In fact, knowledge was such a central aspect of FARC-EP that some of the ex-combatants we talked to stated that their main reason forjoining the FARC-EP was the possibility of learning. In the rural areas where FARC-EP mainly acted, there was little to no public education and peasants were frequent collaborators of the organization. One ex-combatant told us "*I was almost nine years old when I decided to join FARC-EP, I knew how to read and write, so I started reading the statute.*" While the importance of education to the organization was empowering to its members, it was also used as a form of punishment: members that were found to be lacking discipline, for example, by carrying a private mobile phone, were subjected to punishments which included

a didactic element, such as copying a book chapter by hand or giving a lecture about security. Learning activities were constant and daily: in daily school activities political science, history in general and even reading was practiced. In classes, they used a dialectical method: "*a discourse between people holding different points of view about a subject, to establish an agreement through argumentation*", Diego explained to us. Members were encouraged to study by themselves and discussions on various topics would take place every 15 days. FARC-EP also offered 30 to 120 days learning activities, especially focused on political science, ideology or military strategy, conducted by FARC-EP experts. Students would move to a safe place in the jungle for the duration of the class. There were also strategies for obtaining new knowledge from the outside, especially when it came to communication technology, economics, medicine or defense and weapons systems. Groups of three students would go to urban areas for a duration of three to six months. Upon their return they were required to teach what they learned to chosen representatives from each front. Depending on the subject, knowledge would be circulated further internally, but often the new skills would stay with the chosen specialists inside the front. Learning also happened in informal ways within FARC-EP, often through trial and error. This approach was especially valuable when it came to technology. FARC-EP members would acquire much of their understanding of technology through experimentation. As Juan told us: "*FARC was always learning things. Almost everyone had a small radio, so we had to know how to fix it. We used to open not only the radio, but the computer, cellphones, every electronic device, to check what was inside and rebuild.*" The thorough technical, practical but also social understanding of technology amongst some members became especially apparent in a discussion we had with Fabio: "*We want to appropriate the technology available, it is a collective good. Technology is a human sacrifice; every piece of technology has a drop of blood ... But are we condemning the use of it? No, we should go slower, in a responsible way. . . . I would like to adapt the technologies to my needs and instead of myself adapting to the technology.*" Others had a much more practical approach, one person told us: "*I just need to know enough to make it work.*"

6.7 Discussion

In this paper we present a unique account of a guerrilla army's efforts to use old and (relatively) new information technology for their own aims, while at the same time counteracting the enemy's employment of much more advanced technology against them. This has caused tremendous losses amongst soldiers and leaders within the organization and weakened FARC-EP considerably. Yet our data also shows how the group managed to diminish the threat with typically low-tech solutions. In times where warfare is often unbalanced, and national armies find themselves in conflict with distributed and fragmented armed groups, our narrative has implications for how we understand the role of advanced and other technologies in such situations. In the following chapter we will discuss how it was possible to resist 50 years of attrition. We will also discuss how FARC-EP managed to employ the rather simple technology at their disposable to achieve coordination of distributed groups over a large terrain.

6.7.1 Technology For FARC-EP

Throughout the entire history of FARC-EP, it was a predominantly rural organization, and their foothold in cities was minimal. This strictly limited their access to new technologies and to related knowledge. As a result, the technology they had at hand was simple: the technological infrastructure on which their operations relied were mostly paper and radio, and at a rather late stage radio communication was aided through computer encryption. The perhaps most pervasive technologies of the last 20 years, mobile phones and the internet, were hardly used and at no point did they play any strategic role in their operations. Given that their operations relied on the successful coordination of large numbers of combatants divided into small units and distributed across a vast area, communication was crucial. That it was managed successfully with extremely limited resources, is remarkable.

6.7.2 Attritional Infrastructures and Counter-Appropriation

In many ways the FARC-EP avoided defeat by a technologically much more advanced enemy who enjoyed the support of the government and military of the USA. The availability of technological infrastructure in this war was radically asymmetrical: while FARC relied on rather simple technologies, the Colombian government had highly advanced warfare technology at their disposal. The practices described in this paper can largely be understood as a way to address this asymmetry by FARC-EP. The use of various kinds of localization technology to enable targeted bombing of FARC-EP's locations initially put the guerrilla under high pressure. A variety of techniques and technologies were employed to locate FARC-EP camps, to a large extent supplied by the USA under Plan Colombia (Schonau-Taylor, 2004). Once a FARC-EP presence had been detected, they were attacked through targeted bombings. Building on the salient features of infrastructure as described by Star and Bowker (2002) (Star and Bowker, 2006), the use of these technologies by the Colombian army can adequately be described as an "attritional infrastructure," one which evolves over a considerable period of time but with a specific aim in view: the destabilisation and eventual destruction of an opposition. Such evolving sociotechnical arrangements consist in a mutually informing set of actions and reactions, embedded in other material or social arrangements. For example, the army relied on knowledge of specific practices of FARC-EP such as ordering goods or carrying radios, places where localization devices can be hidden. These localization devices are made to be invisible to FARC-EP and are the foundation to the precision bombing attacks the army carried out. Through the attritional use of infrastructure, the warfare the army was engaging in, attempting to continuously degrade their capability in repeated attacks over extended periods of time, rather than seeking decisive victory. These losses forced the guerrillas to deal with these attritions: They gradually learned, and over time managed to develop, a set of strategies to evade the army's localization, with the support of technology but most often without. In fact, their strategies often consisted of simple security practices: To avoid localization through heat detection, combatants started to employ different cooking methods and to sleep in more dispersed arrangements, so as to emit less heat. To escape cameras or sensors they avoided using the same paths. Trenches were dug in different locations to provide increased opportunities to seek shelter

in case of attacks. The devices that were described to us as 'microchips' probably provided a more difficult challenge. Without in-depth knowledge it is difficult to guess the function of an electronic chip from its appearance. Once FARC-EP members detected them in their supplies it was only possible through a very painful process to learn their functionality. Their size made them hard to detect. It was unclear which goods contained them, and if they in fact were present in any suspicious goods. To avoid detection a simple strategy such as leaving new supplies in specific areas for an extended amount of time, to see if the location would be attacked, was adopted. Later on, technological support was also used to scan goods and treat some with electric shocks to destroy any tracking chips. FARC-EP's strategies and eagerness to acquire knowledge were likely crucial. Their experience with trial and error modes of learning, to understand technologies by opening, repairing and rebuilding them served as useful approaches to the detection and destruction of 'microchips.' Knowledge about microchips and strategies to mitigate their effect were then successfully shared across the organization. The painstaking learning process FARC-EP members had to undergo, and the changes in practices they adopted, to escape the threat of precision bombings is what we characterize as counter-appropriation: As Stevens and Pipek (2018) (Stevens and Pipek, 2018) mention, "*Appropriation refers to the establishing of new practices in the light of new technologies*" and "*such transformations may be a slow, unnoticed, quiet and evolutionary process*" (Stevens and Pipek, 2018). This adequately describes the painful process of change FARC-EP underwent to mitigate the loss of fighters and friends: it was a gradual and slow development of new practices in light of new adversarial technologies. What distinguishes it from the established concept of appropriation is the fact that the technologies in light of which they changed their behavior were not their own, but those used by others. The term “counter-appropriation” is not entirely new. It has been used by other scholars to describe for example practices observed in post-colonial contexts, where inhabitants of former colonies re-integrate goods or practices into their daily practices that have been “culturally appropriated” by the West, and thereby counter-appropriate them (Young, 2016; Peluso, 1992). While in other contexts it describes the re-appropriation of technologies or practices in post-colonial or post-capitalist contexts, in the context of CSCW and HCI however, we emphasize a different reading of the term. Rather, we use the term to describe

how, in asymmetrical conflict, one side is forced to adapt their behavior to the use of attritional technology by the other side, while the exact functioning of the technology remains opaque. Counter-appropriation can but does not necessarily need to involve technology use. Examples of non-technological counter-appropriation include FARC-EP's practice of storing goods outside their camp to ensure they had not been contaminated with tracking technology. Furthermore, it needs to be understood as a specific form of wider resistance to the political, economic and social system of the Colombian state. While it is a novel term for us, it is useful to describes phenomena that have been observed before in similar contexts. Previous studies have shown that surveillance technology employed in conflict situations has similar effects on activists working against governments, such as in Syria. As Rohde et al. (2016) have found, members of the Free Syrian army were forced to acknowledge that they were being surveilled by the Assad government with devastating effects. It was impossible for them to know exactly how the surveillance technology of their enemy worked. In the absence of full understanding they had to develop beliefs that provided incomplete but sufficient explanations that allowed them to successfully minimize the risk of being caught. Activists in Tunisia's Arab Spring, for instance, had to develop strategies to escape specific use of technology by the Tunisian government against them, for example to circumnavigate upload controls by sending their video content abroad and upload it from there (Wulf et al., 2013b). It is likely to occur in other asymmetrical conflicts such as the war against the Taliban in Afghanistan, Boko Haram in Saharan Africa and wherever else a similar imbalance in the access to technology in conflict situations exists.

It is worth noting that the enemy's technologies were likely not well understood entirely by the guerrillas: for a remote and clandestine organization as FARC-EP it is difficult to maintain up-to-date technological knowledge and distribute such expertise across the entire organization. Some combatants exhibited distrust towards information technology, calling it imperialist technology, as our contact Fabio (see e.g. (Semaan et al., 2017b) for a discussion of this term elsewhere). Also, the nature of the technologies employed by the enemy was obscure: cameras and sensors were hidden, and electronic devices do not readily disclose their purpose. It is difficult or impossible in situations like this to know what the enemy knows. The

obscurity of the enemy's power and the devastating effect this had resulted in a drop of morale amongst the combatants, as Fabio told us. Consequently, these devices were treated as mystical objects whose workings were to a certain extent mysterious, but whose effects were sadly well known. At times this also led to a certain amount of carelessness: some of the people we spoke to told us that they were convinced that the attacks were targeted at very specific people within FARC-EP in high leadership positions, and that the “footsoldiers” felt rather safe. As Laura told us: "*After the Peace Agreement I learned that I was an important target. But I was only a nurse!*" The private use of mobile phones was thereby, likely unintended, undermining the counter-appropriation efforts, a similar phenomenon as previously observed in the Ukrainian conflict (Shklovski and Wulf, 2018). As much as the FARC-EPs explanations for localization were perhaps incomplete, they managed to gain an understanding that was sophisticated enough to devise simple practices that diminished the destructive effect of their counterpart 's advanced technology.

6.8 Conclusion

Our study demonstrates that technology usage in conflict situations and its effects need to be considered as embedded in a complex network of interrelations between culture, technology, geographical location and social practices. While this is arguably always true, specific relationships in the context we describe, in our view, are best understood through the lens of 'attritional infrastructure' and 'counter appropriation,' so as to distinguish it from contexts where there is a more symmetrical access to given technologies, or from other less conflictual situations. The processes we uncover above are specifically the result of a very radical asymmetry, one where the kinds of ICT and other technology taken for granted in the Western world were not available to one side in the conflict. Counter appropriation was possible, over time, as a result of the high value on learning inside their organization and their ability to communicate knowledge across their distributed organization. The term specifically describes the phenomena in this account, but also builds on other accounts within the HCI and specifically CHI canon. It traces the development of forms of technology appropriation in a variety of conflictual and post-conflictual situations and attempts, over time, to find a conceptual framework which accounts for shifting patterns of use.

In line with these previous studies our account shows that counter appropriation of the use of technologies is a common phenomenon in conflict situations. Such processes may explain partially why technological superiority on one side does not lead automatically to decisive "victories" . For practical reasons our account is limited to FARC-EP. The Colombian conflict was shaped by the involvement of many different actors, and we lack an understanding of the actual functions of the technologies we mention here, processes of appropriating these technologies on the side of the army, or their relation to any other involved parties such as paramilitaries, other leftwing rebels or crime syndicates.

7

Growing together, remaining apart: The role of digital technology in former guerrilla fighters' social capital

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Abstract. *In this paper, we present an account of how FARC-EP ex-combatants are using digital technology in the process of reincorporating into Colombian society. We report findings showing how this technology mediates the difficult task of transitioning from a culture of opposition to civilian members and active political actors. Using the concept of social capital as a framework, we investigate the intersection between the use of digital tools and developing cultural and economic practices among these groups during this transitional period. Reflecting on the bonding and bridging aspects of social capital, we describe how ex-combatants draw on substantial social capital from their former lives as a guerrilla army in order to strengthen their position in these new circumstances, and their cautious and difficult creation of new social ties with wider Colombian society. We contribute to the CSCW discourse by discussing the crucial role digital tools, previously not available to these groups, play in sustaining, re-growing and building social capital of communities in post-conflict periods.*

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7.1 Introduction

Studies within HCI and CSCW have investigated the role digital technologies can play in modern political conflicts, spanning a range of topics from protest and conflict mobilization to technology counter-appropriation and HCI for peace (Stepanova, 2011; Jansen, 2010; Shklovski and Wulf, 2018; de Castro Leal et al., 2019; Hourcade et al., 2011; Hourcade et al., 2012; Rohde et al., 2016; Wulf et al., 2013c; Semaan and Mark, 2012). In this paper, we contribute by extending this interest into investigation of the role of digital technologies in transitioning from a period of conflict (Junne and Verkoren, 2005) into post-conflict scenarios. We focus our contribution on how digital tools can serve as mediums to expand, preserve and regrow existing capital during this transition period. This tense, sometimes long, post-conflict passage, represents a wide array of challenges for states, citizens and ex-combatants. Investigating how digital technologies support or hinder this transitional stage can help deepen our understanding of their potential, particularly in relation to how groups directly involved in prior conflict can make use of them in their process of transition.

The case of post-conflictual life for ex-combatants in Colombia serves as the most recent example of this transition and exemplifies the intersection between digital technologies and changes in cultural practice. In May 2019, a report found that as many as 3,000 ex-combatants had returned to arms while a deeply rooted issue of illicit drugs remains alive (Casey, 2019). Furthermore, at least 500 activists and community leaders were killed in Colombia due to post-conflict unrest created by a complex post-conflict transition (Ditta, 2020). The situation has been, and remains, fraught. In what follows, we examine the attempts by ex-combatants to forge new lives and examine the conditions which may make that possible or otherwise hinder progress. Understanding what conditions pertain and how digital technology is implicated in change is critical to inform the transition to post-conflictual life in other national and international contexts.

The theoretical lens we use in order to make sense of these transitions is that of "social capital." We focus on two dimensions of social capital: bridging and

bonding (Gittell and Vidal, 1998). Broadly, *bonding* represents capital emerging from inward dynamics, and *bridging* represents capital resulting from outward dynamics. These concepts, as we point out below, have been used in a number of ways but can broadly be understood as referring to the non-economic resources implicated in opportunities for personal, cultural and social development. It is important to note here that the concepts can be used both to denote elements which enable inclusion and social cohesion, but also to denote elements which function to exclude social groups. This conceptual lens, combined with an ethnographic approach to our work, allows us to flesh out how these groups are experiencing this period of transformation. We highlight how they rely on technological infrastructure, especially mobile technologies, to re-build their cultural, political and economic lives, even though these technologies were largely foreign to them before the end of active conflict.

We begin by providing context through a historical account of the conflict and Peace Agreement in Colombia; we present prior work done at the intersection of HCI and CSCW, peace and post-conflict and identify gaps our study contributes to filling. We lay out the methods and positions used in our study, particularly our conceptual contribution to the work, followed by a set of empirical findings. We discuss findings in relation to the concept of social capital and the role of digital technologies in transitional post-conflict scenarios, with a focus in the case of Colombia. We end with a discussion of novel areas of work this methodological approach reveals and a conclusion.

Set in Colombia's post-conflict transition, our study contributes a novel and unique case for the role digital technologies play in mediating the post-conflict transition to mainstream society. This is not a straightforward matter in that they can be implicated in facilitating shifting cultural practices[2] which orient more to mainstream cultural life or, conversely, to maintain a form of cultural identity which remains distinct. We complement this contribution by layering social capital as a framework of analysis. In so doing, we point to the complexity of the choices made and how they can be viewed as exemplifying both the *bridging* and *bonding*

[2]For details about practices, see e.g., (Wulf et al., 2018)

effects (Gittell and Vidal, 1998) that Putnam (2000) discusses. More specifically, we demonstrate how this lens enriches the study of digital technology in the context of guerrilla ex-combatants' post-conflictual lives, including their ongoing political activities, their current economic situation, and the experience of being newly embedded in family and community. Moreover, our study adds to the increasing body of work on HCI for peace (Hourcade and Bullock-Rest, 2011).

7.2 Research Context

7.2.1 Historical account of the conflict

The origins of the Colombian conflict trace back to a time of civil unrest and violence, known as La Violencia. It started with the murder of Jorge Eliecer Gaitán, a popular presidential candidate who defended the rights of workers and Colombia's rural population, in 1948 (Rueda Pardo, 2004). His murder gave rise to ten years of civil war, and 220,000 deaths (Jan, 1997). To end this conflict, the two main parties Liberal and Conservative, agreed to govern the country together for 16 years, until 1974.

While most of the civilian armies of *La Violencia* disbanded during this time, some remained active and organised themselves in semi-autonomous enclaves throughout the Colombian countryside. At roughly the same time, and in response to the Cuban revolution, the United States sent experts to investigate Colombia's internal security situation. In the early 1960s, at the behest of the United States, the Colombian government started attacking these organizations. A village of 1,000 inhabitants, formed by liberals and communists, had established self-government in a rural region of Colombia, which became known as the República Marquetalia. This area was seen as a threat by the government, and 16,000 Colombian troops were sent to attack the village (Rempe, 1995; Janicke, 2008). The village and their crops were destroyed (Petras and Brescia, 2000) and motivated the founding of Armed Revolutionary Forces of Colombia - Popular Army (FARC-EP), which mainly consisted of small-scale peasant farmers.

Their political and ideological views were broadly Marxist-Leninist and FARC-EP effectively became the military wing of the Colombian Communist Party's (PCC). Throughout the conflict, FARC-EP's membership grew, consisting of 18,000 combatants. Nevertheless, they were only one of many parties to the war, including other left-wing guerrilla groups, the Colombian National Army, right-wing paramilitary groups, and drug cartels. Given its size and importance to the war, several attempts to negotiate peace focused on FARC-EP, in the early 1980s, all failed. In 2011, then President Juan Manuel Santos renewed efforts to broker peace between the government and FARC-EP and initiated a series of secret exploratory meetings between representatives of both parties. In August 2012, negotiations started and ended in 2016 with the Colombian government and the FARC-EP signing a peace deal. The accords were supposed to edn a conflict that displaced more than 8 million people (RUV, 2020).

As part of the Peace Agreement, the Revolutionary Alternative Force of the Common (FARC) party was established as a communist political party and as the political replacement of the former rebel group (FARC-EP). Now, FARC supporters, who were not part of the conflict, can be affiliated to the party. Two years after the creation of the FARC party, ex-combatant dissidents from the Peace Agreement also decided to continue using the acronym FARC. In the text, we will refer to the political party as the FARC party, ex-combatants of FARC-EP as the people still part of the Peace Agreement, and dissidents of FARC-EP as the people who are now not part of the Peace Agreement and went back to armed struggle.

After the Peace Agreement, at the beginning of 2017, 24 areas around the country were used as a transitional space to receive the approximately 7,000 ex-combatants. These spaces were named and will be referred to as Territorial Spaces for Training and Reincorporation (ETCR) (ARN, 2020).

7.2.2 ETCR and inhabitants

The objectives of the ETCR zones are to guarantee that the cessation of conflict can be monitored, to create conditions for ex-combatants to lay down their guns,

and to prepare ex-combatants for their transition to civilian life through training and capacity building offered by the government. ETCRs had their transitional legal status completed in August 2019, which means that the government was supposed to start a process of provision of essential public services, roads, connectivity, among others (Marulanda, 2019). The government also decided to maintain the ETCR mechanisms for another one to two years (Redmas, 2019). Among other conditions, the government arranged to maintain the monthly basic income ex-combatants receive (around 90% of the Colombian minimum wage, $\tilde{\$}$250 USD), with the exception of individuals who have other reliable income streams.

Despite all this progress, weeks after the government announced these measures, former top FARC-EP guerrillas returned to a war footing in Colombia (Casey and Jakes, 2019). This threatening moment not only causes instability but also brings uncertainty to what happens next. Several ex-combatants and members of the reincorporation process have been killed since the Peace Agreement (Justice for Colombia, 2020) by unidentified perpetrators („Colombia's FARC Says Two Ex-Fighters Killed after Campaigning" 2018), causing a strong feeling of fear in the ETCRs. Amongst the dead was a participant of the present study, which we learned about through a WhatsApp message. There is a growing fear now that more and more ex-combatants might become dissatisfied with the reincorporation process, given the uncertain and dangerous situation they find themselves in, and may decide to withdraw themselves from the peace process to join other dissidents, inclusive one of the participants of this paper.

The ETCR, of our present account, consists of about 400 inhabitants and it is remotely located (a difficult 3-4-hour drive from the closest city). Before the Peace Agreement, the area was controlled by FARC-EP. Ex-combatants moved there in 2017, assigned to this area by the government, and within a year were able to construct their homes, a library, a meeting hall, classrooms, three greenhouses, plantations and several fishing pools as infrastructure for the community. This occurred while other elements of basic infrastructure are missing or inadequate. The next electricity line is 5km away, so the camp relies on electricity from a diesel generator supplied by the government – a challenging circumstance due to the remoteness of the area.

As a result, the community is frequently without electricity, running water, no way to pump oxygen to the fish farm, no internet, or ways to properly store food.

These struggles affect the rurality of the ETCR, which arguably plays a crucial role in the emergence of their specific situation. The community is rural in a descriptive sense (Hardy et al., 2019b), in terms of their distance from an urban centre, their low population size and density and their lack of certain basic infrastructure. Some of the specific practices we describe here would likely not be possible in an urban area, even though there is an increasing link between urban and rural communities (Hardy et al., 2019a; Flora et al., 2016). This interdependence makes their interaction an important role in their social lives. However, in the case of this specific ETCR, the geographical distance to the closest city, and the poor conditions of the road makes selling of local products at any market effortful and costly.

7.3 Related Work

7.3.1 Social capital

The concept of social capital has a fairly long, and somewhat contested history. It has been associated (see e.g., Coleman, 1988) with, for instance, rational choice theory. For Coleman (1990), social capital consists of a set of resources embedded in network relations which allow for the maximization of utility. It can come in a number of forms, which include obligations and expectations, information potential, norms and effective sanctions, authority relations and (membership of) social organizations. Bourdieu (1986), at roughly the same time, formulated a version which emphasizes the exclusionary potential of social capital. Here, social capital is roughly equivalent to symbolic power, acquired through "more or less institutionalized relationships of mutual acquaintance and recognition" (Bourdieu and Wacquant, 1992, p. 119). Robert Putnam (2000) famously drew on the concept to discuss changes in USA society, lamenting the decline of social capital in USA community. Putnam outlined various ways in which social capital works and is transferred, including *Information flows of learning and exchanging ideas*, *Norms of reciprocity*, *Collective action* and *Broader identities and solidarity*. He discussed them

at length in some of his central works (Putnam, 2000) but only later categorised them as those above channels (Putnam, 2019). More usefully for our purposes, he draws on a distinction made by Gittell and Vidal (1998) in an attempt to synthesise the inclusionary and exclusionary potential of social capital. The distinction is between *bonding* and *bridging* social capital. The first, they suggest, functions for *getting by* and the second for *getting ahead* (see Leonard, 2004 for a critical review of this distinction). In other words, bonding social capital will involve bringing people closer together via family, community and other bonds, whilst bridging involves looking outwards to establish other kinds of positive relationships. Below, we discuss how notions of *getting by* and *getting ahead* illuminate the way in which members of ETCR community attempt variously to maintain political identity, to forge new family and community relationships and to develop new material practices. We expand on this below.

The concept of social capital has been drawn on in the study of rural communities and by various authors who deal with communities in transition in relation to a wider culture. Related to rural communities, Flora et al. (2016) have analysed communities in the United States for many years and they argue that any community has resources or assets within it, which become capital that can be used for the community's betterment (in a group-level phenomenon), what they call Entrepreneurial Social Infrastructure (ESI) [Ibid.]. Regarding communities in transition, Perez-Diaz has pointed out that: "the term 'social capital' needs some clarification, and the assumption of social capital's benign effects on liberal societies should be drastically qualified. The term denotes a combination of norms and networks of cooperation and sentiments of trust that may be of quite different character and serve quite different functions in the larger society" (Pérez-Díaz, 2002, p. 1).

Existing work on social capital, including work from HCI and CSCW, deals specifically with immigrant communities. Notably, Carranza (2007) uses social capital represented in the form of values strongly held by Salvadoran families previously exposed to war in their assimilation to Canadian culture. Values based on the notion of family, or "familismo," as well as social networks, are counted as social capital that these groups use as anchors during this transition. Hsiao and Dillahunt

(2018) and Almohamed and Vyas (2019) also use the concept of social capital as a variable of analysis in their ICT studies of immigrants and refugees' adaptation to new societies. Ha (2015) uses the notions of bridging and bonding social capital to examine cultural assimilation in South Korea. Simpson (2005) explains that social capital is key for effective implementation of Information and Communication Technologies (ICT) initiatives. Kang et al. (2017) report about North Korean women moving to the democratic and neighbour country South Korea. They present the fast transplantation to the new society by the government and show that the first thing they buy is a smartphone. However, they argue that ICT is not sufficient to empowering migrants, on the contrary, it tends to be used for bonding with their counterparts rather than bridging with South Koreans.

7.3.2 Digital technologies and post-conflict transition

As early as 2005, reports have considered the actual and potential impact of ICT and digital computing technology on conflict prevention, peace building, and post-conflict reconstruction and reconciliation. An early report for the UN highlighted the internet's potential to aid with the dissemination of live information about ongoing conflicts but also about appropriate responses or available support, and the possibility of creating stronger networks between organisations or even early-warning systems (Stauffacher et al., 2005).

In the years after this specific report, several authors from the field of HCI reported on specific instances in which computing technologies addressed issues of peace and conflict. Hourcade et al. (2011) and Hourcade et al. (2012) attempted to sensitize the CHI community to pay more attention to HCI and Peace, focusing on several aspects of peace. Most relevant to our paper is the work focused on post-conflict situations, the challenges societies and individuals face in such situations, and the role ICTs play. Other authors have outlined the need for reliable information to support social reconstruction and collaboration post-conflict, or for ICTs to be able to support the emergence of stability after the conflict has ended by assisting in the management of a state (Best et al., 2009; Comninos, 2013). Most of these examples considered the role of the state in transition as its primary angle of work.

Given the unique transition into political and civic life faced in the case of post-conflict transition in Colombia, our work takes a different approach by centering ex-combatants' efforts.

Best and Serrano-Baquero (2009) have worked with Liberia's Truth and Reconciliation Commission to develop new media technologies that support the work of the commission in post-war Liberia. In the context of the Rwandan Genocide of 1994, Friedman et al. (2010), and Yoo et al. (2013) investigated the role of videos from the International Criminal Tribunal for Rwanda, and how such videos can be retained and reused years later. Their study considers that such post-conflict reconciliation and peacebuilding is a multigenerational and multi-lifespan process, and they reflect on the role of information systems in supporting such long processes.

A few authors have set out to better understand the processes of transition that participants in armed conflict undergo after the end of the conflict or their participation in it. Semaan et al. (2016) focus on the identity crises veterans frequently experience. Their study shows social media is able to provide access to "human infrastructure" (Lee et al., 2006), that is required to rebuild a sense of identity and highlight the obstacle military's hypermasculine culture poses to the disclosure of personal troubles, necessary in the transition into civilian culture (Semaan et al., 2017a). While these studies provide a crucial backdrop for our context, it also becomes clear that FARC-EP ex-combatants will likely undergo a different process. For example, while veterans report challenges with loneliness, a lack of understanding of their social surroundings outside of the military, and the transition from the collectivist culture of the army to the individualistic culture of civilians, ex-combatants of FARC-EP are surrounded by their peers in the ETCR and many go through this transition together.

A further tragic, yet common consequence of armed conflict is the displacement of people. The UNHCR currently counts 25.9 million refugees, and 41.3 million Internally Displaced People (IDPs) (UNHCR, 2019). Those at the centre of the present study are equally displaced. Although they moved to an ETCR voluntarily, the conditions are akin to refugee camps (Defensoría del Pueblo de Colombia, 2018).

In recent years several scholars have focused on the role ICTs play in contexts of displacement or technology use by displaced people (Ahmed et al., 2015; Fisher et al., 2017; Dossa and Golubovic, 2019). Some authors have investigated how displaced populations access technological infrastructure in their new circumstances. One such study investigated ICT access and use by displaced populations living in refugee camps (Sabie et al., 2019). The paper shows the importance of mobile technology and its prevalence amongst these groups. ICT's were most crucial to connect with other people. Given the lack of opportunities for employment or further education in these contexts - similar to the context of our present study - it is crucial to note that this research found no use of ICTs towards improving the participants' circumstances in these domains.

Furthermore, other investigations into the challenges refugees face point to the loss of social capital (Almohamed and Vyas, 2019) in such contexts and the role digital technology can play in facilitating the rebuilding of social capital (Huysman and Wulf, 2004; Lingel et al., 2014; Almohamed et al., 2017; Almohamed and Vyas, 2019). Even though these studies clearly investigate a different context and population, the inhabitants of the ETCR face a similar challenge of how best to build their social capital, and to what purpose.

Through our account of a community of former combatants of FARC-EP and in light of the lack of knowledge regarding the role of digital technologies in post-conflict contexts, we argue that the importance of social capital in post-conflictual societies is significantly under-examined. By applying this concept to our account of the community of the ETCR, we are able to draw out specific insights about the bridging and bonding effects digital technologies have for the community at hand. It is important to note, however, that we do not seek to generate new theory, rather we implement this two-fold theoretical lens and direct it to a new context using our ethnographic data.

7.4 Method & Positions

This account is based on an exploratory analysis of qualitative data gathered from observations and interviews. All interviews were unstructured and narrative, which allowed our interview partners to tell detailed stories, in collaboration with the interviewer (Holstein et al., 2002; Holstein and Gubrium, 2000). As such, they were rather like a conversation instead of following a traditional question/answer structure.

All data was collected during two trips to Colombia by the first author (FA), both made in 2018. The data predominantly stems from the ETCR mentioned earlier, as well as several interviews conducted in the country's capital, Bogotá. The first trip took place in January 2018, to join a several week-long social design workshop in the ETCR, organised by the Universidad Nacional de Colombia and a North American University (NAU), where the process of co-design was used to build trust and contribute to reconciliation in areas of post-conflict zone. During this trip, FA spent a total of 7 days in Bogotá and three weeks in the ETCR, where the FA constantly interacted with its residents. While most of the data was collected in the ETCR, the FA also reached out to other persons affected by the conflict. To expand this first set of extensive data, the FA returned to the ETCR in August 2018 together with the seventh author (SA). During this journey the FA again spent several days in Bogotá, before and after a week-long stay in the ETCR. In Bogotá, the FA was able to reconnect with prior acquaintances while making new contacts with people whose lives were entangled with FARC-EP in the past, as well as recently, as part of their newly formed political party. In the ETCR, the two authors interacted constantly with residents of the camp, their families, as well as visitors from the closest neighbouring community during lengthy conversations, joint work sessions and social events in the surrounding area.

In total, the authors interacted with more than 50 people. In Bogotá, FA stayed in the house of the daughter of a FARC-EP leader who was killed before the Peace Agreement. In the ETCR, FA first joined as an organiser of the aforementioned design workshop. On the second visit, FA made it clear that she was visiting with

an academic interest, as a researcher, a motivation that was discussed openly with members of the ETCR and which is reflected in the shared authorship of this paper. Interactions with members of the ETCR would usually start by offering help with local activities (carrying pieces of wood from the forest to build a table, cooking, planting, participating in dancing classes, consuming local products and services, watching sport's tournament, etc). That opened space for more conversation, especially with those interested in returning to the academy and accepting to be co-authors of this paper. All interactions and observations were captured in field notes, resulting in 114 pages of written data. In line with the idea that particulars of author's identities could have an effect on their research, we clarify that three of the authors are from Colombia, four of the authors speak Spanish. FA and SA conducted all fieldwork and data collection in the local language, a portion of which was translated into English with the help of a translator. As this account hopefully makes clear, the situation in the ETCR is highly unstable, which extends to the data collection, and required us to treat all interactions flexibly: some interactions lasted several hours or were repeated, others lasted mere minutes, and some interviewees were not met again during the second journey. The FA however, stayed in frequent online contact with several of the research participants, both in Bogotá as well as in the ETCR.

Several community members fear for their lives, many have lost friends and family to unknown killers since the Peace Agreement. It required intensive trust building between foreign researchers and residents of the ETCR, including many informal interactions to build a mutually trustful and sympathetic relationship that enables us to present this account. To preserve the anonymity, and therefore safety of our collaborators, we have changed all names in this paper. Information that could reveal individuals as well as the specific name of the ETCR has been omitted. The authorship of this paper is shared between inhabitants of the ETCR and researchers from different backgrounds, all currently affiliated with Western academic institutions. The data was shared with a limited group of colleagues, all of whom were involved in the open coding of the data using Thematic Analysis (Braun and Clarke, 2006) as a methodological framework. Codes were shared and discussed intensively, resulting in the present account. Continued contact with some of our interviewees as well as other informants, allowed us to clarify questions and

verify information as well as codes. We should stress at this point that, although the concept of social capital became a conceptual focus for us, this was after we recognised it as relevant to the emergent categories in our analysis. After analysing and inductively coding the data we found our findings corresponded very well with the general ideas of Putnam, Bourdieu and Flora, and we adopted this framework after open coding the data.

As a diverse group of authors of this paper, we have different political positions, but we stay true to the data we have been able to gather. The conflict in Colombia consisted of many different parties with different positions, subjectivities and experiences. In this paper, we predominantly focus on the experiences of the inhabitants of the ETCR, almost all of whom are ex-combatants from FARC-EP, with additional insights from our collaborators from Bogotá.

After immersion in the ETCR, we continued our dialogue with ex-combatants and assisted in finding work opportunities. In this sense, it is impossible, to not be sympathetic to the people we interviewed, who opened their homes to us, who told us about their lives, their struggles, and who ultimately share authorship of this paper. The initiative of including ETCR members as authors stems from the need to recognize their contributions to the work, their desire in returning to the academy and telling their stories that comprised this work. That being said, the non-ex-combatants authoring this paper do not endorse armed struggle and violence in any form.

7.5 Findings

Below, we describe how ex-combatants experience the post-conflict transition period, the difficulties they face in the process of reincorporation and reconciliation and their hopes for the future. We pay special attention to the role of digital technology as infrastructure in this process. Our findings cover various aspects of their life after the conflict, including 1) the continuation of political activities in new democratic forms, 2) the economic practices they are developing, 3) adaptation to family, and 4) community life. These activities are characterised by the ongoing

difficult transition of former FARC-EP members from being a Marxist guerrilla army to members of Colombian (capitalist) civil society.

7.5.1 Participation in politics and social media

As former members of an organisation with a strong Marxist ideology, the ex-guerrilla now need to develop ways to continue their political life with democratic means. In this section we will detail these experiences of the members of the ETCR we visited but also of other members of the newly established political party FARC, and the role digital technology such as social media play in these attempts.

One of the foundations of the Peace Agreement and of restoring FARC's social fabric, was granting the group freedom to exercise political participation. In the information age, connectivity and access to proper diffusion channels is fundamental to achieve this goal. However, during this transition period, digital connectivity within the ETCR, where this study unfolded, was lacking. As we learned later, however, it was FARC-EP that destroyed the tower in the region before the Peace Agreement, from fear of being located or surveilled. Internet arrived around March 2017 in the region, through the *Vive Digital* project (de TIC, 2020), a national program offering free internet in public spaces. The signal connection was very weak, and the antenna was four kilometres away from the community - in the location where the first camp was planned. Ex-combatants organised themselves, to have better internet access, and contracted a private Internet Service Provider. Currently, most houses have antennas installed to receive the radio signal.

Regardless of the lack of connectivity in the ETCRs, the FARC party has managed to leverage social media as a tool for enhancing political action. The cessation of the armed struggle does not mean ideological changes and many members continue to engage in various forms of online political activism. The party has a presence in some of the major social networks, using these platforms to establish political positions, mobilize members, and communicate their values and work. This presence goes beyond Spanish speaking audiences, with English and international-focused accounts on platforms such as Twitter. LGBTQIA and gender-focused presence in

these channels allows the FARC party to convey new inclusive and collective values. These messages are complemented by platforms such as YouTube, which provides new mediums to broadcast messages of social justice to different audiences. As mentioned before, the FARC party has also used social media for more traditional mobilization strategies. In 2018, during the controversial incarceration and trial of one of FARC-EP most prominent leaders, the party used its social media platform to call support on a hunger strike that lasted 40 days (News, 2019). More recently, during a national march in response to the alarming number of social leaders killed, the FARC party communicated their solidarity, relying heavily on Twitter.

We interviewed Carol, a young FARC party member who had been engaged with social issues but never belonged to FARC-EP. Her father is visible in the left-wing community, giving interviews in newspapers and posting about his political activities on social media. What she sees is that *"in reactions to some of his postings, he receives [death] threats on FB."* Carol seemed to be discrete in her position and said she did not like that the political party was using the same name as the armed group before. People would, she thought, find it difficult to understand she had not been a combatant. This account shows how the distrust and feeling of danger that exists in the ETCRs extends to FARC party's political activities, as well as to other leftist political actors.

This led ex-combatants to develop specific social media practices in order to actively manage any risks online presence might pose. When creating their profile on social media for the first time, they use a code name and profile pictures that do not correspond to theirs. *"We prefer not to use our real names,"* Elaine, one ex-combatant, told us. On the other hand, our conversations in the ETCR revealed that people use messenger apps and Facebook freely, imposing few security constraints on themselves: *"I do not have anything to hide but I want my privacy protected. Is it possible?"* they asked with real interest in learning more about digital privacy. When asked if they felt safe using social media, one ex-combatant answered: *"Nothing is safe, it is like being in the [Facebook's] house. The same for a computer, I have a computer, but the computer is not mine. I paid for it, I have it, but [the big companies] use it, it will be forever their computer, their data. It is like having a house, you use the*

front door, but they will have access to the back door. [. . .] during war we removed the cameras, Wi-Fi, and Bluetooth from the computers."

One example of their technological experience previous to the Peace Agreement happened when they were using a computer connected to a compact wireless printer. Ana said: *"When a platform plane passed, suddenly the computer got online, there was a message saying: 'Welcome to the internet!' We looked everywhere, how could we be connected in the middle of the jungle? It was clear that the airplane used the printer to access our computer. We opened the folder and deleted all the documents."* The experience by ex-combatants of using technologies was traumatic, as Ricardo pointed out: *"Everything related to technology was bad for us, it killed us. Now, technology is in everything."* He explained all the technologies they needed to carry around in order to communicate: radio, computer, antenna, cables, generator, modem, compass. He complained, pointing to the cellphone: *"now we have all here: two cameras, GPS, telephone, we can make cartographic maps, you do not need to talk to people on the street because you can locate yourself easily. You have everything here, for the enemy it is fundamental to offer you all this tools, but for us it is an open microphone, where we sell our data, ourselves, our family... This is full of temptations"* (for more information about the use of communication technology by FARC-EP see (de Castro Leal et al., 2019)).

7.5.2 Current economic situation and livelihood practices

A crucial component of the transitory experience of the former guerrilla is the development of new economic means and practices in radically different conditions. In this section we outline how members of the ETCR attempt to develop an economically sustainable life in the ETCR, how they put their political values into practice and where they adapt to the values inherent in mainstream Colombian economy. This process, we will show, is mediated by newly encountered digital technologies.

The current economic situation requires the ex-combatants to make a living in very different ways compared to their former lives, as several of the inhabitants told us. They have to create sustainable sources of income for themselves as individuals,

whereas economic life was formerly organised in a very collective sense. The reincorporation plan provides professional training and funding from entrepreneurship projects, especially because 96% of the demobilized guerrillas shared their intention to become entrepreneurs rather than employees (Espectador, 2019). During the establishment of the ETCRs, the government committed to providing access to training. The effort, led by Colombia's Ministry of Work, had the goal to ensure economic prosperity. It focused on training ranging from schooling for all ex-combatants by providing access to elementary and high school education, to educational offerings focused on local and solidarity-based economic models. These trainings were to be connected with a larger effort to allow ETCR members to submit projects for funding from both governmental and multilateral organizations. There are mixed results in terms of how these programs are moving forward (Defensoría del Pueblo de Colombia, 2018).

To develop a new economic life, the inhabitants of the ETCR are exploring agricultural production techniques, growing crops like maracuja, cacao, pepper and tomatoes, fish farming and raising and maintaining livestock. Several aspects limit the success of these activities. As mentioned before, geographic remoteness, and poor road quality, make it difficult to sell agricultural produce before rotting. The soil is contaminated with glyphosate (Solomon et al., 2009), originally sprayed by the government to fight coca production in the area, and its concentration in the soil leads to low crop yields, also for the villages around the ETCR. José, one campesino from the region, shared with us: *"The presence of the government was restricted to the helicopter full of glyphosate. Even people who did not have coca plantations had glyphosate sprayed onto their field and it killed everything."* Lastly, ex-fighters lack both agricultural and marketing knowledge. Some crops such as tomatoes, have been hit by a devastating fungus, and the ex-combatants were unable to fight the infestation successfully, leading to the loss of the entire production. Although this seems like an area in which digital technologies could possibly be of support by offering relevant information in a systematic and targeted way, our account does not show any effort by the government or ETCR members in this direction.

ETCRs members' response to this challenge has been to collectively try to improve their agricultural practice. For example, by organising their work in cooperatives, in accordance with their political ideals, and seeking investment together, they are able to make fewer perishable products or buy machinery to dry fruits and vegetables, and to maintain the tanks for the fishes. Such cooperatives exist in every ETCR across the country, and a national cooperative, called *ECOMUN* (ECOMUN, 2020), organised by the FARC party, is coordinating and supporting their efforts. In other ETCRs, it is possible to find beer production, clothes manufacturing, coffee farming, tourism and fish farming cooperatives among others. An important communication channel is a shared WhatsApp group, organised by ECOMUN, where members of cooperatives in different ETCRs support each other in their search for strategic partners, understanding the value of their products and generally exchanging knowledge and expertise. These communication and knowledge exchanges extend outside their network. After the Peace Agreement, for example, the Universities from Colombia supported students and professors to visit and engage in projects in different ETCRs (Molano et al., 2018; Trigos-Carrillo et al., 2020; Perilla, 2020). If leaders of the cooperatives need help with writing a proposal, branding or management of greenhouses, for example, they would contact academics and/or professionals through WhatsApp for help.

Individual strategies also come into play with members selling cosmetics through catalogues, establishing hotels, and trying to turn crafting skills into profitable ventures. A lack of required knowledge is often tackled with the help of the internet as illustrated by a woman who makes a living working as a tailor. Angela was a tailor for the guerrilla army, making uniforms. Now she works alone with two sewing machines that she bought with the monthly wage she received. She invested $1,4 million pesos (approximately $450 USD) per machine and $200 thousand pesos in mosquito net fabric. Laughing, she told us: *"I learn everything from Dr. YouTube, do you know him? Sometimes I also use Dr. Google."* In addition to her sewing business, she also offers copying services. She pointed to the print and copy machine and said: *"I had also to learn how to use this machine to offer copying services to people here."*

Another member of the ETCR, Gustavo, who works in the cultural sector offering dance classes and DJing, quickly grasped the importance of online media for his craft. He maintains a YouTube channel to record and publish his work. As he told us: *"Technology is an essential part of my life, through which I can generate content."* Female ETCR-member Paula has a hotel with six rooms (in the same makeshift construction style as before the Peace Agreement) and a restaurant. She also sells internet access by handing out the one Wi-Fi password to clients and changing it after they use up the time they paid for. If a person pays per day, they have to ask for the password many times in one day or, if per month, almost every day. She also rents out the TV in her house to young inhabitants to play video games. Non-agricultural work is also organised in a cooperative manner. Women's cooperatives, for example, run a market, a school, a restaurant, and a greenhouse.

Leadership within the ETCR places high hopes on the positive impact digital technologies could have for their economic activities, realizing the potential it holds to improve current practices, but also to develop new professions for the future. When talking about digital technologies, we learnt that the community is building a Wi-Fi infrastructure for the camp. They also want to use the upper level of the library building to set up a computer room where people can learn from the internet. During our conversation, Ricardo showed us a Raspberry Pi and said: *"These kinds of cheap computers should be the base for such a learning infrastructure."* He also envisions the use of affordable technologies like Raspberry PI to automate functions in a new greenhouse. This motivation has a clear political element to it, he said: *"We do not want to have campesinos lagging behind, this is a way to make a modern campesino."*

Despite their ambitions, and what we perceived as an often-positive outlook towards the future on the side of our interviewees, others had a much bleaker perspective on their present and future situation. When we talked to Paula, the woman running a local hotel, she said: *"Looking back at my time in FARC-EP, we were fighting in the jungle for a different society, a solidaristic one and we did not get any money for that, only food and education. And now? Where did those dreams go?"* As part of the peace process, ex-combatants have to integrate themselves into the

more capitalist mainstream Colombian economic system. An ex-combatant, who was a professor during the war and loved teaching, decided to put his skills aside to engage in the creation of cooperatives and in learning English. Other ex-combatants told us about their desire to have a diploma. Some members did not complete their bachelor's degrees before joining FARC-EP and, after the Peace Agreement, more than twenty years away from the academic world, they tried to join and finish their studies unsuccessfully. Universities did not accept them as existing students, requiring them to enroll again. Those struggles, as Paula expressed: *"It feels like we have lost the war,"* show how difficult it is to live a life based on the values and ideals they fought for, and many still hold. Antonio, a middle-aged shop-owner in the ETCR and ex-combatant, expressed this in a radical way: *"We did not change our thoughts, we did not surrender, we only gave them the arms."*

7.5.3 Experiences of family

One of the most drastic changes for the members of the ETCR is the changed family- and overall social life. In this section we detail their experience of this change, and their use of digital technologies to deal with this new situation, including the rebuilding of ties to family members outside of FARC-EP.

With the Peace Agreement and the move into the ETCR, the ex-combatants' experience of having a family, and their relation to their own family, have changed profoundly, as our conversations reveal. Prior to the Peace Agreement, FARC-EP members did not have strong ties to their families and were prohibited from starting families of their own inside the group. Our collaborators told us that contact with family members outside the group such as parents or children were sporadic, before the Peace Agreement. Some had short phone conversations once or twice a year, some sent short handwritten notes containing nothing more than *"I am healthy do not worry"* every few years. Later, sometimes mobile phones were used for this, clandestinely, as FARC-EP leadership forbade the use of cell phones (see de Castro Leal et al., 2019). One ex-combatant, Claudio, said that in 30 years he saw his sons *"once every two, four, six years."* He is still married on paper but him and his partner live separated lives.

Within the army, some fighters lived in romantic partnership but were not able to start families, neither allowed to have children. However, pregnancies did occur, in such cases, some women aborted their pregnancies with the help of the FARC-EP medical practitioners and nurses. Medical procedures, like abortion, were also learned in informal ways, often through trial and error. Others carried out the complete pregnancy and gave their children to friends and family members outside of FARC-EP[3] (Rodriguez, 2014). One ex-combatants sadly told us: *"It was really hard."* Camilla, a female guerrillera we met in the ETCR, had a child in 1984. As it was too dangerous to keep her son in the group, she gave him to extended family, at the age of 19 months, ten of which she had spent outside the camp with him. After the Peace Agreement, she wanted to meet him, but the family, who had adopted her son, had changed their names, making it difficult to find him. She first tried Facebook and then hired a lawyer for one year to find her son. When they finally met, she was surprised to learn that she was already a grandmother. They now have regular contact, exchange pictures through WhatsApp, and see each other once a year or more.

The family dynamics changed dramatically with the Peace Agreement and the move into the ETCR. There was somewhat of a *baby boom* in the ETCR. During our visits, we counted 24 babies. Some of the relatives of ex-combatants also moved into the camp. This was not caused by poverty or a lack of opportunities, as we initially suspected. Paula told us that *"the women in the camp had never lived in a society with kids and had no experience of motherhood, so they were afraid of being alone in the child rearing."* The new possibility of family was clearly welcome: *"There was no romance before, no future, no plans, only the present. For that reason, many couples were formed but without obligations. Now we can dream about having a family, and we [my partner and I] are trying to have a baby."* The pride is frequently seen in WhatsApp status updates, where videos and pictures of babies are posted. Another statement by a former leader of the group summarizes this: *"The first impact of the peace for us was demographic."*

[3]This was perhaps not always voluntary (Reuters, 2015), although our sources do not mention any force to give away their kids or to abort.

The Peace Agreement also opened the possibility to reconnect with family members. Even before the agreement was signed, in the transition period between war and peace, members of the guerrilla group began to reach out to family members, well aware that this would be a difficult return. Through conversations, there was a clear concern that ex-combatants felt like they would be a burden for the family, because they were not economically stable and because they were considered disappeared for many years. Most of the families were in areas near the forest, so some ex-combatants would travel in person to contact the family. However, other ex-combatants did not know anything about their family, so the strategy was first to try Facebook. For them, this was an easy process somehow, as most of the families had a Facebook profile. Two ex-combatants mentioned that they were worried about how their family members might react to them, so they created an account under a fake name on Facebook to reach out to their family. After acceptance of the contact request, they would start chatting with each other and reveal their true identity in conversation. This experience was echoed by others we spoke to. Evaristo, who had not had contact with his family for twenty years, used the first money he received after the Peace Agreement to buy a smartphone to contact his family. He installed Facebook, registered a fake profile and found his mother. He had some concerns about talking to the family, so he asked a friend to call his family, travel to the place where they live, and, in person, tell them that he was alive and willing to meet them again.

Others reiterated the importance of smartphones not just to find each other but to stay in contact. Igor was given a smartphone by his father to communicate. Leonora went to Bolivar square in Bogotá in 2017, the day the FARC Party was launched, as many other people did. In the crowd she met her uncle, who attended the demonstration hopeful to meet her in the middle of the crowd. He had brought a smartphone to give to her so they could stay in contact. She showed us the phone, smiling. Many of the ex-combatants nowadays consider the internet as a *basic need* as one of them explained: *"If you are sick, how do you call a doctor? Communication is an integral part of being human, we have to exchange with the family. We will not die because of no communication, but we will not be the same."*

7.5.4 Encountering new social structures

In addition to the new experiences of family life, the former guerrillas are confronted with an overall drastically different and often more complex social context, compared to their former life as a guerrilla army. Below we will outline their experiences in this new context, which includes experiences brought on by formerly unknown technologies.

Their new situation as civilians, living in a more or less settled arrangement, demands of them a lot of changes to their previous routines and poses a variety of challenges. Apart from the welcome new experiences of family, the inhabitants do not all find it easy to adjust to the new social circumstances. A major change was from a military, top-down way of social organisation to a civilian one with a flatter hierarchy. This allowed new freedoms, but a lack of clear orders also confused some of our interviewees. The sudden absence of defined structures was an anomic experience for many of the ex-combatants but also for their relatives and the campesinos who live around the region. One campesino who was participating in a meeting in the ETCR mentioned that, after the Peace Agreement, they had some concerns but at the end, *"it was a big change [. . .] we could stop producing coca leaves and substitute it with other things, like cattle."* The campesinos participation is not limited to meetings, there are soccer tournaments and parties every week and the habitants around the ETCR arrive by foot, bicycles and motorcycles - improving their formerly strained relationship. Sergio, leader campesino of a village next to ETCR, said smiling and pointing to a former combatant: *"I was surprised to encounter my childhood best friend here after so many years. . . He disappeared and we did not know if he was alive*."

Ricardo, with a bit of cynicism, complained that life is so much more complex in the transition process than it was during the war. In the jungle, he only needed to decide on issues which were clearly demarcated. Now, he needs to take care of schools, cooperatives, government negotiations, neighbours' disagreements and family issues. *"Things became so complex,"* he said. To overcome these difficulties, tasks and responsibilities within the ETCR, he created groups to manage aspects of

the ETCR, such as electricity, food, water supply, and the health centre. Each group uses a WhatsApp group to communicate internally, which became an important means of coordination. To share these experiences, similar communication groups exist between different ETCRs.

Our interviewees also overwhelmingly complained about the loss of their former social arrangements. Formerly, no one had to wait in line for a doctor; transport was organised collaboratively; now ex-combatants have to arrange travel by themselves - and pay for it. A very important aspect was the lack of community in the new life, *"I miss the relationship with the community, we would see each other every day, talk. I would wake up, see them and say - good morning, neighbour! Today, we don't talk so much."* Others mentioned the lack of care for each other in the new environment. Before people would cook together and freely share food, now they receive food from the government, each of them collects their parts in the collective kitchen and cook in their individual kitchen at their home. The rules of hospitality have changed: *"[Before] people would arrive, indigenous, black; any human being would be received with food, water and a place to sleep."* Another woman expressed this feeling of loss in the following way: *"In the fighting units everybody felt like they were in a community and behaved in a solidaric manner, now they all look for their individual interest."*

As FARC-EP was a very rural organisation, disconnected from much of Colombian society, they developed their own cultural practices such as dance styles, songs, and dresses. With free access to information and art, now these practices are no longer the only ones available. One choreographer and ex-combatant had his performances from the times of conflict recorded and saved in his computer. He proudly shows them to visitors, but he did not upload them online to his YouTube channel, only the dances that were created and presented *after* the Peace Agreement. This serves to illustrate the role new digital and online media take in the communities' new social life, while radios and communication equipment used before the Peace Agreement were left aside. While permitting new freedoms and communication channels, they simultaneously add to their sense of confusion and discomfort. Our interviewees expressed constant doubt about what can be uploaded or posted online. *"Which name to register with on social media, which picture profile to use, will people recognize*

us, our past? And which information can we trust?" were questions members reported to be asking themselves. *"I prefer not to use my real name, neither my guerrilla name,"* Elaine told us. *"It was like a toy in front of a kid, something totally new. It was a discovery and people were worried about the reaction of other people. It was an unknown landscape full of sensitive information without control,"* reflecting on the arrival of the internet in their lives.

Besides being their first time using social media, it was also the first time that they did not have to ask permission to talk to someone outside of FARC-EP. Before the Peace Agreement, leaders of a FARC-EP unit had almost absolute control and suddenly they had no control at all. This created significant disorder. It also opened the door to misinformation, especially because members who were against the peace process were deliberately posting fake news on WhatsApp and Facebook, we were told. One leader explained to us: *"There are also people who do not love the peace process. There are FARC members who want it and others who do not. Those who do not want peace are looking for ways to damage the process, putting false information on Facebook."* He continued: *"They want to break us up. A united community is not interesting [for the government]. [. . .] I think that you will understand that we were not prepared to manage networks, we were not able to assimilate all the information and it came to us in an avalanche."* The internet was flooding the ex-combatants with information and distractions. It became difficult to distinguish the important from unimportant or false information, and how to preserve one's experiences and practices, in light of these new technologies, was problematic. Some members of the ETCR tried to formulate a principled approach to this new technology. An ex-combatant explained to us that in communities with traditional, rural or indigenous culture it is important to find a way to use the internet as a tool to validate their knowledge and not to invalidate them. He explained that *"we suffer from a disability, where we do not know how to start even a fire anymore, a very old technique that we think we do not need anymore because we depreciate traditional knowledge."*

7.6 Discussion

We currently know little about how people appropriate ICTs when undergoing a dramatic, sometimes vertiginous post-conflict life transition in a rural community. After the Colombian Peace Agreement, members of FARC-EP had to experience a period of profound transition: changing from a Marxist guerrilla army to civilians in a democratic, pluralist society, giving space to new digital technology, all while readjusting to a wider new world. This reincorporation process to a wider civil society opened up a variety of possibilities but also created numerous problems. In this section, we discuss our findings, reflecting specifically on how social capital develops through *bonding* and *bridging* in the form of new family relationships, both as a way of preserving existing identities and conversely as a driver for being integrated in the new society. We highlight the role of digital technologies at this intersection.

7.6.1 Transition into Colombian society

Considering the contrasts between the practices inherent in guerrilla life and mainstream Colombian society, former FARC-EP members become affected by asymmetries of cultural production and consumption, being located in what could be described as cultural, economic and relative geographical periphery of Colombian society (see Wallerstein's World System Analysis (Wallerstein, 2004) for a discussion on centre vs periphery). In these circumstances, they lack access to dominant, cultural life of mainstream Colombia and are disprivileged in its production. Ex-combatants then, find themselves with little option but to try to integrate into the larger Colombian society, including adapting their social relations, economic practices and political activities, as we detail above, at the same time that they face environmental obstacles to prosperity such as an unhealthy soil, as many campesinos around Colombia. They are, to certain extent, expected to organise themselves in a specific way that does not always align with their own wishes and preferences, as they are coming to realise, and find imposed upon them a specific view of what a community and work should be like, modelled more after modern Western conceptualisations, dominating other ways of organising (Quijano, 2000). This is not

an easy process, as our data shows, and the former FARC-EP members face the difficult task to find out how to carry their values, practices and ideals into these new circumstances, or to abandon them and embrace new values and practices.

As our fieldwork demonstrates, this struggle is emphasized by the environmental, political, social and economic beliefs that informed the guerrilla and their practices. On the one hand, integration strategies become clearer through their social media activism where former Marxist political ideals are maintained but communicated with different means, in parliament and on social media, instead of in an armed struggle. The organisation of economic and social practices also presents an example, with members engaging in individual entrepreneurial activities while also trying to organise them under cooperative structures, reflecting their social and economic ideals. As we described above, much of their economic activities are organised in cooperatives, both within the specific ETCR, but also across ETCR boundaries, involving other communities of former guerrillas. The same applies to the cooperative manner in which the ETCR is managed. For these processes digital technologies seemed to have quickly become useful tools to organise tasks, share information and coordinate locally and across locations. On the other hand, integration takes place through the transformation of former hierarchies, where former military leaders are still highly respected, but structures are shifting towards a more democratic distribution across all members of the community. Another instance is exemplified by the fact that recordings of cultural events and practices such as dances and music that were developed by the guerrilla during the war are not put online. In this way, ex-combatants find themselves in a constant state of negotiation, sometimes even negotiating their own identities, as mentioned, in their usage of fake names in social media and elsewhere. Although this has no legal implications in their status as citizens, it does convey elements of mistrust, and is expressive of the tensions endemic in attempts by ex-combatants to integrate. These dynamics are marked by difficulties and considerable disorientation (Olsen, n.d.). Submitting to the pressure to engage in a capitalist economy as well as their ongoing dependence on government support creates a feeling of defeat, as was very clearly expressed to us by Paula: *"It feels like we have lost the war."*

It is important to point out that this sense of frustration and loss does not characterise all activities or applies to all members, and that the benefits of integrating into larger Colombian society are also experienced by community members of the ETCR. One ex-combatant expressed this feeling in enjoying economic success with her individual enterprises, as mentioned in our Findings section. Family life is also an area in which many members of the ETCR clearly embrace the new situation by starting romantic partnerships, having children and fostering increased relationships with extended family. As our findings show, both of these enterprises are, to a great degree, supported by digital technologies. Community members use social media applications on smart phones to find and reach out to family members outside of FARC and to maintain contact or use video platforms and search engines (Dr. Youtube) to learn or improve skills such as sewing. Understanding the pluralistic nature of these transitions, and the challenges associated with them, we argue, is a necessary condition for any effective HCI for peace (Hourcade and Bullock-Rest, 2011).

7.6.2 Becoming stronger through social capital

Concepts of social capital are relevant here because they describe assets people require in order to be members of mainstream society and why they might be difficult to acquire. To discuss how social capital expresses within communities of FARC-EP ex-combatants, we focus on two main aspects of social capital: bonding and bridging (Gittell and Vidal, 1998). As mentioned before, these refer to the different types of social capital within communities (bonding), and how they expand such communities' assets outside of their own (bridging). Years of building a strong social network before the Peace Agreement, led to beneficial outcomes for the ex-combatants, such as trust, cooperation, leadership, shared values and norms, and a strong sense of community.

The bonds grown within FARC-EP since the war, are the bonding social capital they strongly maintain. Together with the specific knowledge gained during that time, such as a deep understanding of the territory, these aspects mark an important distinction between ex-combatants, USA veterans, and refugees for example. Differ-

ent than refugee populations, which have frequently been shown to lose a lot of their social capital (Almohamed and Vyas, 2019), former guerrilla combatants actually actively maintain a lot of their former social capital, continuously transforming it. Different from the USA veterans, the Colombian ex-fighters also do not exhibit the *delayed disclosure* (Dosono et al., 2017) observed in USA veterans, as they remained in their close social networks and any difficulties are faced collectively and individually, as is the case of former USA military. Their existing social capital thereby helps FARC-EP ex-combatants to overcome any of such difficulties.

With regards to how social capital is accessed, we found that through membership to the ETCR community and the former FARC-EP movement overall, ex-combatants become and remain connected to communal resources. Putnam (2000) listed various channels through which individuals' bond, bridge and build their community social capital; these can be observed in the experiences of ex-combatants, divided along the lines of bridging and bonding:

Information flows of learning and exchanging ideas

This is illustrated by their contact to cooperatives in other ETCRs (bonding) but also by the expansion of their networks beyond former guerrilla communities, or by receiving support from academics regarding technical knowledge (bridging).

Norms of reciprocity

This is seen in ex-combatants supporting each other in contacting family members, at times travelling far to reach out to friends' family members, letting them know she or he is alive and would like to reconnect (bridging and bonding).

Collective action

This we observed in the way they approach political action and the work done with the national cooperative ECOMUN, in which all local cooperatives contribute (bridging). The meetings, gatherings, tournaments and parties organized by the

ETCR are also ways to foster their networks, or when ex-combatants contact academics or other professionals via WhatsApp, to help with grant proposal writing and branding (bridging).

Broader identities and solidarity

This channel is portrayed in the way ex-combatants approach civic and political life through social media (bridging and bonding).

For Leonard (2004), bonding may support immediate needs but bridging capital is essential to benefit the community economically. While she points out that *bonding* social capital is usually perceived to be of lower value, enough to *get by* but not enough to *get ahead*, this does not fully apply in our case. The community of the ETCR depends on bonding social capital in crucial ways. In the absence of strong social ties to mainstream Colombian society, community members depend to a considerable degree on each other, use shared values and knowledge to develop their position in these new circumstances and do so with at least some success. On the other hand, bonding social capital also contributes to their peripheral position. As Bourdieu (1986) has pointed out, social capital has exclusionary effects, serving to exclude people from certain communities or classes. Similarly, bonding social capital has been referred to as exclusive (Leonard, 2004). As we already outlined above, the community of the ETCR is however also developing bridging social capital, through their political activities, through some of their economic activities as well as through their efforts to reach out to family members, re-building connections that can become bridges to wider Colombian society.

In our case, these different forms of access to social capital have come to be facilitated through digital technologies, in particular social media, in crucial ways. While they enable former guerrilla combatants to access and maintain their social capital, they also support its growth through new social connections to extended family, support networks built through projects and initiatives or social media followers on the party's political channels. Economic activities are also heavily mediated by digital technologies such as local and cross-regional WhatsApp coordination groups

between and within the cooperatives. The former guerrilla display a remarkable proficiency in the use of these tools, especially when considering that these were largely unknown to them a few years ago. The statement by some ex-combatants about the plan to use Raspberry Pi computers in greenhouses, to make a *modern campesino*, illustrates their proficiency in appropriating new technologies, incorporating their political values into these appropriations. These digital tools became such an integral part of their interaction that they can be considered infrastructure, crucial to the day-to-day functioning, self-determination, and community development (Huysman and Wulf, 2004).

In support of the bonding effects of social capital, many ex-combatants in the ETCR draw on their political education to form cooperatives, use their local and national networks to strengthen their economic skills and position through the ECOMUN national cooperative, and exchange with the local cooperatives in other ETCRs. This cooperative work contributes to promoting community identities that better preserve, recover, invent and transform cultural expressions which would not survive if they would work individually. In the growing family life this can be seen in the inclusion of extended family into the camp, thereby expanding their social net locally. However, only few of the activities extend the social capital to people and culture outside of the former guerrilla community, representing the bridging effects of social capital. These activities include the new political life some former guerrilla members engage in, where new alliances are made, and new cultural skills are acquired, or also aspects of their entrepreneurial economic activities that allows them to create new connections with communities and organisations outside of their immediate surroundings. These activities are also heavily facilitated by digital technologies, predominantly social media.

Nevertheless, even though both bonding and bridging aspects of social capital are observable in the ETCR, the bonding aspects are significantly stronger. As individuals, former guerrilla members have limited social capital; this capital is concentrated within their own community, physically within their ETCR or strongly connected to their former guerrilla life. If an individual moves to the city for example, access to social capital becomes limited. This provides a strong incentive to

remain within their community and ETCR, and not leave as initially intended by the Peace Agreement. This then exemplifies the exclusionary aspects of social capital, highlighted in Bourdieu's conceptualisation of the term (Bourdieu, 1986). In this understanding, social capital serves to exclude members of other social groups or lower economic classes. Although we can only make very few observations about social capital outside of the ETCR community, through our account it becomes clear that the social capital of the ex-guerrillas outside of their immediate community is severely limited to other former fighters or family members. The difficulties they encounter when reaching out to for example long lost family members illustrates the exclusionary potential. FARC-EP members have to go to great length to protect their real identity when approaching people outside of their own community, and only reveal their real identity when they feel sure that the interaction poses no risk to them. A much more tragic illustration can however be found in the high number of murdered ex-fighters, including a member of the ETCR at the centre of this account, that have occurred since the Peace Agreement and the lack of government activity to either identify the perpetrators of protect former fighters that have laid down their weapons in support of peace.

7.6.3 Implications for post-conflict digital technology research and design

Besides all the strong social capital that FARC-EP ex-combatants built previously to the Peace Agreement, the stigma of being considered criminals for many years continues. More than that, they now have new constructed identities added to their characteristics: rural, with low-income, an extreme left political ideology and not being "educated" for the civilian way of life. Those stigmas emphasize the exclusionary potential of social capital (Bourdieu, 1986), where the social capital of other groups might not allow the bridging. We shed light on the ex-combatants' intersectionality (Hill Collins and Bilge, 2016) in order to understand the fear inherited and the complexity of prejudices they face, sometimes facilitated by digital technologies. In doing so, we reveal insights that can animate future research in order to further understanding of the ways in which these technologies can play a role in mediating the aforementioned tensions.

As our study shows, the tools at the hands of the former fighters, especially social media and messenger services, help increase, regrow, but especially maintain already existing capital. It both greatly assists them in building a sustainable life in the new circumstances, for example in the form of WhatsApp coordination groups for economic and administrative tasks, while potentially enhancing integration dynamics into mainstream Colombian society, by facilitating contact with family and friends outside of the ETCR. Digital technology can also help to generate and maintain trust and acceptance, highly valuable elements in long-term cooperation (Huysman and Wulf, 2004), while at the same time facilitates the bridge to networks within the neighbouring community and more broadly, such as with government, academics and partners. These elements can be crucial particularly in the face of newly evolving economic practices developed out of their social capital. For Simpson (2005), social capital is one of the three more important aspects that provides a foundation for effective implementation of community informatics initiatives, and their sustainability. From our studies, we noticed a slightly high level of bonding and bridging in social capital, referred to by Flora et al. (2016) as Entrepreneurial Social Infrastructure (ESI), where norms of reciprocity are reinforced, and are poised for action, able to engage the community field. However, as the dire overall situation of former combatants and our account of this specific ETCR make clear, ex-FARC-EP members face a difficult situation and an uncertain and dangerous future, diminishing the bridging social capital. As a consequence, members of ETCR may organize themselves in opposition to the outside, limiting access of opportunities and information from other groups' capital [Ibid.] that could mediate their transition. Furthermore, bridging social capital might even pose some risks to their prosperity, based as it is on the bonding effects of social capital and their strong internal community ties. Even though Leonard notes that bonding social capital is limiting and bridging social capital is eventually required to realise "more entrepreneurial members' full potential" (Leonard, 2004, p. 929), it is unclear whether this is actually desirable. While members of the ETCR are forced (and encouraged) to be entrepreneurial and develop new economic practices, we observed differences between cooperative and individual activities. Much of the community benefits strongly from mutual cooperation, from shared values, activities and social contacts, including cooperative entrepreneurial activities. Engaging in activities that build or

rely on bridging social capital runs the risk of weakening internal community bonds. The former guerrillas therefore walk a tight line between bonding and bridging, under considerable pressure to balance the two.

It is perhaps curious to notice that digital media have seemingly played no role in the reintegration or transition plan. There is, as far as we know, no initiative that employs digital media in any reconciliation efforts, as has been described by Best and Serrano-Baquero (2009) or Friedman et al. (2010). Furthermore, given the important role digital media play for the former guerrilla member in managing their own transition process (and the potential areas for interventions they outlined themselves, for example when speculating about the digital campesino), there would certainly have been room for deliberate interventions. Despite the proficient use of a former unfamiliar set of technologies by the ETCR inhabitants, there are also several shortcomings that emerge in our data. One example is the relative lack of safety that is perceived in reaching out to family members, leading our collaborators to use fake names. Given the importance of community bonds and the role of internal coordination processes to manage the ETCR or the economic agricultural cooperatives, community informatics initiatives could be of value. Other studies have found ICT initiatives to facilitate the growth of social capital, including the bonding type (Gaved and Anderson, 2006; Almohamed and Vyas, 2019) and help communities to become stronger and more prosperous. As Warschauer argued, "the combination of carefully planned infusions of technology with relevant content, improved education and enhanced social support can multiply those assets that communities already have" (Warschauer, 2003, p. 47).

Yet we believe a word of caution is also necessary. While the mediating influence of digital technologies detailed here might suggests an opportunity for socio-technical interventions in this or similar post-conflict scenarios, perhaps in service of an HCI for Peace agenda (Hourcade et al., 2011), our analytic framework also holds some warnings for CSCW researchers and designers to engage in the design of technological interventions. With regards to the importance of the *existing* social capital of the community and its bonding effects, Putnam reflects on the social network existent in communities and says that well-intentioned projects can "heedlessly ravage existing

social networks" (Putnam, 1993, p. 6). In line with Putnam's consideration, and the crucial role the bonding effects of social capital play for the community of the ETCR, Simpson (2005) observed that social capital is one of the three crucial aspects that provides a foundation for effective implementation of community development initiatives, and their sustainability. Similarly, Warschauer (2003) pointed out how community development and technological initiatives should be woven together to meet community needs, and thereby *multiply* the existing community assets. He says that *"technology does not exist as an external variable to be injected from the outside to bring about certain results"* [Ibid., p.47]. Furthermore, as Baumer and Silberman (2011a) pointed out, social approaches may at times offer more benefit of creating or supporting a community than designing technological solutions - a consideration which we assume would be of value in this context as well.

The findings of our paper add a new perspective to our current understanding of the role of ICTs in post-conflict processes. In contrast to other studies investigating post-conflict contexts (e.g., Best and Serrano-Baquero, 2009), our work demonstrates the contradictions inherent in the bridging or integrative efforts between the former conflicting parties through digital technologies. While e.g. Best and Serrano-Baquero (2009), Friedman et al. (2010), and Yoo et al. (2013) have highlighted how digital media can rebuild connections between citizens of states that have suffered civil war, we believe our findings point out that before engaging in such measures, researchers (and of course the communities afflicted) need to carefully consider when to build connections with other groups in society and when to strengthen internal bonds and what the consequences might be. Digital technologies can also be used (as members of FARC-EP are already demonstrating) to strengthen internal community bonds. The reintegration of FARC-EP into wider Colombian society is proving to be troublesome, characterised by considerable friction, including perhaps different social and economic values but especially the violence that former guerrillas are now exposed to (Justice for Colombia, 2020). These hurdles are perhaps much higher than what FARC-EP leadership had expected the situation of the former guerrilla members would be when negotiating the peace agreement. Under such circumstances, a situation emerges in which the inhabitants of the ETCR(s) remain to a certain extent apart from wider Colombian society. It is not up to us to judge

whether a post-conflict society that consists of separate groups with peaceful ties is desirable or even feasible in the long-term, but such a goal would certainly have very different implication for anybody attempting to design supportive digital interventions and artefacts.

7.7 Conclusion

Despite a growing interest from the community in studying the role of technology in the post-conflict period, the area remains under-researched. Given the current state of conflict affairs globally, understanding how digital technologies unfold and are used during this period is fundamental. We begin to fill this gap by presenting an account of how FARC-EP ex-combatants are using technology, in particular social media, at the crossroads of reincorporating into social life, building and rebuilding family bonds, exercising political presence, navigating current economic circumstances and adapting to the challenges and opportunities of a new way of living.

By applying the concept of social capital as a lens to investigate these intersections, we are able to understand better the difficulties FARC-EP members face in reorienting their lives in these new circumstances and defining their place in wider Colombian society. The bonding effects of social capital create strong internal connections with other members of their immediate community in the ETCR, creating a well-working community life. The bridging aspects of social capital enable them to re-create bonds with family members outside of FARC-EP or also with new contacts through economic and political activities. However, the strength of their internal bonds and the rather weak existing ties to the rest of Colombian society and the exclusionary effects of social capital within mainstream society create significant difficulties for the members of the ETCR. We discussed how digital technology has become a staple of the reincorporation of FARC-EP ex-combatants, supporting both bridging and bonding aspects of social capital. We also reveal however, how its pervasiveness begins to represent new challenges for these groups. We report how ETCR inhabitants observe digital tools as a potential pathway to skills training and education in general, while at the same time using these digital tools to communi-

cate their way of life through entertainment and the arts. Lastly, we highlight the remarkable technological fluidity within the ex-combatant groups we collaborated with; a characteristic that has played an important role in revealing the weaknesses and potential of these technologies during post-conflict periods.

To summarize, the transition process of the former fighters is a discordant one, and digital technologies take on different roles. While in many regards, the former combatants seek an increasing closeness to the rest of Colombian society, such as when (re-)connecting to friends and family outside the guerrilla army, in many of their activities, they exhibit a reliance and a need to remain apart and within the social group of the guerrilla, thereby maintaining their social capital as the foundation on which to build their post-conflict life. However, in light of the ongoing violence they face, as well as the increasing number of withdrawals from the peace progress, it remains to be seen if such a pluralistic vision can be realised.

8

Digital Technology at the Edge of Capitalism: Experiences from the Brazilian Amazon Rainforest

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Abstract. *It is sometimes argued that there is hardly a place in the world in the 21st century left untouched by global capitalism (Moore, 2016; Moore, 2017). Even so, some places remain at the periphery, participating in this system without being fully absorbed by it. In this paper we take a detailed look at the economic life of such a pericapitalist (Tsing, 2015b) community in the Brazilian Amazon region. We detail how the community increasingly participates in global systems and supply chains, yet also organizes economic life around local and traditional values. We pay special attention to the role of digital technologies in the community, including mobile phones and internet. The contribution of the paper is as follows: Firstly, it provides a detailed analysis of the material practices of a community at the edge. Secondly, it draws attention to the heterogeneous nature of responses to global capitalism, formed from the relationship between specific material practices, new technology and elements of cultural identity. Thirdly, it argues for an increased sensibility towards these different relations to capitalism when considering design implications. We argue that close attention to*

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material practice goes some way towards resolving those tensions and, further, provides for an appeal to a more pluralistic views of culture and development (Escobar, 2018).

8.1 Introduction

The Amazon rainforest is populated by communities that include more than 300 indigenous ethnicities as well as the *Quilombola* (former slaves), *Ribeirinhos* (populations that live alongside the river), and other traditional communities. In this paper we will focus on a specific rural community who are not indigenous, even though they follow similar traditional ways of life. It is a community affected by government negligence, increased incursion by outside capitalist enterprise, and under pressure to become *modern* (reflected in the deforestation agenda pursued by the government). The rhetoric of development is not by any means universally accepted within the community and, indeed, for many, comes with potentially disastrous consequences. Nevertheless, despite divergent attitudes towards development, technologies such as smart phones and the internet have reached even relatively remote places in the Brazilian Amazon region and create both new opportunities and new challenges. Their impact however, we suggest, has to be understood in relation to both the power and direction of global capitalism, and an understanding of the nature of local culture as expressed in material practices and how it mediates these forces. Our contribution, described below, lies in a careful empirical study of a rural community in the Brazilian Amazon, called Boa Vista do Acará (Acará for short), and to theoretical work concerning the "world system" (Wallerstein, 2004); postcolonial studies (Spivak, 1988), decolonial thinking (Mignolo and Walsh, 2018; Quijano, 2007) and more recently, *edge* or *peri* capitalism (Tsing, 2015b).

We are particularly concerned to show how "material practices"[2] of various kinds and the roles of digital technology in the community are variously mediated by both connections to global supply chains and by community knowledges, values and beliefs. In so doing, we draw attention to the diversity of meanings attached to these practices and how the community's management of their relation to global capitalism

[2]By material practice we mean something akin to *doing work with things*. We do not provide a technical definition but draw on the conceptual work of Schmidt (2015) for inspiration. Practices, in his view, are regular, systematic activities which are normatively circumscribed.

affects their participation in it in heterogeneous ways. Digital technologies are used in various ways by community members to manage their divergent relation to global economic systems. Subsequently we reflect on what this might mean for HCI4D' sensibilities in relation to intervention in rural community life. Put simply, while not explicitly concerned with design outcomes in this paper, we are concerned with the importance of these sensibilities in relation to the *what to do* questions that we ask ourselves and that are the core of any design-related intervention.

Below, we firstly examine critical theoretical perspectives on capitalism and the relevant post- and decolonial arguments in an effort to relate ethnographic, idiographic (contextually oriented), approaches to wider, more *universalistic* theoretical views. We outline more recent contributions and the relationship of HCI4D to these perspectives. We then analyze and discuss the specific case which is of interest to us and locate it in these discussions.

8.2 Theoretical Perspectives on Global Capitalism and Local Culture

"*The centre of the world is everywhere. The world is what you see from where you are.*"
Santos (1996)

The rhetoric of *progress* associated with what is sometimes called the "Whig" view of history, after Butterfield (1931), promotes the view that capitalism was and is a progressive force that ultimately can only result in improvements in standards of living, peaceful coexistence, declines in mortality and morbidity, and so on. Nevertheless, and for our purposes, critique of the Whig view has come from different sources, one of which is the more Leftist analysis of capitalism, an exemplar of which is world systems theory (predicated on a Marxist historical materialism), and the other of which is postcolonialism and decoloniality.

A perspective, from the periphery of the world system (explained below) (Wallerstein, 2004), is provided by decolonial thinkers of Latin America (Mignolo, 2000;

Grosfoguel, 2011). Analyzing processes of colonialism as ongoing rather than *post-*, they criticize how the hegemony of the West structures life everywhere through the "colonial matrix of power," forcing onto the world a One-world system, rooted in the cosmologies, epistemologies and ontologies of Europe. This coloniality of power imposes specific dimensions along which the world is structured, such as gender, race, the production of knowledge, concepts of nature and economic relations, thereby enforcing specific hierarchies, creating a condition of coloniality – a fundamental element of "modernity[3]" (Quijano, 2007).

This group of thinkers takes explicit interest in Latin American movements of resistance such as those of Afro-Colombian communities, the Mexican Zapatistas and the notion of "Buen Vivir," a view of life that "subordinates economic objectives to ecological criteria, human dignity, and social justice" (Escobar, 2011, p. 73) and constitutes a challenge to Western ideas of *development*. They propose alternatives to the condition of coloniality and the single universal ontology of one world: the "pluriverse" (Reiter, 2018; Kothari et al., 2019; Escobar, 1995; Cadena and Blaser, 2018). This concept is directly inspired by the writings of the Zapatista movement: "In the world of the powerful there is room only for the big and their helpers. In the world we want, everybody fits. The world we want is a world in which many worlds fit" (Cadena and Blaser, 2018, p. 10). Such a view eschews for example divisions between the human and nature that is central to modernity/coloniality and fundamental to the critique of extractivism contained in the recent HCI concern for sustainability (see e.g., DiSalvo et al., 2010; Nardi and Ekbia, 2017).

Escobar (2011) views the various ecological and social crises we face as design failures and asks us to re-vision design in ontological terms – designing for different ontologies and designing for the pluriverse (Kossoff et al., 2015). This pluriverse, we will argue, is already visible in the rural Amazonian community at the centre of this paper, Boa Vista do Acará, where in one village different ideas and practices relating to global capitalism exist.

[3]For decolonial thinkers, coloniality is constitutive of modernity, and in that sense, they have to be referenced together as modernity/coloniality (to know more, see e.g., Mignolo, 2009a; Escobar, 2004).

Debates concerning the global reach of capitalism and its effect on non-Western communities can be traced back at least to the early Marx and Engels (1967) of the Communist manifesto, where he wrote, "The need of a constantly expanding market for its products chases the bourgeoisie over the entire surface of the globe. It must nestle everywhere, settle everywhere, establish connections everywhere" [Ibid., p. 16]. Arguably, colonialism played a crucial role in supporting the emergence of capitalism in Europe by providing resources for the process of industrialization, while preventing development elsewhere (Blaut, 1993). Marxist theories concerning global capitalism are famously represented by the likes of Immanuel Wallerstein (2004), who attempted an historical analysis of capitalist development. His work had the effect of generating enormous interest in the commodity chain as a unit of analysis (see e.g., Bair, 2014). World systems theory showed how interlocking supply and commodity chains were creating a single world system, extracting resources from, and selling goods to, even the furthest corners of the globe, in a process of universal commodification. In world systems theory, notions of the *core*, the *periphery* and the *semi periphery* were central. They purportedly explained how global supply chains were constituted, and how benefits accrued in an exploitative relationship, with Europe historically at the centre of the world market, able to establish its colonial dominance everywhere on the globe (Quijano and Wallerstein, 1992; Quijano, 2000). This resulted in on going asymmetric power-relations both in the physical and (today) the digital world. One recent additional contribution to this perspective has been Jason Moore's notion of the "Capitalocene" (Moore, 2016).

8.2.1 The Capitalocene and Pericapitalism

The notion of the Capitalocene was proposed as an alternative to the "Anthropocene." Echoing the concerns of the decolonial thinkers introduced earlier, this notion entails that it is not Anthropos, humans, that are at fault for the destruction of the planet that characterizes this age, but a specific way of being in the world: capitalism. From the perspective of the Capitalocene, planetary destruction started when nature became cheap. An example given by Moore (2017) demonstrates how it took 200 years to clear 12,000 hectares of forest in France at the beginning of the twelfth century while in the fifteenth century, in a single year, the same amount of

forest was cleared in colonized Brazil. Bringing this comparison to our times, it is now possible to clear the same area in less than five days (Gonzaga, 2020). This "relations of power and profit that enabled rapid deforestation in the early modern centuries also shaped coal's passage from a rock into a fossil fuel" (Moore, 2017, p. 609) and marked a shift in the scale, speed and scope of landscape transformation across the globe.

The goal of capitalism's political economy was and continues to be to make nature cheap and render it subject (Moore, 2016). This dualism between Nature and Human is implicated in the violence, inequality, and oppression that is causing extinction not only in a biological sense, but also in the extermination of languages and cultures (see e.g., Haraway, 2015; Tsing, 2015a; Moore, 2015; Schumacher, 1973; Esteva et al., 2013; Shiva, 2008).

In the Capitalocene, there is thus hardly a place in the world left untouched by globalised capitalism. Supply- and commodity chains span the entire planet, delivering everything from electronic devices (whose raw materials, design and manufacturing all involve different locations) to fresh agricultural products year-round, everywhere. The internet has aided this globalization tremendously (Zook and Shelton, 2017), by facilitating the global communication necessary for globalized production and trade, but also by supporting the emergence of new digital production chains. Even though the internet has facilitated tremendous change, it has not substantially reorganized the division of economic power in the world, or the impact of capitalism as a whole [Ibid.]. The large part of economic value for physical or digital products is still captured by companies from the USA and Europe.

In her book, *The mushroom at the end of the world*, Tsing coins the term "pericapitalism" (Tsing, 2015b) to investigate, using the example of the Matsutake mushroom, the way in which the local meanings of human interaction with the natural world (the edges) are translated so as to become part of a global system. The edges of the mushroom's supply chain are at the same time the periphery of capitalism, connected to global capitalist systems, yet not fully part of it. Together with Tsing's work on the Matsutake mushroom pickers, Anita Say Chan (2013)'s book, *Networked*

Peripheries, vividly demonstrate this. Chan details the changes a Peruvian village undergoes when a local, traditional craft (pottery), with roots in pre-Columbian indigenous traditions is being turned into a commodity traded on global markets. Through a variety of instruments of neoliberal globalised capitalism, including Intellectual Property titles and Denomination of Origin, trainings, investments and specific narratives the production methods are transformed from largely hand-based to the almost industrial in order to produce at scale. People are transformed from craftswomen and -men to modern aspiring entrepreneurs and *businesswomen and -men* fit to work with global clients, and a village community is transformed into a group of enterprises competing for orders and investments. Chan's powerful account demonstrates the risk to rural, traditional or non-Western communities, such as Boa Vista do Acará, the rural Brazilian community at the centre of our present account. To extend such observations, our focus is very much on the nuanced ways in which different material practices mediate capital and culture differently. The various practices described in our ethnographic observations are very much a feature of the tension between, on the one hand, the logic of capitalist accumulation and, on the other, the active role played by local culture in production and consumption choices. The village of Acará is pericapitalist in that sense. Capitalism may inflect these choices, but it does not determine them.

In our study we detail how digital technologies are used by the community to manage their position at the periphery. Such studies of global capitalism's *edge* help us to perceive nuances and imagine alternatives to a system that can easily seem universal and inescapable. A related analysis is made by Marcus (1995) and Marcus (2012), who discusses alternative ways of dealing with the problem of local culture and the global order to analyze how cultures are "contextualized by macro-constructions of a larger social order, such as the capitalist world system [or by] multiple sites of observation and participation that cross-cut dichotomies such as the 'local' and the 'global'" (Marcus, 1995, p. 95).

This relationship between the global and the local is also highlighted by Mantz (2008), who shows how the Congolese village Minova, a "forsaken, war-ravaged semi-urban abyss in Central Africa" [Ibid., p. 36], is at once an important site of the

global digital economy due to the mining of coltan, which is a crucial component of digital devices such as smartphones and playstations, yet at the same time remains very much unconnected to larger global systems - the village was not even connected to the power lines linking two regional cities which cross it. The paper outlines how a shortage of playstations led to a rise in demand for Congolese coltan, which caused intense violence amongst militias in Congo fighting for control over coltan mines. The periphery, the study shows, can also be a terrible place to be. However, studies like this that draw on World System Analysis, Marcus's concept of "multi-sited ethnography" or pericapitalism illustrate how the supply chain for a product can be global, yet the local experiences of the different parts of the chain differ widely. They demonstrate how within global systems there is room for a wide variety of experiences of that system and ways to participate in it.

8.3 HCI4D and the Edge of Capitalism

As we have pointed out, the internet has facilitated the advance of such globalised systems. It has expanded across the globe rapidly (Zook and Shelton, 2017) and much work in the HCI4D community and elsewhere has aimed at connecting the previously unconnected corners of the globe (Badimo, 2005). Early approaches included the development of so-called telecenters (Gomez, 2014), which aimed to improve communication, economic activities, education or personal development of their users (Reilly and Gómez, 2001). Such Telecenters were established in Asia, Africa and Latin America. However, this approach remains controversial due to problems associated with financial unsustainability, political barriers, a lack of customer service or simply content that proved irrelevant to the user groups (Toyama and Kuriyan, 2007; Best and Kumar, 2008). Similar controversies surround the take up of mobile phones. It is argued that mobile telephony has positively affected health, social relations and economic practices in Africa (Aker and Mbiti, 2010) and has decreased inequality worldwide (Asongu, 2015), leading actors including the World Bank to term this, *the mobile revolution* (Demombynes and Thegeya, 2012; Steinbock, 2005). Nevertheless, recent studies have shown that the costs of accessing the internet via phones are still prohibitively high in many African countries. Csikszentmihalyi et al. (2018), casting some doubt on the universally acclaimed

success of smart phones. In a similar vein, the interventions of technology companies have been critiqued. The *Free Basics* project of Facebook delivers access to selected online services through an app (Sen et al., 2017). The initiative, sometimes termed a "Walled Garden" (Romanosky and Chetty, 2018; Best, 2014), has been strongly criticized for violation of net neutrality (Sen et al., 2017). As a response, India has withdrawn from the program (Cellan-Jones, 2016). In other many countries however, such as neighbouring Bangladesh, the project is fully operational (Bin Morshed et al., 2017). Google's project *Loon* aims to provide internet access in the Amazon region via balloons at a high altitude (Loon, 2018). The prevalence of large USA-based companies in providing internet access across the globe and their monopoly-like position has been portrayed as a form of digital colonialism (Pinto, 2018), especially in areas where governments lack resources or the political will to provide public infrastructure. Several authors have highlighted the responsibility of the ICTD community in critiquing the imaginaries that such Silicon Valley companies put forward (Smart et al., 2016; Graham and Mann, 2013; Nardi and O'Day, 2000; Toyama, 2015) and in interrogating whether digital tools are amplifying inequalities or not (Graham, 2019; Graham et al., 2014).

In some areas, a variety of local approaches to internet provision are described by Dye et al. (2018), Bin Morshed et al. (2017) and Wulf et al. (2013a). It is however interesting, and not entirely surprising, to note that providing access alone is in some cases not enough. As Poveda (2016) noted, simply supplying infrastructure or access is not enough. The specific approach an initiative takes, and how it includes the affected people into the project, influences how the technology will be used. Similarly, in Bangladesh, digital inclusion was not accomplished by access alone but was mediated by a variety of factors including socio-demographic context, gender and physical proximity of the community to the capital (Genilo et al., 2015). One study found that users value shared physical spaces such as libraries to access the internet, even in times of almost ubiquitous mobile access, for the services and assistance such spaces can provide (Donner and Walton, 2013).

Several studies have investigated internet connectivity and technology use in Latin American contexts from an HCI or ICTD perspective (see e.g., Medina, 2006;

Dye et al., 2018; Nemer et al., 2013). An interesting alternative approach to the often-problematic top-down efforts of Big Tech to *connect the unconnected* can be seen in Cuba, where internet access has been stalled, also due to political worries about previously mentioned digital colonialism. In recent years the government has begun to provide limited access, for example through the creation of low-bandwidth WiFi in a few selected parks across the country (Dye et al., 2017), which has slowly been expanded. This series of studies also investigated the island-wide community network of Cuba, SNET (Dye et al., 2019), pointing to alternative conceptualisations of large-scale information infrastructures, and highlighting bottom-up initiatives. Taking a historical perspective, Medina (2006) investigated Chile's *Project Cybersyn*, an early computer network developed in Allende's socialist Chile to manage the growing social property and factory production, putting forward a very different imaginary for an internet. Several other initiatives across the world are similarly led by public actors, activist networks and NGOs. Heimerl et al. (2013), Coolab (2017) and Rhizomatica (2018) focus on providing training and infrastructure in remote areas. Others experiment with communication networks in the Amazon rainforest and "question the paradigm of inclusion as an imperative for underserved third world/global south areas" (Caminati et al., 2016, p. 171). A series of studies investigated the appropriation of internet technology in the favelas of Brazil, shedding light on some challenges that inhabitants experience such as physical difficulties of access and fears of retribution by criminal gangs (Nemer and Freeman, 2015), or how digital inequalities become materialized and exacerbated by other elements of internet technology (Nemer et al., 2013), but also highlighting various creative ways of overcoming these challenges (Nemer, 2016). Also, from Brazil, Tarcízio Silva et al. (2020) mapped stories on racialization in digital algorithms and social media platforms. However, while such studies make important contributions to our understanding of existing inequalities in accessing the net, they say little about this situation in the specific (rural) context of the Amazon region, and even less about the role internet access plays in mediating the relation of communities to global capitalist systems and how these relations impact local economy and culture.

How exactly the internet has produced change remains up for debate. One prevailing notion is that it improves the economic life of rural populations, for

example by improving agricultural practices (Oduor et al., 2018) or enabling access to better information about agricultural markets and prices, thereby allowing small-scale farmers price their goods more accurately (Wyche and Steinfield, 2016). Although no coherent definition seems to exist, the idea of a smart village, especially as it is promoted in India, aims to employ internet connectivity to connect rural villages to globalised capitalised systems (Darwin, 2017; Darwin et al., 2018). By providing villages with internet connectivity and smartphones and organising Start-up competitions, this specific project aims to create rural Silicon Valley-style entrepreneurs, provide easier access to financial investment and facilitate e-commerce. The ICTD community has provided considerable nuance in studying processes of use and the appropriation of mobile technology in a variety of regional contexts (see e.g., Furuholt and Matotay, 2011; Patel et al., 2010; Uduji and Okolo-Obasi, 2018; Baumüller, 2012), finding for example that very specific use patterns emerge in specific conditions (Wyche et al., 2013; Bidwell et al., 2010; Axup et al., 2005). Such work has shown how specific cultural factors mediate the use of mobile technology. Furthermore, mobile phone use and specific applications have played an especially important role in agriculture, and have been shown, for example, to affect the entire annual farming cycle and the livelihood constructs that come with it (Furuholt and Matotay, 2011).

A limited amount of research has concerned the local Internet practices of marginalised communities in Brazil and Latin America. While observing LAN Houses in Brazil, Nemer et al. (2013) argue that the role of digital technologies must be understood through the socio-economic and socio-cultural context. Spyer (2017) explores the use of internet by low-income Brazilians from different perspectives, including education, relationships, work and politics. In Latin America, through the development of a web-based application for cooperative technicians and coffee farmers, they realised that the whole process is of low profitability for smallholders compromising the sustainability of the coffee industry (Leshed et al., 2018). Others examine the use of Facebook to report crimes and safety-related data in Mexico (Alvarado Garcia and Le Dantec, 2018)

To our knowledge, however, and as has been pointed out by several scholars (Thapa and Sæbø, 2014; Walsham, 2013; Avgerou, 2010), the available ICTD/HCI4D literature has not engaged strongly with the role of capitalism or the effect of global economic systems in conceptualising the "D" in ICTD. Some authors have, nevertheless, investigated the larger political and economic systems in which HCI projects take place and the ways in which HCI work relates to political economy. Ekbia and Nardi (2015), for example, critique the influence of capitalism and the need for growth in computing, and stress the need for a research focus on political economy for "Sustainable HCI" (Nardi and Ekbia, 2017). Such considerations however have only rarely been made within HCI4D and ICTD. Although several conceptualisations of development are at play in ICTD (Avgerou, 2010), decolonial thinkers have pointed out, that *development* often embodies and furthers the hegemony of capitalism and modernity, at the cost of different local economic models (Escobar, 1995; Escobar, 2001; Mignolo, 2011; Quijano and Wallerstein, 1992). This is only occasionally questioned or addressed in the ICTD literature, perhaps because it owes more to postcolonial and decolonial argument. ICTD has arguably engaged less with the notion of politics within ICTD (Díaz Andrade and Urquhart, 2012; Young, 2019). As has been pointed out elsewhere, ICTD runs the risk of failure at the point where local culture is dominated by Western assumptions (Díaz Andrade and Urquhart, 2009; Díaz Andrade and Urquhart, 2012), including universalist or neoliberal ideas about global capitalism, or the nature/human dualism at the centre of the Anthropocene. Building on the critique of (ubiquitous) computigs *colonial impulse* (Dourish and Mainwaring, 2012; Canevez et al., 2020) reflect on the knowledge enterprise within computing and ICTD, pointing that even though knowledge within computing is assumed universal, it migrates from *centers of power* to the periphery, thereby clearly originating from somewhere, contradicting its false universalism. They ask for a re-rendering of computing as a pluralistic epistemological enterprise to unsettle the centrality of power.

It is for this reason that the notions of "postcolonial computing" (Irani et al., 2010), "decolonial computing" (Ali, 2014) and "digital colonialism" (Pinto, 2018) have a more explicit engagement with the role of digital technologies in mediating the meeting between global capitalism and the local community. Various studies of

how social media have been appropriated by political activists in mostly Western settings (Tan et al., 2013; Soliman et al., 2019; Sen et al., 2010; Waddell et al., 2014; Ngidi et al., 2016) have been conducted but, more relevant for the paper at hand, is a study of the use of communication technology by Colombian Marxist FARC Guerilla during the 50-year long armed struggle with the Colombian state (de Castro Leal et al., 2019). This study shows how politically active groups have resisted the impact of digital technologies. Others have investigated the use of such technologies in supporting the solidarity economy in Greece (Vlachokyriakos et al., 2018), creating local alternatives to capitalist economic relations or the development and role of artifact ecologies in organic food communities in Denmark that aim to provide sustainable, local alternatives to commercial products (Bødker et al., 2016). Of course, computing of any kind cannot be presumed to be a sufficient intervention when dealing with external forces. To understand its relevance, we argue, requires a much better picture of the demand conditions present in local cultures, as well as an explicit engagement with post- and decolonial theories as introduced above, analyzing the role of digital technologies in contexts of pericapitalism and advancing or resisting the Capitalocene. These lenses so far have not been applied in order to plan or evaluate interventions within HCI4D. This is despite, the fact that they are, of course, often interventions that aim at economic practices and communities' connections to larger economic systems, be they regional, national or global. The concepts of pericapitalism and the Capitalocene or the writings of the decoloniality movement, which have been briefly introduced above, provide critiques of "modernity/coloniality," as decolonial scholars call it, that could benefit interventionist work in HCI by shifting a focus from what is arguably *complacency* to interventions that embody this critique. This entails the need to address the relationship between local practices of material production and global capitalism, and the role ICTs play in mediating this relationship (see e.g., Shaw et al., 2014).

A study from rural Wales provides somewhat of a counterpoint to initiatives solely aiming at increasing income for rural populations, as has been the focus of much of ICTD interventions as described above. Crabtree and Chamberlain (2014) investigated IT use at a farmers' market in a Welsh village. Their preconceptions included the expectation that improved IT infrastructure could help sellers at the

market scale up their operations and thereby make more money, but their findings proved surprising. Although a little bit more money was uniformly desired, other values than scaling up were far more important to the activities at the farmers' market such as staying small, care for the local community, and making a living with dignity. Many of the respondents actually resisted the notion of growing their business as it was perceived to be incompatible with their values and goals. Another study from the USA shows that independent local food communities supported by ICTs often directed efforts towards societal change (Steup et al., 2018). As we shall see, such situations are also fairly commonplace in other pericapitalist contexts. We note here that pericapitalism is not a geographical concept. It can apply to any situation where the global meets the local. Brazilian geographer and postcolonial scholar Milton Santos suggests that "each place is, at the same time, the object of a global reason and of a local reason, living together dialectically" (Santos, 1996, p. 231), pointing out that no place is only periphery, but also always a centre in its own right. In this paper, then, we build on these strands of academic work to detail the economic life of Boa Vista do Acará, provide insights into the economic practices in the community and the motivations behind them. We further show the different ways in which digital technologies are appropriated in the community. By doing so we add to the literature an investigation of the role digital technology plays in both connecting community members to globalised economic systems and supply chains, but also supporting them in their efforts to remain at the periphery and perhaps resist the full *capitalisation* of their life.

In this paper, we examine the way in which the capitalist nexus has slowly encroached on traditional patterns, bringing with it a variety of changes. These changes are mediated by a number of technological and cultural factors, including the arrival of Internet facilities. We detail how the use of Internet technology does not have a unitary effect but is a function of the specific local conditions, values and the different local economic activities and material forms of productions it begins to change. The main contribution of this paper, therefore, is an analysis of the role of internet technology in this rural community's management of their relation to global capitalism, their participation in it, as well as their resistance. Our focus here is the specific way in which internet technologies mediate the relationship between local

practices and globalised capitalism, and how this relation depends on, and differs with, the specific forms of different material practice we describe here.

8.4 Methods and Researcher Stance

Many villages in the Amazon region are now subject to national and even global pressures. Their adaptation to modernity/coloniality and modernization is problematic, as has been examined in, for instance, the postcolonial studies literature (see e.g., Griffiths et al., 2000; Ashcroft et al., 2006) and through the decolonial approach (see e.g., Quijano and Wallerstein, 1992; Quijano, 2007; Mignolo and Walsh, 2018). Like much *standpoint epistemology*, this kind of perspective aims to bridge the gap between academic theory and intervention (Harding, 2004; Bardzell, 2010; Lindtner et al., 2018) (see also e.g., Sprague, 2016 for discussion). Other, more activism-oriented, work has focused on how exactly this bridge is to be constructed. One inspiration is the work of Brazilian educator Paulo Freire (1987), who is arguably one of the initiators of (Participatory) Action Research. His hugely influential book, *The Pedagogy of the Oppressed* provided the ideological groundwork for scholars to engage collaboratively and work towards a desired change. His critical pedagogy focuses on the oppressed and oppressor's distinction and on education as a way to restore humanity and liberate oneself from such oppression. The transformation of the world and the liberation of the oppressed is achieved through knowledge created in dialogue, where words without action and action without reflection remain meaningless. Walsh et al. (2006), who worked with Freire and is a decolonial thinker, argues that practices and the exchange of knowledge should go beyond the formal spaces of education and the instrumentalist sense of teaching, being at the service of social and political struggles. Others within HCI have engaged in participatory research projects, acknowledging participants and researchers as co-producers of knowledge, building on Freirean principles (Campbell, 2004; Poveda, 2016) or putting forward an explicit agenda of design for social justice (Dombrowski et al., 2016), decolonizing HCI education (Wong-Villacres et al., 2020) or designing for justice (Costanza-Chock, 2020) and outlining steps towards putting these concepts into practice.

The work in this paper derives from work done over a number of years by an activist and researcher in the community of Boa Vista do Acará. The work was predicated on a Participatory Action Research (PAR) methodology (Kemmis et al., 2014; Freire, 1987), combining ethnographic, qualitative methods with cooperative interventions to reach community goals. While this paper does not focus on these specific interventions, the background to our account is a long-term relationship with community members Boa Vista do Acará since 2015, aimed at developing resilience and increasing community agency when managing development processes. Together we have organised training on agriculture, design and technology and established several partnerships between the Association of Organic Producers of Boa Vista (APOBV) in the community, NGOs and research institutions in the area. The authorship reflects this, by bringing together academics and community members of Acará. The data for this specific paper was collected through frequent and lengthy visits by the first author to Acará over the past five years, where visits ranged from one day to several weeks. Data has been collected through personal interactions and discussions with more than 50 people, ranging in length from several minutes to hours-long and repeated conversations. Our research partners and participants in the community were of different ages, professions and roles. The youngest was 16 years old, the oldest was 68. As our data will show, they occupy a variety of occupational roles, from growing and selling different agriculture products, the directorship of a local agricultural association (a voluntary role that changes every two years) to women who sell cosmetics to neighbors and friends. Most of these interactions were recorded in short notes which were later extended to full field notes. The recordings were done with the other side's explicit permission and transcribed. Authors three and four live in the community and were also responsible for collecting data through interviews or informal conversation. Such conversations were also recorded in fieldnotes. All field notes were then shared with a limited number of colleagues. Thematic codes were developed individually and then shared, compared and discussed extensively between all authors, resulting in the present analysis (Aronson, 1995; Guest et al., 2011). All names appearing in this paper have been changed, to preserve the anonymity of the community members.

Fig. 8.1: Map with location of Boa Vista and the islands around.

There is on our part an urge to bring solidarity to rural communities in the Amazon region. More than that, activist motivations, we believe, can be married to academic investigations in such a way as to provide a route map for, and an understanding of, effective intervention. Intervention, put simply, must be based on understanding. This understanding, we strongly believe, entails developing a critical and political counterpoint to the *global forces* threatening local people. Others works support this view, Esteva and Prakash (2014), Nardi and Ekbia (2017), and Ostrom (1990), for instance, defend the importance of outsider, activist, involvement as allies in the struggle by small groups to bring about changes that mesh with local concerns, knowledge, beliefs and expertise. This does not mean that policy and practice are easy to resolve. In sum, we want to find ways of combining formal insights and traditional *cultural* knowledge to understand the role of technology in supporting the resilience of communities. The engagement with the community of Acará that led to the present account has then led us to become sympathetic to the pluriversal ideas as put forward by decolonial scholars.

8.5 The Setting: About Boa Vista do Acará

Much of the Brazilian Amazon region is remote and unconnected. There are very few paved roads and travel and transportation often happens by boat. To commute from the capital to Boa Vista, there is a harbour where members can choose between a boat called *popopo* or a *voadeira* (speedboat). The time of departure is often haphazard, but journeys by popopo take around 50 mins and by voadeira around 15 mins. On the boat, there is no internet connection so last-minute arrangements have

to be made before departure. Arrival at Boa Vista usually means a motorcycle ride to the community, or a walk.

The harbour and the roads in Boa Vista do not have proper illumination so many of them use their phones as flashlight to see the road, be seen by drivers, and to make sure they will not step on any animals like snakes. Electricity arrived in 2010, in that year, only 61,5 percent of the population in Northern Brazil had electricity in their homes (IBGE, 2011). Much of the area also lacks connectivity to telecommunications including access to mobile networks or the internet. Government programs aim to increase electricity coverage through solar power, roads are being built (for which the forest needs to be cut down) and several projects also bring digital TV and telecommunications access. All of this profoundly affects the local life of a community full of traditions. There is an increased pressure to look for work and education outside of the rural areas, which increases migration to cities. This weakens personal ties between community members, while at the same time making the use of the internet a necessity for social and economic reasons.

Ribeirinhos, as they are termed, are part of Amazon's non-tribal indigenous rural population of approximately 951,000 in the Amazon. Nearly 255,560 ribeirinhos (around 4.6 percent of the population) are in the State of Pará (Oliveira and Fridrun, 2006). For several years we have worked with members of a specific community in the Brazilian state of Para, called Boa Vista do Acará – substantially based along the shores of a river. This work has given us a detailed understanding of the economic and social life of the community. They belong to one of Brazil's most economically marginalized groups (Ribeiro, 1995), at the same time a rich local culture where herbs are used as traditional remedies and in healing rituals, where cassava and açaí are grown, and where fishing and forest extraction are typical activities.

Boa Vista's community is rural both in terms of its distance from urban areas and its population size, as well as in a sociocultural sense (Hardy et al., 2019b). The *rurality* of Boa Vista do Acará arguably plays a crucial role in the emergence of their specific practices. The community is rural also in a descriptive sense, in terms of their distance from an urban centre, their low population size and density and

their lack of certain infrastructure such as paved roads, as well as in a sociocultural sense [Ibid.]. Many of the specific practices we describe here, as well as the attitudes seemingly motivating them, would likely not be possible in an urban area, even though "there is an interdependence between cities and rural communities" (Hardy et al., 2019a, p. 41). They are connected for example to the natural surroundings of Acará that make the growing of açaí or cassava and their important role in the life of Acará possible. They also stem from the geographical distance to the city, which makes selling at the market effortful and costly.

One of the members of Boa Vista explains that things in the region are changing, some land has been sold because of Brazil's ongoing economic crisis, and people unknown to the community are moving in. The circulation of new people in the region is causing fear, as one member says: *"We feel insecure with those new neighbours."* Another member of the community mentioned: *"With the construction of roads, the woods were cut down, the streams were damaged, the circulation of people became intense, the drugs came, and people from everywhere circulate here - we do not know if they are of good character or not. The development opened the door for the people of the community to work in the city and many stopped working with herbs, flour, plantation. We left aside the manual labour here to work at manual labour in the city.*

8.5.1 Infrastructure and Economy

Although Boa Vista is only an approximate 50 min boat ride away from the state capital Belém, it is situated right in the forest, without paved roads. The village is home to an estimated three hundred families. The land is used in a mostly informal economy. Farming is done only on very small plots; sometimes individual trees are planted for fruit, and existing trees are cared for to deliver fruit. The community has been working to regenerate the forest where needed, largely through natural processes. The word *community* is not used idly. Mutual support is a strong element of community life, underpinned by a strong sense of *family* which extends beyond blood ties. Maintaining common resources is typically a collective effort, for instance with regard to road and pond maintenance. During our visits we witnessed and participated in several of such work parties or *mutirão*: people

would gather early in the morning with their tools to do, for example, whatever is necessary to prevent silt from entering one of the community's natural ponds (called *igarapé*). Community knowledge also encompasses the assets and resources (trees, plantations, and production) of the whole community, such that *where to get* local produce is seldom a problem. Gift giving is a normal and natural part of local life. That it is "more beautiful to give than to receive" (Ribeiro and Rabassa, 2000) is a commonplace. The importance of "gift-giving" in the abstract (Mauss et al., 2002) has long been recognised, but personal significance is more difficult to attest to. The first author was never able to visit a village and go back home with empty hands.

Many families in the community generate income through traditional methods of planting and processing crops such as cassava or by harvesting and processing forest crops such as fruits and nuts. In a conversation with community members, they listed more than 30 fruits extracted from the forest – the largest part of this production they are not able to absorb (consume or sell) locally. The primary markets for goods from Boa Vista are in Belém, which is accessible by boat or by car (1h30 drive). They also complement their income by offering services to do with security, transport, selling gasoline in PET bottles, restaurants, bars, bakery, repairing and fixing things, tailoring, and selling cosmetics from catalogues.

The education of the vast majority of adults does not reach the second grade. The first members of the community to go to university went very recently. To prepare for the university, young inhabitants travel to nearby Belém to attend school and mobile phones and the internet plays an important role. The learning of traditional methods is decreasing, especially the more time-consuming ones, such as working with cassava. Certain families in the community have been producing and processing cassava for centuries. In recent years some families of the community have increased their income by producing and selling specific natural products to a large international company.

Fig. 8.2: Harbour of Boa Vista and a popopo waiting for passengers. In the background, power lines and the tower used by co-NecteBV.

8.5.2 Communication Infrastructure

Acará is largely unconnected not only in terms of roads but also in communication infrastructure. While the small harbour region receives a weak mobile telephone and 3G/4G signal, the main part of the village, located further inland, receives no signal. One frequently sees community members walking or driving motorbikes along the sand road, periodically stopping and holding their phone in the air, to see if they can receive a signal in a specific spot. Some people have in their houses a PET bottle filled with a layer of sand, a layer of stones and the cellphone on top to make the connectivity better. Whether this makes a difference in practice is unclear. Rural telephones are also deployed in households and need to be connected to an antenna on the top of the house. Those telephones come with Wi-Fi function, so some members of the community attach the rural telephone to their motorbike, connect it to the battery and an extra antenna to reach the cellphone coverage and transfer data to the cellphone through Wi-Fi. Areas where the internet works are always very well-known, like the window ledge of the office of the building of APOBV. One can often see several phones lying there. Every now and then their owners come to see if they have received a message. To mitigate these access difficulties, some members of Acará pay for the services of a company to access a connection via satellite, paying between 270 and 300 Reais per month (about 60 USD) – this is more than a quarter of the minimum income in Brazil of 998 Reais (206 USD), and most members of the community live on less than that. The community (including authors of this paper)

have been working to communally improve their internet connection themselves, a project titled *co-NecteBV* (BV for Boa Vista).

co-NecteBV

co-NecteBV aims to create a WiFi signal in specific areas of Boa Vista. The community had three main reasons for wanting the internet: to call and receive help in cases of medical or other emergencies, to improve education, and for business purposes. This, they were hoping, would increase their resilience by decreasing the pressure to move to the city. The WiFi signal is provided through a partnership with the Federal University in Belém, about 6 km away, across two rivers. The signal is received by an antenna on an abandoned tower at the harbour, and from there sent to the local school right next to the harbour as well as an antenna on a self-made tower in the centre of the village. This antenna then further distributes the signal to specific regions of the village, where we installed receivers and routers. A group of community members is responsible for maintenance as well as the expansion of the network. While not complicated technologically, the local conditions, notably the fact of heavy afforestation interferes with its functioning, and frequent maintenance is required.

The leaders of the project keep areas clear by cutting specific branches to guarantee the radio waves' propagation through vegetation, so the trees and the location for the routers are carefully chosen. Trees suitable to carry antennas are trees that do not grow much, in areas with easy access, surrounded by trees that can handle the loss of some branches. It thus requires some familiarity with the environment. Such maintenance relies on the availability of knowledge, time and motivation, the organization of which is the biggest challenge of this project. This project provides free internet to the community with a 60 Mbps backhaul. It has eight points connected through a mesh network: the school (which is located near the river), the health centre, the APOBV building (2 km away from the school) and other five points distributed throughout the community. We report in detail on this project in a separate paper.

Fig. 8.3: Finding ways to communicate: cellphone in a PET and rural telephone connected to the motorcycle.

8.6 Findings: the Economic Life of Boa Vista

As we have suggested, the economic life of Boa Vista is very diverse. The community engages in a large variety of activities to either produce food and other goods directly for themselves or to sell and make money. Farming, processing and selling of mostly natural goods are complemented by several services such as gastronomy, mobility and repair. In this paper, we focus on four of these activities: the production of cassava flour, the farming of açaí, the production of roots and herbs (*priprioca* and *pataqueira*) and their sale to an international cosmetics company, and the selling of cosmetic products from various companies in the community. We pay attention to the way in which the Internet and social media, in particular, have begun to transform practices in certain ways, but not in others. Furthermore, we describe activities that are not directly or strictly economic, such as activism, but that are directed at the economic and social situation in the community. We pay special attention to the role of technological, digital infrastructure for these activities, and how such technologies have affected specific practices. It is important to note that the impact of technological change in Acará is not unitary. As we shall see, specific impact depends on what is being produced, the nature of the local supply chain, and the intersection of global capitalism with the local culture.

Fig. 8.4: Cassava Flour production in Boa Vista do Acará.

8.6.1 Rejecting Growth: Selling Traditional Products through New Means

Community members engage in a variety of *traditional* economic and agricultural practices, the tools and skills of knowledge of which have been passed on from the ancestors of the current community members. As we will see, several people can tell stories of how their ancestors used to engage in these practices, which illustrates continuity but also change. Outside of the community of Boa Vista do Acará the products of these practices, such as the açaí, a local staple dish, are often bound up in large, even international supply chains but an expensive "superfood" in the west. Despite this opportunity for economic growth, in this section we will show that community members use digital technologies to resist this urge to grow their operations.

Two main forms of agricultural production are to be found in Acará: cassava flour and the açaí berry. They are staple of the region and their importance and role as a *commoner's dish* have made them also the topic of popular songs or poetry in the region. Families are engaged in the whole process of growing, harvesting, making and selling them to clients in the community and in the capital. Some of the producers in Boa Vista live entirely on the income from açaí. The cassava

flour production is done in an outdoor processing area next to their home that incorporates shelter, processing equipment, and a large wood-fired frying pan. For the açaí preparation, a stable table is needed to put the one-meter-tall blender used to pulp the fruit. In both cases, many of the tools used require knowledge and skill traditionally passed on from one generation to another. There is an increase demand of a formal education system on the children and working on cassava or açaí is not seen as a promising career path. The number of families engaged in the making processes over the years has declined as parents do not allow their children to take up this traditional activity, *"it is a burden"* the oldest cassava flour producer in the community told us, who, at the same time, complained about the loneliness and tiring character of the work. This heavy manual work has been cited as one of the main reasons the younger generations are encouraged to opt for other ways of employment.

Even though there has been a decrease in the number of families engaged in such production, the market for açaí has expanded and it is now well known as a superfood outside of the region, marketed as an ingredient in a healthy fitness diet in North America or Europe. The state of Pará is the largest producer of açaí in Brazil (IBGE, 2017) and home to perhaps the biggest açaí market in the world, where the products were traditionally sold. For some communities, the increased interest in the product leads them to put at stake their own food sovereignty for participation in the market that provides the bulk of their income, selling all their product without keeping some for their own consumption (Pepper and De Freitas Navegantes Alves, 2017). Igor, a cassava flour producer, explained that his grandfather would trade cassava flour or açaí for industrialised products in the market. His father started selling the cassava flour *"once a week in the fair on Saturday at the harbour,"* there he would meet the clients, give the products, get paid and make notes of the order for the coming week – the communication was in person only. Nowadays the use of WhatsApp is essential to communicate with old and new clients. Orders today are typically received in this way. Igor told us: *"Nowadays I have four clients in the city. They send me a message about how much they want, and I bring it to the harbour where they pick it up."* At times, Igor could not be in the harbour in person, so he

would take the product(s) to the local harbour and negotiate with the boat pilot to deliver it to the client in the capital.

Bruno, a former APOBV president, said that, in recent years, community members have stopped selling cassava or açaí to the *atravessador* (middleman), who would buy and sell it to restaurants or to the *maquineiros* (person who buys the raw açaí berry and make the juice). Now, they use WhatsApp to communicate and schedule the delivery and receive orders directly from the clients. Ricardo, another member of Acará, has been in the açaí business for 19 years, and his story illustrates this point. Previously, he would take the *rasas* (a basket full of raw açaí) and negotiate the price with clients at the fair in Belém. In the last five years, however, Ricardo has been selling only to one specific woman, who works as a maquineira in Belém, and the delivery is scheduled through WhatsApp. WhatsApp, then, is commonly used to receive and negotiate orders and delivery. There is a downside, however, as the internet connection is not always reliable. Ricardo pointed out that *"if the internet is not working well, some transactions can be lost."* When asked if he was looking for more clients in the capital, he replied: *"No, that is not possible, I can sell just the amount of açaí that the trees can give to me."* At the same time, our partners in Acará are well aware of the higher prices paid for açaí in Rio or São Paulo, one of our contacts wondered out loud to us: *"How can I sell my açaí to São Paulo?"*

Smart phones have not left the ancient and traditional practices of growing and selling of açaí and cassava-based product untouched. The selling of these products is now predominantly mediated through WhatsApp, enabling direct contact with clients instead of middlemen, and better management of the sales process, skipping the market and knowing in advance the amount of produce to be sold. Yet despite these changes, other limitations – naturally or voluntarily – remain in place. Even though their improved market connections might allow for larger sales, the total amount produced - and sold - remains the same.

8.6.2 Embracing Growth through Local Networks: Selling Cosmetics

Selling cosmetics, in contrast, is a rather new but increasingly common economic activity in Acará. In this section we will detail how some community members engage in selling the cosmetics of international companies in the village. For this effort they make use of smartphones and messenger apps, but also rely on their local social networks to manage the necessary logistics of receiving and sending orders. In contrast to the previously detailed activities, selling cosmetics entails an active engagement with capitalist systems rather than a partial withdrawal from them.

Some of the members of Acará started selling products from catalogues. They buy cosmetics at a discount of around 30% (usual percentage of profit on sale). Many women in the community are engaged in it and women are also the regular customers. These consultants, as they are termed, serve as *middlewomen* of cosmetics that are displayed in a catalogue that customers choose from. To join the scheme, some companies demand that the reseller or consultant purchase a cosmetic kit that costs around 40 Euros. It is a work dynamic where the risks of not finding clients or non-payment are transferred to the consultants, giving them no guarantee of income, while encouraging them to invest in stocks that may never be sold (Abílio, 2014). In the past, consultants had exclusive licenses to sell these products. More recently, most companies have opened online shops, where everybody can purchase their cosmetics. Nevertheless, many still prefer to buy via consultants or are actually reliant on them, as they lack access to the necessary infrastructure.

The activity of selling cosmetics is not considered a business - it is rather a way of helping with the income of the family (a complementary- and highly gendered - form of work) and sometimes a way for women to be less financially dependent on their husbands. The catalogues are from different brands like Natura, Avon, Hinode, and MaryKay. We talked to around 15 catalogue consultants, only two of whom were male.

Consultants work on their own, as freelancers, and are not employed by the company. Natura, one of the companies, works with more than 1.7 million national

and international consultants (Natura, 2019). Through a specific website Natura aims at "accelerating the digitalization of Relationship Selling" [Ibid.]. Consultants can buy products for their clients online or direct clients to an online shop, and in the process of buying, clients typically mention the affiliated consultant who directed them to the shop. Not all consultants are equal, being ranked from “Seed” to “Diamond” and with each new rank consultants keep a bigger percentage of their sales. Consultants participate in social gatherings promoted by Natura, where they strengthen their social relations. The selling process is done by the consultant, whereby s/he uses the monthly catalogue to show product to clients. Clients then tell the consultant the products they want that month, the consultant communicates the order to the company, pays the bill, waits for the delivery, then separates the products and delivers to the clients and receive the payment. The payment from clients to consultants can be done in different ways: from credit card to cash. From the 15 consultants we talked to, only one offered the credit card as a payment option. Most accepted payments are in person and in cash.

The selling process was very similar for all the consultants we spoke to. They began by selling the cosmetic catalogue door to door, showing the physical catalogue to their clients. Usually, they would have just one version of the magazine and, if they trust the client, they would allow the person to spend some days with it to decide the products s/he would buy. This process of talking in person helped them to build a relationship with the clients. If people moved from the village or stopped working in the village, they would have to find another client to substitute for the ones lost. Clients are located not only in the neighbourhood or the same village, but also on one of the islands close by. They usually meet clients in family parties, *aparelhagem* (a very traditional and common weekly party), at church, at school meetings or on a boat from or to the nearby city. The personal lives of the consultants are deeply implicated, as sales are interspersed with the consultants’ job, leisure, and religious behaviour. This is consistent with the insights of Ludmila Abílio (2014), who sheds light on the work of consultants in Brazil and its way of potentializing capital, and the logic of accumulation and exploitation.

Mobile phones and the internet play an important role in this activity, in various ways. They are necessary for the consultants to communicate with the company and make the orders, but they also facilitate interactions between consultants and their customers. A working internet connection was crucial, but before the work of co-NecteBV, a reliable and stable connection was hard to come by. Consultants would have to find a spot where the GSM signal would work, usually under a power line on the road. Some were lucky, such as Tatiane: *"I found a hidden spot in my house where the internet works. It is on the backrest of the couch in the corner of the living room."* She had a weekly contract to access the internet and hence do business without having to go outside for connectivity. Tatiane further told us: *"I would just buy packages when it was time to collect the clients' orders, talk to my consultant or when my daughter had to go to the doctor."* She explains that *"talk to my consultant"* means that she had someone ordering the products from the capital: *"No, I do not know how to make the orders online, and I did not have enough internet available to use Natura [online] shop anyway. So, I send the orders to a woman in Belém, who is also a consultant for Natura, and she manages the orders."* Such a lack of familiarity with common interfaces is not an unusual in the community, and others are affected by it in various situations. The filling of a very simple online form can create a barrier, for instance when one member was trying to fill in such a form, the fields asked for her first and last name. Her name, like many names in Brazil, consists of several first names and several surnames. She only knows her name as a whole and was unsure which of her first names she should put as first name, and if she should just put one or all of them, and the same for her surnames. It requires familiarity with inflexible online forms to be able to fill them in successfully. A mobile phone and a working internet connection are important tools for Tatiane to both receive orders as well as to order from her consultant. It is also crucial to note that digital technology limits the role Tatiane takes on in this trade, because she lacks the required infrastructure and - as she perceives - the skill to make orders online. She is a middlewoman who still relies on another middlewoman in Belém to conduct her business.

Mobile phones are also crucial when it comes to organizing the delivery of the products. Boa Vista and the surrounding communities and islands all lack individual zip codes and postal service, so the consultants had to be creative with the logistics of

selling cosmetics. Each consultant uses different trustful contacts to make it happen. Some use the address of relatives in the capital, others use the address of businesses or restaurants of families and friends. Tatiane uses the zip code of her husband's mother, who lives in Belém, and orders are shipped there. He, the husband, visits his mother every Saturday to collect the orders. His travel costs, however, are not added to the product's price, so she pays from her own pocket around five euros per month. Sher works closely with her nephew in the city. He takes care of all logistics, including any online ordering. Sher collects the orders in person from her clients and communicates them to her nephew by phone. He takes care of the rest - Sher herself is not interested in the internet, she told us.

Other consultants inform their clients that the product has arrived in a specific place and the clients collect it. This is usually at the harbour in the capital - a commonly used place for everyone living in the surrounding islands. Isabela's uncle, for example, has a small restaurant at the harbour of Belém, which she uses to distribute products. She explained: "*My clients already know the point where to collect the product, that is in my uncle's snack bar in the harbour. They all work in Belém, so they have to pass in front of it every day. I just tell them: 'Your product is there.' They go, collect the product and leave the money with my uncle.*" Isabela also uses her uncle's bar to receive business orders, invoices, and letters. Just one consultant offers the option of paying through credit card, all the others collect the money in person or have a middleperson to manage the logistic. The members of the community are not alone in relying solely on cash. During the Corona crisis, the government of Brazil agreed to pay a small sum to citizens unable to work they found out that 46 million Brazilian citizens do not have bank accounts (Fantastico, 2020). Isabela told us that she also offers door-to-door delivery: (1) if a client is from Boa Vista, the product is brought to the village by a contact who is coming from the city and she is responsible for picking it up at the harbour of Boa Vista and delivering the goods by motorcycle or bike directly to the client; (2) if a client is from a nearby island, the consultant pays a fast boat to deliver the orders and collect the money. All consultants we spoke to coordinate this logistics through WhatsApp or by phone. The consultants established these infrastructures for themselves and they are one of the main reasons why clients keep on buying from them instead of ordering directly (which would

not be cheaper, as consultants charge the same price). Most clients lack the required infrastructure and cannot make online purchases directly themselves. The process is mostly based on a cash economy, even the total payment of the consultant to Natura is made in person in a bank.

The process of selling from catalogues has changed drastically with the improved internet connection and is seen as an opportunity to improve their rank and status - incentivized by most of the cosmetic companies. They now use the paper catalogue only to take pictures of products which they send it to the clients via WhatsApp. There is also the option of sending the complete digital version through WhatsApp and the client can choose the product they want, but this requires sufficient bandwidth and data packages on both sides. Tatiane is aware that her clients still struggle with internet access: "*I know what the client likes so I do not send the complete version because it is too heavy for them*" to receive the complete PDF. Nowadays Tatiane has 13 clients and uses the internet to contact them and her consultant in Belém. After the deployment of the internet, the first thing she mentioned was: "*Now I can learn how to access the online shop of Natura, so I do not depend on the representative in Belém to shop in my name.*" Isabela knows how to navigate and order online, so she has a better control of her orders, and enables other ways of improving her business: "*Sometimes a client wants a perfume, I go online to buy it from the site and it is much faster, it arrives in the next day*" in the capital, where she used to live. She proudly said that her clients did not look for another consultant when she moved from Belem. One of her clients explained: "*When I have conditions to pay you, I pay, when I do not have, you understand.*" She says: "*So that is how it is and the internet helps me a lot. If I have no internet, I lose many things, many things.*" Isabela delivers the products by bicycle or motorcycle and usually she sends the invoice through WhatsApp with eight to ten days to pay (generated by the online shop). The role of the consultants is more than simply offering infrastructure. Several told us that they make use of sales on the website, ordering products they think a specific client might like or bringing samples to personal meetings with their clients for them to try, and at times even offering make-up services, so that clients experience specific products directly.

Personal contact remains very important, involving more than just being a part of the necessary infrastructure for gaining access to products. The relationship between consultants and clients has an important social component and the act of participating in the sharing of product knowledge is itself regarded as a pleasant experience. The relationship is clearly a trustful one, some consultants who restricted their service to the WhatsApp messenger complained that: "*[Even with more time available to do other things,] I miss going to the clients' houses to chat, gossip, and eat.*" Others continue visiting their clients because "*it is easier to sell the cosmetics in person.*"

With regards to marketing and selling their goods, the phone is not only used to distribute the catalogue, some of the women also regularly demonstrate makeup by using it on themselves and distributing pictures of it through their WhatsApp status or even through Instagram and Facebook. Camila posts pictures of her wearing makeup on social media to show the products she sells and her eyebrow design service. Smart phones and internet connectivity have thus become crucial components of the practice of selling cosmetics as engaged in by the members of Acará. Even though the practice existed in some form prior to the arrival of the internet connection and smart phones, the connection to internationally producing and operating companies it entails, and therefore to globalised capitalism, has accelerated, allowing more marketing-directed activities. These include such activities as distributing pictures of themselves with the make-up in question and enhancing their role as middlewomen by enabling the placement of direct orders online, instead of going through other consultants.

8.6.3 Joining the Supply Chain: Local Herbs for Global Players

The community members are not only engaged in selling cosmetics but are also involved in their production. For several years now they have been supplying an international cosmetics company with raw materials, roots and herbs, for the production of upmarket cosmetic products. Building on traditional use, such herbs are rooted in communities in the region. This specific relation is also used by the

Fig. 8.5: Banho de cheiro (spiritual bath rituals) and herbs preparation.

company for marketing purposes. Digital technologies play specific roles in the community's attempts to manage this complicated relationship.

Boa Vista has a long tradition of growing various medicinal herbs and plants that are used to create traditional medicine, scented baths and perfumes. The preparation of baths from the herbs and the bathing itself are important tradition in the Amazon rainforest region. Each bath is prepared with specific herbs, depending on the desired effect of the bath, as different meanings and effects are attached to each herb. The herbs are cut and soaked in a large clay bowl overnight. Baths can be prepared for one household only or for the entire community (in which case all possible herbs are used to satisfy all possible needs and desires people might have of the bath). Participants have to cover their whole body with the herbal water and then take a long walk in the forest, they say: *"The trees will help with the treatment"* and make the process more effective. The water is not washed off afterwards but is left on the skin for the entire day. In the community, bathing rituals are learned through participation, and aim to cleanse not only one's body but also one's spirit. The herbs grow in a semi-wild manner in the forest that the village is part of. The inhabitants use these herbs for themselves, to offer ritualistic baths to tourists and sell them

at the *Ver-o-Peso* market in Belém, the largest free market in Latin America, where a special section is reserved for traditional medicine. While these baths arguably have their origin from Quilombolas and from indigenous descendants (see more Silva, 2018) in Boa Vista, they are now common also in urban settings for various occasions such as New Year's Eve and are practiced by members of various religions - even Christians and Evangelicals. Because of this practice of growing, harvesting and selling aromatic plants, a big cosmetic corporation approached the community in around 2003 to buy local herbs in large quantities to use in their products. They were specifically interested in the herbs, priprioca and later on pataqueira. Priprioca is the root of a grassy plant with a slightly woody scent, while pataqueira is a shrub, the small leaves of which have a floral scent. Dona Rosa, one of the oldest in the community, said about the priprioca herb: "*I used to see prioprioca as a sister who was forgotten. She was always around but we did not give her attention. She had a secret hidden inside of her, in her roots, and we would never discover this treasure without the company coming here and showing us how to work with her. In the end, it gave jobs and money to many of us.*"

To organize the production of these herbs and to facilitate the administrative processes of dealing with the corporation, the APOBV was founded in 2003. The members of APOBV learned how to grow the herbs used to produce cosmetics, like priprioca and pataqueira, at scale. The group started with 23 families and in 2018 it grew to 54 (membership is organized by families, not by individuals). About 20 to 50 tons of the herb and root in their natural state are sold each year. A few families continue to sell other varieties of herb directly at the Ver-o-Peso market in Belém. They display the herbs on a piece of cardboard on the floor, from 5am until everything is sold. The location is strategic, next to the fish market and the stands of women, who sell the *garrafada* (the herbal bath in bottles) or small glass jars for those who prefer to buy the bath ready-made by these women, who are locally referred to as witches. However, given that the price at the market is about 1/5 of what the cosmetic company pays and that they can only sell much lower quantities there, and only a few families choose to do this. The products that are made with ingredients from Acará are also presented in the company's catalogue and sold by consultants as detailed above.

A representative of the company regularly visits the community to consult with them on agricultural and organizational matters regarding the herbs and the association. At the beginning of the cooperation these meetings happened frequently. Nowadays however the community produce largely by themselves and do not require consultation so often. Once or twice a year the company also organizes workshops for all producers that they work with in a specific region. Improved internet in the region has greatly helped communication, largely through messaging services. It also helps to strengthen the association's position in negotiations with the company. Members also now use phones to verify, confirm or debunk the information the company provides in personal discussions, thereby enhancing their ability to influence negotiations for their benefit. A member told us: "*During meetings, if I do not know the meaning of a word or if an information is correct, I quickly check it online.*" However, the relationship with the company and the foundation of the association has not been an unalloyed benefit. The international company which now buys much of the product imposes meetings and documentation on suppliers. Older people have struggled to meet these organizational requirements, which has meant in turn that younger people have become more active in the supply process. It should be noted that community members that are not part of the association have a very critical attitude towards it and it has sown some discord, partly due to the economic imbalance it created. Members of the association that deal with the large company have grown disproportionally wealthier compared with the rest of the community.

It is the company's policy that the associations it deals with has to re-invest some of the profit into the community. This has made the association a financially powerful institution, over which non-members have no control. A young man who only joined the association recently told us: *"Before I joined I did not like the association at all. They just make things for their personal interest, not for the community. Everyone knows they have a lot of money."* It is also worth noting that some members of the community, like Karina, have refused to join the association. Even though her relations to many association members and to its leaders is friendly, she remains committed to her way of making cassava flour and selling cosmetics, instead of joining the association, thereby also refusing the business opportunity and substantial income increase it

presents. She is worried that the income inequality within the community, created by the association and the large company, is unfair and destructive to the community. A senior herbalist and traditional healer of the community, Seu Gonzaga, in contrast embraces the new opportunity of the association, but also remains firmly connected to the traditional aspects of growing more than 10 different kinds of herbs: *"I would never move to the city, I will always be here growing herbs,"* he told us. Curiously, he is also the only member we met who refuses to have a smart phone. All his business is exclusively done via phone calls on his trusty Nokia phone and rural phone, including orders from customers in the city who would like to pre-order specific herbs for special occasions such as New Year's Eve and a traditional party in June.

Interestingly, the company recently approached the association with a request to grow and sell a third product to them in large volume. After deliberation, the association rejected this proposition as they did not want the additional work it would entail.

8.6.4 Development on Strictly Local Terms: Micro-business and Activism

While the previously described activities constitute some of the main economic activities of Acará, they are not the only ones. In the following section we will highlight activities and practices that are performed by relatively few community members, yet nevertheless impact the community's economic situation.

Several members of Acará find new and creative ways to use smartphones to support new business endeavours, resulting in a variety of local microbusinesses. By way of example, a fourteen-year-old girl uses her WhatsApp status to sell products that she bought in the capital. During trips to the capital, she would explore different shops, buying clothes or make up, and then later advertise these goods through her WhatsApp status, often at opportune moments. For example, just before the birthday of a community member she would put extra effort into advertising products that could be suitable gifts, hoping others would buy from her and therefore save the

costly trip to the city. Another woman keeps packaged gift products at home, and, on celebratory occasions, she communicates to friends through a shared WhatsApp group or via WhatsApp status that she has festive products available. Camila is a skilled baker, and she regularly finds inspiration and knowledge online to make impressive cakes, by watching videos on YouTube. She also uses the WhatsApp status to show the cakes and advertise her service. The first author was part of the production and delivery of the unicorn-themed cake made, ordered by a client in another ribeirinho community close by. On that day, the internet did not work in the house, so she had to download the recipe, video and pictures beforehand to make sure we would not miss any detail. They spent some hours working, talking and listening to mp3's on the phone. After the cake was ready, her husband came by motorcycle to help with the delivery of the cake. She had to balance herself and the cake during the bumpy 2km ride to the harbour, where a popopo was waiting. The pilot of the popopo was then responsible for delivery to the house of the client.

Another woman cooks twice a week to sell the food and snacks such as *coxinha* (a local kind of croquet filled with meat or egg) also advertising her delicacies through WhatsApp status. WhatsApp almost functions like a community shop, where many community members advertise their wares, with products differing every day. Purchases, however, are always made in person. Our point here is simply that the internet can be appropriated in a variety of ways. Individuals seem in many instances to be happily engaged in new forms of micro-capitalism. In others, as we have seen above, they may be more resistant.

Recently, a group of activists has formed, calling themselves *The Group of Polemics*, where information and judgments are shared with each other via messenger. The group discusses issues with regards to the situation of the entire community and their relationship with the local government, who for example want to fell trees to create space for power lines or who cause damage to local waterways through the construction of roads. Communication via digital media allows a certain level of privacy. In a tight-knit community like Boa Vista, it would be difficult to hide meetings for long. Another activist is Kaka, who was also the president of the association of the village inhabitants. As such, he feels the pressure of the ca. 300

Fig. 8.6: Closing the road and posting on social medias.

families he is representing in this role. Many complain, but when the issue is related to the damaging the ecosystem, infrastructure and the environment, he has to act fast. An example of his attitude is the use of social media to fight against incursion by large enterprises. One company began to deploy power lines to send electricity from a dam to a mining company, sending machinery to do so, without communicating with the community beforehand. Their activities silted natural ponds (which are both a source of pride to the community due to their natural beauty, as well as a source of income as bars exist around the ponds - no pond means no customers), damaged the roads, and several large trees were cut down. Workers would arrive in the village saying that some trees would have to be felled, creating stress in many members of the community given that they feel a historical ownership of the trees. Adoniran, who is a very active and energetic man, claimed to be very stressed by these events. In the presence of the first author, when his daughter heard discussion of events, said: "*Dad, I told you already, they are not cutting down [your grandpa's] tree! Do not worry.*" His reply was: "*Do you think I should believe [what these workers say]?*"

Activists in the community sought to obstruct workers' passage. Kaka decided to close the road with pieces of wood and stones. He shared a call for help days before the action and during the action via WhatsApp messages and through his WhatsApp status. He tried to engage more people in staying with him on the road, texting: "*Join me on the fight for our rights. [name of the company] has to talk to us. Bring water and food.*" He argued that the company was damaging Boa Vista and providing no benefit. Kaka wanted an audience with the company so they could hear the complaint and listen to demands of the community. Eventually, the company managers were forced to negotiate their intentions. Kaka believes that his actions on social media were instrumental in achieving this goal. He told us: "*I think the divulging on social media has an impact. No one wants to be exposed in the media.*"

A third activist in Boa Vista is Rebeca, a 16-year-old girl. Concerned about the future of the environment, Rebeca very recently created a WhatsApp group called "Preserve the tomorrow" with seventeen participants from the village, as well as friends from Belém. The profile of the group shows a picture of many fists and the text, "*Being an activist is necessary.*" One issue they sought to address was the garbage from households and from the school. Since the village receives no waste services, the villagers are forced to burn their garbage in the backyard of the houses - which pollutes the air and sometimes causes fire in the forest. Camila texted: "*[I am also inconvenienced] with the garbage of my house. Everything comes with a lot of plastic... but because we do not have garbage collection, I burn most of it. I know we could recycle; this makes me really sad, the fact that we are contributing to global climate change, but we do not have the conditions to discard waste properly.*" The outcome of various group actions of this kind and the effect on community solidarity is, at present, difficult to judge. What is clear, however, is that the very existence of actions of this kind indicates the stresses that the community faces.

8.7 Discussion

The economic life of Boa Vista is rich and diverse and tells us much about economic relations and material practices at the edge of the capitalist world-system. Our findings highlight a variety of ways in which this community relates to global

economies and commodity chains, showing how local people can, in some circumstances, maintain their distance and in others are more bound to the global system. Local practices, capitalist systems and new technology are entangled in complex ways, where traditional knowledges and local raw materials are part of international commodity chains. Products are sold to an international company, but also more locally by the same peripheral community members who are the suppliers of the raw materials.

Digital technology, mobile phones and an improved internet connection have an ambivalent role. Their effects are a function of the specific conditions, values and practices of the community, and the production modes they are applied in. While the specific use of technology we described are perhaps not surprising, the important point is their difference in meaning and the variety of responses and relations to capitalism they represent. These technologies both facilitate the community's participation in global trade systems, but also support them in managing their independence. In short, adjustment to the larger world of capitalism involves a balancing act, one in which community members can be both members of supply chains but cautious about some of their consequences. Equally importantly, and we should stress again that the discussion in this paper constitutes a descriptive/analytic contribution, it is our view that a sensibility concerning the various challenges faced by a rural community of this kind is a necessary precursor to any attempt at design. That sensibility, we suggest, comes from a close, nuanced, understanding of the material practices of its members. We cannot, of course, detail every kind of economic activity that people might engage in. We have focused on those activities that, following several months of observation and involvement, have seemed the most significant.

8.7.1 Moving towards Capitalism

As our description of economic practices in Acará makes clear, the community is pericapitalist in several ways, engaging with larger globalised capitalist structures in some form while maintaining a distance in others. As Anna Tsing (2015b) explains, pericapitalism always entails forms of exploitation of resources that are not entirely

under of capitalist control, forms which are clearly visible in Acará as well. Most of the community's practices require knowledge traditionally passed on from one generation to another. However, some at least of these practices, like *Banho de Cheiro* (spiritual bath rituals), that once were just knowledge of the elderly, are now on the pages of international cosmetic outlets, online or in print, and the resources used are now even sold by descendants of the traditional knowledge retainers, such as the consultants we described earlier. The company that the community is dealing with took advantage of this former non-capitalist activity and its foundation in ancestral knowledge to increase the value of its products, made with herbs from communities like Boa Vista do Acará, translating them into commodities. Another example of exploitative pericapitalism, as we have shown, is how the harvesting and processing the local materials like açaí and cassava have become appropriated. Their production involves unique skills originating in their indigenous' ancestors, and the supply chains of those products are totally dependent on the continuation of these practices and the necessary knowledge deployed. The accumulation of capital continues to depend on the skill, culture and vernacular knowledge of communities like Acará to *develop*.

Technology clearly enables an engagement with capitalism in some form. That form, however, varies and much of what we discuss above is intended to show that, even in a single community, a range of reactions to broader capitalist agendas can be discerned. Several of the activities of members of Boa Vista clearly connect them to large globe-spanning commodity chains or other large distributed systems that add value and create new consumer goods. Açaí is a local staple food that plays an important role not just as nutrition and income but also as an element of local culture and tradition - central to community identity. It is, however, also an element of international trade, in which it is stripped of the value Boa Vista attaches to it and a new one is created. It becomes a healthy sweet superfood associated with a fitness and health diet in the USA, Europe and larger cities located in the South of Brazil. Oddly, the local function of açaí is entirely different, starting from the original taste that is plain instead of flavoured with banana, granola or strawberry. It is consumed as a main dish daily, together with sweet or savoury foods, and the consumption of it is, in the region, not associated with gaining energy but with

taking a nap after drinking it. Açaí consumption accounts for more than half of the calorie consumption of a typical rural family (Brondízio and Siqueira, 1997) and because of its central role in local diets and the fact that it only grows in the Amazon region of Brazil, it is really important to the regional identity.

The increasing interest by outside markets in local products such as açaí and herbs transformed the lives of members of Acará engaged in their production and trade, where the values of these products are decided by markets external to their community. But in the case of traditional products such as cassava flour, the link with globalized markets is mostly maintained by the oldest generation of members interested in such work. Younger generations do not want to engage in cassava production, and their elders often encourage them to pick up a different trade. The hard work and the low value attached to cassava production might not sustain the way of life of the village for much longer. Space then opens up for other kinds of *development* to arrive in the region, embodying a rhetoric of modernity that operates on "in every area of life that does not fit modern/colonial global designs" (Mignolo, 2020, p. 3). In our account, we found community members who have a clear understanding about the connection between their production and their relation to nature, something that is becoming rare in the Capitalocene (Moore, 2017) with its focus on accumulation, profit and exploitative relationships between humans and the "more-than-human" world.

The digital tools the community has to hand - an internet-enabled mobile phone and WhatsApp - help local producers participate in this trade, and at times exercise more control over it when negotiating and organizing the logistics of the açaí trade. WhatsApp helps Ricardo coordinate with his clients in Belém. Through producing and selling açaí in the Ver-o-Peso market, the members of Boa Vista participate in this global trade, although their participation is somewhat passive, ending at the local market. What digital tools are *not* used for is perhaps even more remarkable. There is little effort to enlist online facilities in order to scale up or sell more. Digital messaging tools are used to make selling easier but, in Ricardo's case, this can lead to a scaling down of effort. He now focuses exclusively on one client, keeping a part of his harvest for himself. Igor, who produces and sells cassava flour, is similar.

WhatsApp allows him to sell exclusively to a small group of clients, they order beforehand, and he brings it to the harbour. He no longer has to spend the day at the market and does not want to, even if he could find more clients there. Digital technology thus enables *sell more easily* rather than *sell more*, and to work less in the process. A similar lack of interest/rejection in growth is exhibited by Karina, who rejects an opportunity to be part of an annual order of herbs, and consequently increase income, explicitly out of concern for the community's wellbeing and to cultivate a better relationship with members of the community. Some, like Seu Gonzaga, refuse to give up traditional herbal practices, such as selling herbs in the market in the city and offering Banho de Cheiro. It also noteworthy that the producers of açaí and cassava do not engage in any form of marketing, a crucial element of growth strategies. Even though larger supply chains, especially for açaí do exist, of which the community members are aware, few showed interest in being part of them.

However, this lack of interest in or even rejection of economic growth is not a unitarily held position in Boa Vista. Others, as we have shown, are very interested in growing their business, for example in the case of selling herbs to the big company, where many were willing to learn new production patterns in order to supply the large amount the company demanded. It needs to be said, however, that they did not look for this opportunity, it was brought to them from the outside with the company approaching the community. Even here then, the wish for growth is limited, as a lucrative company offer of producing another herb was turned down by the association. The women who sell cosmetics also exhibit a clear interest in growth, as their activities on social media can be understood as a form of marketing, aiming at attracting and building trust (AlArfaj and Solaiman, 2019; Curty and Zhang, 2011) with online and offline customers, either new or returning. While some of these positions might remind readers of the Western concept of "de-growth" (Kallis et al., 2012), we would not really find this term applicable here, and it is certainly not applied by the members of Boa Vista. The rejection of economic growth we witnessed is not based on political ideals or an explicit anti-growth or even anti-capitalist stance but is constituted as a practical preference for one kind of life over another. There is

clearly a diversity of relations to systems of capitalism amongst the members of Boa Vista.

Importantly, however, we need to recognize that access to new technology does not, in and of itself, produce change. It does so only in conjunction with new economic constellations. The dealings with a large cosmetic company clearly entail new markets and new meanings for existing herbs and roots. Even so, the herbs produced locally still have an important role in local cultural practices such as spiritual baths, whether used directly in the community or sold at the local market for the same purpose. Nowadays the same herbs are one ingredient of many goods produced and marketed by a company with a presence in at least 73 countries. Local producers have little control over the ultimate destination of the fruits (and herbs) of their labour. Their dealings with the company and their role in this trade are nevertheless facilitated by digital tools. They communicate with the company's representative via messaging apps and can schedule meetings or enable discussion about the progress of the harvest. The internet helps members of the association to double-check information during meetings or obtain other information that improves their negotiating position. This can create tension, but also strengthens their position in relation to this large global company, enhancing their competitive bargaining position and symbolic of a nascent entrepreneurial interest. On the one hand it structures their participation in this global commodity chain by making it more lucrative. One the other, it can also, at least in some circumstances, make their role as supplier a more active one, with consequences for life in the community, and the alleviation of pressure to abandon village life for the city. This highlights the complex relationship between pressures to *become more capitalist* and the village's own explicit or implicit resistance to or mediation of these pressures.

The selling of cosmetics is equally a matter of local practice partially transformed into elements of a global supply chain, mediated by smart phones and internet connectivity. Consultants and their clients have little to no insight into the production of the cosmetics or which ingredients go into them, with one exception: some perfumes listed in the catalogue are made with the herbs from Acará, and members of the Boa Vista community are well aware of that. They marvel at the high price

this perfume is sold at - a price that prohibits them from buying the product. In this activity, as catalogue consultants, the role of digital technology is perhaps most striking. Rather than simply mediating interaction, making communication easier by allowing it to happen without travelling, it requires the skilful use of the technology to receive orders from clients and to order from the different companies. The ability to not only send text messages but also pictures, makes this even easier, as images of the catalogue can be distributed, or consultants can use social media to promote their products and make-up skills. Where digital skills are lacking, consultants continue to rely on intermediaries.

Digital technologies, however, make up only half of this infrastructure, the other half lies in the trust-based connections that exist between community members, friends and family in other places. Lacking recognizable addresses to receive packages or invoices, family members and friends become part of the infrastructure, and receive, keep or forward goods without any contractual agreement. Social relationships in this instance are embedded in and are strengthened by the creative workarounds necessary because of lack of infrastructure. The reliance on others is, therefore, a common feature of internet use in Boa Vista. Similarly, complex logistics networks have been described by (Jack et al., 2017), in the form of a diverse and complex infrastructural creation in Phnom Penh, that draws in online and offline, material and social components. In Boa Vista, this represents a response to a certain form of digital colonialism (Pinto, 2018). The technologies in this activity, such as the online shops of the companies, cannot be seen simply as part of a developing nexus, especially because systems such as websites "often benefit, de facto, the members of privileged socioeconomic classes" (Ekbia and Nardi, 2015, p. 48). Their use is heavily mediated by local skills and knowledge, by physical or organizational infrastructure and existing patterns of use. The latter themselves are partly determined by certain cultural imperatives.

Our findings expand the concept of digital colonialism, by showing how digital technologies exert pressure on individuals around the globe to have the same specific knowledge and skills and have access to specific infrastructures, echoing the critique made by decolonial computing, which suggests for researchers to subvert

the design of computing systems in a way that the asymmetry of local-global power relationships is reduced (Ali, 2016; Ali, 2014). To use IT facilities, people need internet connections with sufficient bandwidth to allow online shopping, credit cards to make online payments, postal service to receive packages and the knowledge on how to navigate their interface or to fill in a form. All of these are certainly not a given in Boa Vista, where many are unfamiliar with the internet, cannot afford the satellite connection that would make online shopping possible, where only very few have credit cards and the postal service is not working.

The creation of the socio-technical infrastructure that we describe here, represents a creative response to these hurdles. Where users of the internet could use the technologies and social relations available in the community. Today, the required technologies do not account for or anticipate this appropriation but work on the premise of different infrastructure. Alternatives are imaginable: the houses could receive zip codes or other forms of digitally-mediated addresses (OkHi, 2019), access to financial services could be eased. Technology could also work specifically for the circumstances of Boa Vista, cater for the absence of individual zip codes and the presence of trustful relationships between locals, and work to strengthen these, rather than replace them.

Explicit resistance to the pull of global capitalism can be seen in other practices of the people of Boa Vista. An improved internet connection has sparked the advent of discussion groups such as *the group of polemics*. Here, community members use the internet to explicitly discuss political issues with regards to the extension of roads and powerlines. Together with the activism of Kaka, it includes the use of digital technology to broadcast information about the acts of development companies the community thereby resists development at any costs and fights for development on their terms. In this village, nut trees that ancestors have planted might be more valuable than a new road.

8.7.2 Towards a Pluriverse: Lessons from Acará

We argue that a careful and sustained ethnographic approach to culture conceived of as a series of material practices may be a fruitful way forward as a means of making sense both of the effects of global capitalism and the way in which local practices and the introduction of new technology can mediate it. Our study is very much concerned with the way that agency is made manifest in and through the work done on and with material resources in the community. These practices are how the rurality of Boa Vista do Acará is constituted. As already noted, the community is rural both in a descriptive sense, in terms of their distance from an urban centre, their low population size and density and their lack of certain infrastructure such as paved roads and zip code, as well as in a sociocultural sense (Hardy et al., 2019b). Many of the specific practices we describe here as well as the attitudes seemingly motivating them would likely not be possible in an urban area. They are connected for example to the natural surroundings of Acará that make the growing of açaí, herbs or cassava and their important role in the life of Acará possible, but also provide for the additional small-scale, personal farming and gardening that alleviates the pressure to spend money on food. In fact, in many of the stories we heard it was clear that, in their relationship to their surroundings, it is impossible to clearly detach "nature" from "human." The practices also stem from the distance to the city, which makes selling at the market effortful and costly. While the geographical distance from the closest city certainly puts pressures on the community of Acará to sustain their way of life, it also facilitates their pericapitalist practices evident in the diversity of relations to capitalism described in this paper. Its setting right in the middle of a natural environment enables a certain level of subsistence agriculture, which might in turn make the lack of interest in economic growth a little bit easier. Many inhabitants keep gardens to grow fruit and vegetables for their own consumption, so less money needs to be spent on food. The rurality of Acará thus allows a specific perspective on pericapitalism and the different, divergent roles digital technologies can take on in its creation.

A notion of culture which emphasises it as constituted in material practice - the transformation of resources and the meanings attached to them - allows us to

show that, within a single community, these practices may demonstrate a variety of responses to capitalist modes of production; may for instance constitute a resistance to capitalist logics, may mediate them through specific responses, or may indeed in some circumstances embrace the affordances that capitalist innovation provides. We know of few studies which demonstrate this internal variation of response and believe that our emphasis avoids an over-totalising approach to culture as well as to theories of capitalist growth.

If, as is the case for the first author of this paper, academic study goes hand in hand with activism or a sense of intervention as inherent in any design activity, the task is to understand what the demand for certain kinds of developmental processes is before one can participate in providing a supply side solution, if so demanded at all. When observed through the lenses of pericapitalism and with attention to the variety of ways a community like Acará related to globalised capitalism, the economic activities of Boa Vista that we describe can illustrate ways in which it is possible to live differently and can help us to imagine the co-provision of alternatives as HCI researchers and designers. As we have pointed out, if global capitalism is characterized by a growth imperative, its local variant, its pericapitalist nature, can mean something quite different. This difference, as has been argued before (see above), remains under-observed in HCI and especially HCI4D. Given the developing concern over the consequences of growth on climate change, desertification, mass migration, and so on, concerns that we share, there are arguably important lessons for us. Various indigenous, activists and other (post)-development and -capitalist scholars outlined the view that post-globalisation discourses emphasize rebuilding of local economies, the re-constitution of place-based societies and advocate for a diverse economy based on communities (Krenak, 2019a; Schumacher, 1973; Escobar, 2011; Hathaway and Boff, 2009; Gibson-Graham, 2006; Hopkins, 2009; Shiva, 2008). Our account outlines several ways in which Boa Vista puts such imaginaries into practice, and the role digital technologies can play in this process.

The community of Boa Vista, at least to a degree, imparts traditional values and practices into their economic activities such as the production of herbs or açaí, and trustful social relationships are the foundation of e-commerce activities. The

natural environment is often perceived to be more important than an improved technological infrastructure, in line with the critique made by proponents of the concept of the Capitalocene, where *nature is cheap*: in Acará, nature is not cheap, it has emotional and not only monetary value and some of its inhabitants are unwilling to exchange elements of the surrounding nature for economic profit. At the same time, knowledge about the natural environment can support the extension of infrastructure, for example, when routers and antennas are installed with natural local materials on specific slow-growing trees or in a specific area, where trees will not be an obstacle for the transmission of the radio. By highlighting this, detailed studies of local economic practices such as ours can add to the post-development project of designating alternatives to development and alternative visions of *progress* (Escobar, 1995; Nandy and Kothari, 2004; Hazas and Nathan, 2017; Sachs, 1997; Rajão et al., 2014; Walsh, 2010; Shiva, 2003). They strengthen and reinforce the theoretical lens provided by the likes of Spivak (1988); Chan (2013) and Tsing (2015b) and allow for a recognition that, even in a single community, there can be a variety of responses, grounded in specific productive material practices.

As we have seen, some of the views expressed by the members of Acará run directly counter to those expressed by orthodox economists, for whom firms (such as Igor's cassava flour enterprise) operating in a capitalist competitive market are subject to a "growth imperative" (Gordon and Rosenthal, 2003). According to Gordon Rosenthal [Ibid.], for instance, no growth means zero benefit and would likely, in the nature of global competition, result in impoverishment. Confirming such an imperative, others have found pressure in rural communities to scale up production and enhance the growth of rural economies (Malecki, 2003; Salemink et al., 2017). Such a pressure to grow is resisted in some of the economic activities of Boa Vista, whose inhabitants at times exhibit no interest in growth, but, as with Igor, even scale down their operation. This is in line with the findings of Crabtree and Chamberlain (2014) in rural welsh farmers markets, where marketeers also deliberately stay small. Such findings correspond with attempts in economic science to investigate and model the theoretical possibility of a stable no-growth economy (Barrett, 2018) or even a shrinking, degrowing economy (see e.g., Kallis et al., 2012), although, as we mention above, the members of Boa Vista that reject

growth do not do so out of political ideals and are not advocating for degrowth, even if our observations perhaps hold lessons for advocates elsewhere. Similarly, the Latin American concept of Buen Vivir rejects the notion of economic growth as the means of development (Acosta, 2016; Gudynas, 2011; Cadena and Blaser, 2018). The economic practices of Boa Vista might hold lessons for such movements and practically illustrate the possibility of a "good life" with zero-growth and in line with the Earth's limits. Rather than being an exemplar of a vision of a fully globalised, universal world, Boa Vista shows us how the relations between people and nature and the technologies at hand are specific, local, based on a distinct set of (at times even contradictory) values. It is important however, to point, that pericapitalism and a heterogenous relation to capitalism and growth is not unique to the community of Acará, and likely can be observed in other rural communities. Our point precisely, in our study of the specific relations visible in Acará, is to refute universalist assumptions about development and point to the continuing diversity of the community's relation to capitalism. This has consequences for interventionist HCI projects - 4D and otherwise - as we as HCI researchers need to carefully attend to the diverse demand conditions that might exist and question our own assumptions when contemplating any such project.

Cadena and Blaser (2018), in more recent work, have extended their critique of modernity by examining a globalist and extractivist capitalism that ultimately results in ecological crisis, illustrated, amongst many other examples, by the wildfires in the Amazon (Gonzaga, 2020; Escobar, 2019). Building on concepts such as the aforementioned Buen Vivir and the struggles of Latin American movements such as Mexicos Zapatistas, decolonial thinkers criticize modernity's "one-world world" and universalist aspirations, and instead argues for a pluriverse, "a world in which many worlds fit" (Cadena and Blaser, 2018). Our findings from Boa Vista do Acará hint at such a pluriverse, a political concept which, in our view, fits comfortably with the theoretical notion of pericapitalism, in which a plurality of ways of being, ways of relating to nature and of connecting to the internet and to global capitalism exist. Places like Boa Vista are not only the periphery of global capitalism, as has been pointed out above (Santos, 1996), they are also a centre in its own right and as such they might hold valuable lessons to see and understand the

possibility of the pluriverse of centres connected for example by economic relations and digital technologies. The value of our observations of the economic practices in Boa Vista is therefore not in outlining a specific alternative to global capitalism, but in highlighting the fact that numerous ways of relating to capitalism can and do exist, allowing us to question universalising accounts and human aspirations for progress and development. The diversity we have pointed to provides ample incentive for HCI researchers and designers (aiming to intervene) to thoroughly interrogate their assumptions about progress and to recognise the consequences in design terms of heterogeneity in the community. Put simply, how can we respond to the pluriverse as emerging in Boa Vista?

8.8 Implications for HCI

While we refrain from drawing out specific implications for design from this study, we do believe it has several implications for HCI as a discipline and as a practice, specifically for those projects frequently grouped under the term HCI4D. In contexts where HCI projects are engaged in re-organising relations to global capitalism, we believe our study shows the value of a detailed analysis of the "demand conditions" for the use of existing assets, such as how the social fabric that sustains the cosmetics trade in Boa Vista is embedded in local practices. Local economic practices can differ greatly in their existing relation to global capitalist systems and can be informed by different values and different preferences. Different practices and different values mediate the role ICTs come to play, and in turn are mediated by them. These preferences for how one might want to relate to global capitalism, what kind of progress and development is desired, if at all, might not be those of researchers, as others have pointed out. For example, Díaz Andrade and Urquhart (2012) have highlighted HCI's "modernity bias" and a tendency to promise better living conditions, embedded in which might be beliefs alien to the communities which are supposedly to benefit from them: "The alleged beneficiaries might be lured into a promise of development even at the cost of eroding their traditional values" [Ibid., p. 289]. Such risks also exist in Boa Vista do Acará. Indeed, a plurality of relations to global capitalism and differing preferences and values that inform such a relation might exist in HCI projects in a village in Brazil as much as

in a village in Wales (Crabtree and Chamberlain, 2014) or perhaps any rural place (Hardy et al., 2019b).

By pointing out this risk we do not mean to warn against HCI interventions in general but point out the need for detailed studies to inform interventions, and a need to critically question the economic assumptions, models and knowledge systems embedded in HCI projects and within ourselves as HCI researchers. This, of course, involves reflexivity, a critical questioning of our own position in the creation of this knowledge as HCI researchers, the values and epistemologies embedded in our research processes and technological tools, and to let this questioning shape the interventions we engage in. Instead of furthering a false universalism and modernity, HCI projects can play a role in constructing a pluriverse, as advocated by decolonial thinkers (Quijano, 2007; Escobar, 1995; Mignolo and Walsh, 2018) and proponents of decolonial computing (Ali, 2014). The writings of decolonial scholars warn against a universalising and euro-centric worldview, critique of the concept of development (Mignolo, 2011) and provide alternative concepts such as Buen Vivir as a means to begin to question our own assumptions. They do not necessarily provide us answers about what to do but might help us to listen better to the demand conditions for any HCI intervention and in which ways they differ from our own ideas. In Boa Vista, this could mean developing ways that support the social network underlying the cosmetics business, rather than replacing it with infrastructure which might be more *efficient* but erodes social cohesion and general social contact, which some merchants are already complaining about. It could mean to support scaling down sales of local products rather than scaling up and expanding, by facilitating contact with customers beforehand rather than at the market. Listening in this way, understanding and reflecting on the conditions that become apparent during the research, could also lead us to see that demand for HCI intervention, indeed interventions of other kinds, may not in fact be wanted or needed (Baumer and Silberman, 2011a). This seems particularly relevant to us when we examine the stresses experienced in Acará, and the heterogeneous reactions we see to the changes engendered by the reach of capitalism and facilitated by communications technologies. Others have promoted similar ideas (see e.g., Nardi and Ekbia, 2017). The technologies we address in HCI can be brought to bear on local communities in many ways. Sensitivity to the

pluriverse, we suggest, acts as a corrective to the colonial views critiqued above and helps us to pay attention to the existing strengths, interests and assets (Pei and Nardi, 2019) in the local culture. Our study shows a variety of relations between economic practices and global economic systems.

Ultimately though, these lessons that we draw from the practices in rural Boa Vista with the help of the literatures we discussed here are not only for HCI projects in peripheral communities but are applicable to wider HCI interventions. If HCI aims to support human (and non-human) wellbeing worldwide, we need to more deeply consider our relationship to the economic systems in which we operate, as several authors have pointed (Ekbia and Nardi, 2015). As the critique of the Capitalocene explains (Moore, 2016), the ongoing destruction of the planet that ultimately will affect human life even more than it does already is a product of a specific way of being in this world - capitalism - of nature artificially made cheap and stretched beyond its limits to cater to capitalisms growth imperative. Rural communities like Boa Vista illustrate what it could mean to resist growth and work within the limits of nature, relying on local resources, and working towards encouraging social cohesion. These lessons, we believe, are applicable in many of HCIs domains, not only "4D" and can ultimately serve to question an economic and academic demand for more and new technologies, software and hardware alike, if the required resources are scarce, or critically evaluate where our interventions support unsustainable ways of being in the world.

8.9 Limitations

Our paper is surely not without limitations. One is a matter of scope: although an aim of this paper is to show the diversity of the impacts of mobile technologies and the dependence on particular material economic practices, the study presented here was done in a very particular community, part of which underwent a significant economic change through their collaboration with a large cosmetics company. Although this company prides itself on its broad support for and collaboration with rural communities, only very few actually get to experience this. Also, even though Boa Vista do Acará is clearly rural and not comparable to any large Amazonian city,

it is still located in relative proximity to the state's capital Belém, and the economic practices portrayed here are shaped by this proximity. Other communities with other economic relations and in other locations will surely exhibit other sets of practices and wishes for economic futures, and we do not mean to generalize across other communities in the Brazilian Amazon. The implications for HCI however, that we draw from our analysis do, we believe, apply to work in similar contexts.

8.10 Conclusion

Our study reveals the complexity, contradictory impulses, and elements of resistance that can be found in a nuanced analysis of the material practices of a local culture. Moreover, we have been at pains to show how they mediate, but are influenced by, capitalist innovation. Studies of this kind, we believe, are a necessary precursor to any attempts to provide for *progress* or to understand best how to mediate its logic. There are lessons here for everyone. It is important, therefore, to pay attention to the contradictory nature of economic activities of Boa Vista do Acará. Digital technology both mediates and eases the community's resistance, but at the same time facilitates their participation in global capitalism. We also do not wish to romanticize or idealize the village as a community of principled ecological activists. These contradictions can at times be present in one person, who feels, on the one hand, a strong wish to protect traditional ways of life and the natural environment that this way of life is entangled with, and on the other hand simultaneously dreams about starting a petrol station in the middle of the community in the forest. A statement from Bruno illustrates this tension: "*It is really complicated, at the same time that we want to be in the age of digital technology, we want also to live the past - we want to have that connection to the past. But we could not reach the border between the two times, where we can use the knowledge of the past and of the present. We need to find this connection, the synchronization of these two times. If we do that, we will find answers for many things that we have been going through.*" While some members of Boa Vista eagerly embrace new knowledge and skills about digital technologies, such as those involved in the co-NecteBV project, other skills, such as how to make the tool to extract the water from ground cassava, are being forgotten. Visions of development are enticing, and not everybody sees reasons to resist these visions.

Even though we hope that this study of the periphery of capitalism and what it means to be at this spot in the periphery provides inspiration. Boa Vista and the many similar communities that can still be found in the Brazilian Amazon region face real threats. The recently elected right-wing president of the country, Jair Bolsonaro, has begun to open up the Amazon region to further mining activities, and is revoking the protected status of the regions under the control of Brazil's indigenous communities (Watts, 2019). Such pressures and the violence that accompanies them are difficult and dangerous to resist.

9

Into the Mine: Wicked Reflections on Decolonial Thinking and Techs

This chapter was published in the Proceedings of the International Conference on Communities & Technologies as *Débora de Castro Leal, Ana Maria Bustamante Duarte, Max Krüger, and Angelika Strohmayer. 2021. Into the Mine: Wicked Reflections on Decolonial Thinking and Technologies. In C&T '21: Proceedings of the 10th International Conference on Communities & Technologies - Wicked Problems in the Age of Tech (C&T '21), June 20–25, 2021, Seattle, WA, USA. ACM, New York, NY, USA, 12 pages.* [1] *It corresponds to the P5 in the List of Publications.*

Abstract. *Our global livelihoods are intrinsically tied to mining. The technologies we use, as currently designed, are not possible without the minerals and metals that are an essential part of several of their components. As a result, HCI research and applications are tightly dependent on mining, including the negative environmental and social impacts resulting from it. This paper aims to describe and reflect on this problematic entanglement as a "wicked cycle." We present a dilemma faced by communities living near mining sites in the Amazon, which are affected by the ecological impacts of mining and rely on digital technologies made with such mines' products, including telecommunication technologies, to effectively and successfully advocate for and realise their own local visions of development. We promote a discussion built on concepts from decolonial thinking and critical sustainability. With this paper, we want to create space and necessity to acknowledge our complicity as HCI researchers in this dilemma and propose a series of questions to reflect on our part in these specific, and other, wicked cycles.*

[1] https://doi.org/10.1145/3461564.346157

9.1 Introduction

"*If we suggest that technology or markets have problems or limits, some will consider us to be heretics, and they will say that we are anti-technology.*" (Meadows et al., 2004, p. 205)

The times we live in can be described as the mineral age, as global livelihoods depend on them (Jacka, 2018). Due to the importance of minerals and metals, our research has focused on examining mining, its practices, and its disastrous impact on nature, including humans (see e.g., Jacka, 2018; Aráoz, 2020 for an overview). Mining can take place in two different types of practices: large-scale mining and what is called Artisanal and Small-scale Mining (ASM). The latter are often but, importantly, not always informal and illegal. ASM is often associated with precarity, as it is for example carried out as a *side business* for subsistence farmers in Latin America to diversify their income (Arsel et al., 2016; Cohen, 2014). It thus presents a critical income strategy for unemployed, underemployed, or otherwise impoverished people (Jacka, 2018). However, the precarity that leads people to engage in ASM, also extends to ASM as a practice itself. It is often done under hazardous conditions with inappropriate equipment and insufficient (or nonexistent) safety measures, presenting tremendous health risks for miners, including mercury poisoning.

Research shows damage in both the environment and populations who live and work in communities close to or dependent on the mines (Freitas et al., 2016; Watson, 2020). Moreover, in Brazil, for example, the suicide rates in areas with extraction of minerals are higher than those of the Brazilian population in general (Souza et al., 2006; Rocha et al., 2018). Both ASM and large-scale mining have disastrous effects on nature. These effects include deforestation (Jacka, 2015), resulting in erosion of land which - together with toxic leftovers - makes reforestation difficult (Rodrigues et al., 2004; Peterson and Heemskerk, 2001). Mining is also severely damaging to water resources, not only through heavy metals (mostly, mercury and cyanide) poisoning water bodies, but also acid draining which affects waterways and groundwater. Dam collapse has also become more frequent in Brazil, causing the death of people, soil, and water. For Shirley Djukurnã Krenak, the damage is

also spiritual: "the whole spirit of the water was murdered. We still mourn the death of Watu river today" (Krenak, 2019b). The large amounts of water which are needed for mining efforts also drain local water resources. This is the case even when the water is fed back into the environment as part of the mining process, which further heightens the risk of contamination. Mercury does not only affect the water quality but also that of land and air, accumulating in all organisms, especially top-level predators including humans (Lynas, 2018, p. 155). Communities with mining operations nearby are also impacted. Their health and their living conditions are affected by the short and long-term consequences of air, ground, and water pollution from these mining activities, along with land subsidence, landslides, and water run-offs in their territory [Ibid.]. Also, communities, mostly Indigenous, in these locations are often left facing risks of attacks and violence, associated frequently with mining and large-scale extractivist projects, when attempting to defend their territories (Rorato et al., 2020). The environmental impacts last hundreds, if not thousands of years (Jacka, 2018), and affected areas are not easily recovered even where environmental rehabilitation was intended.

HCI research and design is directly implicated in these matters of mining. A wide variety of metals and minerals are used when building digital technologies such as semiconductors, capacitors, and hard drives. These include aluminum, gold, niobium and tantalum. Niobium and Tantalum, for example, have become especially important (and infamous) for the production of digital technologies. They are extracted from coltan ore. Coltan is primarily mined in the Democratic Republic of Congo (DRC), but large reserves (40% of the world's resources) can also be found in Latin America including the Amazon region (Sutherland, 2011).

Studies that directly investigate the connection between mining and the global computing industry have predominantly focused on the role of coltan mining in fueling armed conflicts and violence in the DRC (Mantz, 2008), and the centrality of coltan for the digital age (Smith, 2011). They detail, for example, how increased demand for Sony's Playstation games console in the U.S. directly led to growing violence in the DRC over increasingly profitable coltan mines, a key component of the game console (Mantz, 2008). These studies illustrate the manifold ways in which

the computing economy (including HCI research) is interwoven with, and directly dependent on, mineral extraction and its associated atrocities such as violence in the DRC and the destruction of the environment and human livelihoods in the Amazon Region. We appreciate the advances in industry and research addressing some of these issues, such as commitments to avoid the use of conflict minerals and metals, contributing to the recyclability of devices, among others by Apple (Adams, 2020) or Intel (Intel, n.d.). We also appreciate there is an extensive history of HCI research and interventions into sustainability issues. However, we believe HCI as a field has not sufficiently addressed, and critically engaged with, its dependence on mining and the associated destruction.

Building on these concerns, Nardi and O'Day (Nardi and O'Day, 2000) have written extensive reflections on the impacts of technologies on our environments and communities. This has been seismic work, and building on it, an important question arises: how can we, as technology researchers, address this? Especially since, as HCI researchers, our main practice is to design, develop, and evaluate new technological solutions and their appropriations and use within communities, workplaces, or homes. As a field of study, we like to intervene when we see potential for technologies to *solve* particular issues or problems. Even when we are not working in this solution-oriented way (see e.g., Blythe et al., 2016), we develop technologies to explore issues, to discuss topics, or to facilitate community-development. The solutions-driven approach to our research is particularly evident when we work in the *Global South*. There is temptation for the HCI community to propose technological solutions to problems of global inequality, and it is especially perverse in light of the devastating impact of technology production. When using a decolonial lense to look at this work, we can start to see that we are addressing long-standing issues which, at least partially, arise from the growing of globalized economies by and for the Global North.

9.1.1 Our Contribution

Building on concepts of decolonial thinking (Mignolo and Walsh, 2018; Quijano, 2007; Grosfoguel, 2011), we problematize further HCI's dependency on mining

and the associated environmental and social atrocities. We describe this deeply problematic entanglement, while considering the research already done, as a "wicked cycle," in which HCI efforts to address and overcome these atrocities contribute to their existence. To do this, we present and theoretically unpick a unique dilemma that is representative of many other ecological and social crises: communities living near mining sites in the Amazon are experiencing the impacts of ecological disasters which, mining and specific notions of *development* bring on. But to advocate against mining, or for their own visions of development, they require telecommunications technologies. Such technologies are leveraged rather successfully, making them powerful and effective tools in the communities' struggle for their own version of *development* and against environmental destruction. Yet, the reliance of these technologies on the use of minerals found in the mines that are causing the problems in the first place creates a tension between their production and their deployment. With this paper we aim to explore this tension which we label a wicked cycle and introduce concepts and ideas from different decolonial thinking traditions that offer a variety of perspectives on this tension.

9.1.2 Process and outline of the paper

This paper stems from the first author's long-term engagement with a rural Amazonian community. Even though the work of the first author one with the community dealt with difficulties associated with development and the role of digital technologies, a concern for mining was never the explicit focus, the concerns addressed here emerged much later. However, this is not an empirical or ethnographic paper, and as such does not provide detailed empirical findings. Instead, it is a critical reflection initiated by an observation made in the community.This observation, shaped by the first author's experience and long-standing relationship, serves as the starting point for us to explore the issues mining poses for HCI. Through a decolonial lense we provide several positions in relation to this challenge which could serve as starting points for our HCI community to develop responses. We arrived at these reflections through a series of collaborative and shared reading, discussions, and writing.

In the paper, we will first explore different perspectives on extractive mining, technologies, and their complicated relation to the lives of people and communities in the Amazon rainforest. We do this by exploring decolonial thinking and linking this to existing research in HCI of designing in existential crisis. Second, we present a look at the role mining plays in the Brazilian Amazon, particularly the Pará region, where the first author has carried out many years of collaborative work. While the paper does not aim to represent a deep ethnographic account, we draw on these long-standing relationships, and present a pressing dilemma that is faced by a specific community in Pará, which has been shared with us by our friends living there. To conclude, we present a discussion on the importance of decolonial thinking for our discipline, and bring proposals of alternative theories that can be helpful for us as HCI researchers in understanding our complex role in the world. We conclude with our thoughts on how using this way of thinking has allowed us to reflect on this knotty dilemma, and advocate for other researchers to take time to reflect and understand their own complicity in this issue as well.

9.2 From Wicked Problems to Wicked Cycles

The notion of wicked problems has been around for over four decades (Rittel and Webber, 1973). They appeared in response to *engineering approaches* to policy-making, where problems are seen as "definable and solutions are verifiable" (Head et al., 2008, p. 102), but are not necessarily corresponding to current global phenomena and dynamics. Thus, wicked problems have no definitive formulation nor solution(s) (Rittel and Webber, 1973). They are complex, unique, non-linear, with multiple causes and actors involved (hence, with high levels of divergence in knowledge and values) and not necessarily solely relying on *scientific certitude* (Rittel and Webber, 1973; Peters, 2017; Head et al., 2008). Wicked problems are often not isolated, but are interlinked with each other (e.g., mining and technology use) which has resulted in the coining of the term *super wicked problems*, where climate change (or the climate crisis) is seen as the most representative example (Levin et al., 2012). Based on this interconnected nature of various wicked problems, we see these individually complex issues not just as interlinked, but as developing into wicked cycles. This relates to, for example, when one wicked problem (such as mining in

the Amazon) is part of, and affected by, other wicked problems such as the climate crisis, which in turn then exacerbates other issues (for instance, negative impacts on peoples' livelihoods). Instead of realizing this and making change though, in a wicked cycle, these processes and impacts continue indefinitely, and are further exacerbated through western notions of capitalism (e.g., the making and use of new technologies, which in turn requires additional mining in the Amazon).

In the following sections, we bring together two disparate but intertwined wicked problems: (1) environmental destruction and its effects on indigenous communities in the Amazon; and (2) the need for communication technologies and infrastructures of these same affected communities to continue the fight for their rights and environmental protections. We hope, throughout the paper, to make clear how they are not independent problems but how they perpetuate one another, turning the individual wicked problems into a wicked cycle.

9.2.1 On modernity/coloniality and technologies

The global, multiple and heterogeneous, structures of coloniality did not vanish with the "juridical-political decolonization of the periphery" Grosfoguel (2011). This means colonial dynamics are still in place even though legally binding colonial rule is no longer present. Such a perspective is also supported by other decolonial thinkers in Latin America (Mignolo and Walsh, 2018; Quijano, 2007; Grosfoguel, 2011). This is further impacted by universalism being pushed as the dominant conceptual notion through which Western structures of life and knowledge have hegemonically been established around the globe, forming what is known as the *colonial matrix of power* (Quijano, 2007). Grosfoguel describes how this process of on-going coloniality has sustained old hierarchical structures which follow the dynamics of current capitalist accumulation processes and global division of labor (Grosfoguel, 2011). This continuous reinforcing of hierarchies creates a condition of coloniality, where coloniality is seen as constitutive of modernity and often referenced as a combined notion: *modernity/coloniality* (Quijano, 2007; Mignolo, 2007b; Escobar, 2004). Modernity/coloniality is understood as the general state of the world, in which judicial colonialism is over, but has structured the world as we

see it today. Modernity is coloniality. The essence of this paper is about the global economic cycles of mining and the development of more and more new technologies - because of this, the issue of modernity is central to our argument and we have chosen to use the dual-use of modernity/coloniality throughout.

Colonialism and the colonial matrix of power have structured the world and the global economic system into *centers* and *peripheries*, as explained in Wallerstein's World System Analysis (Wallerstein, 2004). The centers are countries focused on high-wage and high-skill production, and the peripheries of the world focus on labor-intensive, low-wage, and low-skill production and exploitation of raw materials. This structure has been developing since at least the first century of colonisation in Latin America (from the end of the 1400s to the end of 1800s). Until the year 1660, 185,000 kilos of gold and 16 million kilos of silver (not including smuggled goods that escaped counting) landed at the Port of Spain, exceeding three times the total European reserves (Hamilton et al., 1934 as cited in Galeano, 1987). This exportation continued for five hundred years during the colonial era and has left its impacts on our contemporary world as a part of modernity/coloniality (Aráoz, 2020). During the colonial times, mercury was already used to discover silver and gold within the earth. According to Maria da Conceição Tavares (2000) these economic dynamics enable *growth outward*. This means, for example, that countries in Europe (the center) use their primary products to grow inward, using their internal and external natural resources for internal growth. At the same time, countries in the periphery would use their primary products to be used for growth outwardly, exporting their natural resources to the center, while importing most of the technological goods which are also produced by the center (perhaps from their same resources that they first exported). Several Latin American countries have gone through phases and developments such as these, resulting in unbalanced power-relations in the physical and our current digital world.

Others (Badimo, 2005; Baumüller, 2012; Furuholt and Matotay, 2011) argue that a lack of technologies and/or access to knowledge may be part of the cause for poverty at the systemic rather than individual scale, and that access to technologies can, in turn, reduce issues like poverty. Furthermore, the positioning strategies of

the Global North and their one-size-fits-all, center-focused, and techno-solutionistic approaches, market them as being successful around the world, including Latin America. However, for Vieira Pinto (Vieira Pinto, 2005), technology transfer from one community to another can also be a mistake, similar to how importing technology does not directly lead to development. Bringing this approach to technologies together with an understanding of "growth outward" helps us see that countries in the center try to develop countries in the periphery with technologies that aim to solve local problems, even if those problems were caused by the exploitation of local resources to build those same technologies in the first place.

This also directly links to the mining of minerals and metals in the periphery destined for technological advancement in the center, which impacts industry, research, and academic HCI practices. HCI has started to grapple with issues of colonialism theoretically through explorations of post-colonial computing (Irani et al., 2010) and decolonial computing (Ali, 2014), but have also started to apply some of this thinking in various countries such as Bangladesh (Sultana and Ahmed, 2019). Building on this, and by looking into mining as part of modernity/coloniality through the lenses of decolonial thinking, helps us get a more context-based and grounded perspective of it. It allows us to explore the power relations embedded, not only among humans but with the natural environment, along with its (direct and indirect) dynamics and effects. It also allows us, for example, to understand more carefully where technology production is placed within this ecology. Lastly and importantly though, it helps us reconfigure our roles as HCI researchers in modernity/coloniality.

To tackle technology's role in coloniality, Varsavsky proposes to first define the kind of society we want to live in: a *people-centered* or *business-centric* one (Varsavsky, 1974). Each of these societies then must have their own technological style, if we want to get out of the problem represented by Western, solutions-oriented and capitalist technological practices (which may include cultural domination, economic dependence, or environmental pollution, etc.). Instead of relying on inward and outward growth, he suggests for the periphery to design their own technologies and technology-related and -oriented policies [Ibid.]. Vieira Pinto, in 1973, defended that "whatever the degree of development, every social group has enough technology to

face nature and obtain from it the necessary production to live" (Vieira Pinto, 2005, p. 297). He believed that cultural diversity contains the intellectual and creative conditions to incorporate modern science and create their own advanced technology, no matter how crude the technological stage may seem.

9.2.2 Crisis, Tensions, and Making Space

To better grapple with multifaceted impacts of mining in the Amazon rainforest, we also need to engage with critical research in HCI for sustainability. We do not attempt to present answers to the questions raised and being dealt with in this community by presenting our reading of decolonial thinkers; rather this is our way of holding tensions and "staying with the trouble" (Haraway, 2016) presented by these extensive bodies of work.

HCI has a strong history of sustainable computing research, exploring how computing and design can contribute to sustainability and unsustainability. For example, Mankoff et al. (2007) distinguish between sustainability *through* design and sustainability *in* design. On the one hand, sustainability *through* design includes attempts to influence people and persuade them to adopt more sustainable behaviors such as reduced energy consumption and encourage carpooling [Ibid.]. Such approaches have been criticized for focusing on individual behavior and reliance on simple heuristics for (un)sustainable behavior such as the number of car trips someone may take. However, researchers have pointed out that (un)sustainability and climate change or other non-individualistic climate change issues are social or systemic challenges. Individual behavior change targeting simple heuristics is unlikely or even unable to address these bigger issues appropriately.

Researchers are asking for a change of scale in this subfield of HCI (Foth et al., 2009). Climate change issues are more complex than these kinds of simple heuristics make them seem; what might on the surface seem like an appropriate behavior can have unintended negative consequences (Silberman and Tomlinson, 2010). Sustainability through design perceives the design of technologies as an appropriate response to sustainability issues, even in the face of planet-wide destruction and the

real possibility of the *end of the world* as we know it, perceiving this to be a call for *imminent action* by the HCI community (Fritsch et al., 2019).

On the other hand, sustainability *in* design addresses questions of how the design of technologies directly contributes to unsustainability and environmental destruction and how this can be minimized. Studies under this umbrella research the negative consequences to the environment based on our technology use and its design. Research on this includes, for example, energy use of digital technologies and looking for ways to reduce these consequences (Widdicks et al., 2019). Others have explored topics like designing with waste (Dew and Rosner, 2019).

Several authors have taken more critical stances regarding the supportive role of HCI research and design in matters of (un) sustainability, climate change, and ecological destruction. (Silberman et al., 2014), for example, have criticized HCI's bias towards novelty as being in direct conflict with sustainability goals. Pointing to the complicity of HCI in contributing to unsustainability and environmental destruction, authors have pointed out that implications for HCI can relate to not designing technologies at all, or even to remove technologies from settings and contexts (Baumer and Silberman, 2011a). By taking the systemic nature of ecological unsustainability and its disastrous consequences seriously, others have explored what the role of design can be when experiencing existential crisis (Light et al., 2017a; Light et al., 2017b) or the possible end of the world (Fritsch et al., 2019). These authors argue that doing so, while also being very mindful not to provide *quick fixes*, requires for us to break with some central tenets of HCI: such as our focus on users as different from us designers, breaking with a focus on humans (or animals, for that matter) altogether, and instead to pay attention to ecological-technical interaction. This way of working, they argue, is necessary in the Anthropocene, where all beings are affected by human technology without having a choice. We align ourselves with these concerns and expand on them by highlighting a specific tension at the foundation of our profession and craft. The violence and destruction caused by the mining of minerals and metals, and our dependence on them to build our computing infrastructures.

Overall, research on sustainability and issues related to colonialism and coloniality has grappled with its effects, such as issues of environmental destruction around the world in a large array of contexts, countries, and uses of technologies. In this paper, we are using a decolonial lens to explore the space where both of these discourses meet: technology and their design processes in a time of existential crisis (Light et al., 2017a; Light et al., 2017b).

We want this paper to give us space to hold tensions on the environmental destruction dilemmas we are faced with and our complicity with them. As HCI researchers, we use and also research the design and development of novel digital technologies. But in this paper we also embrace the uncertainty in HCI research (Soden et al., 2020), hold tensions of our own histories and the discomfort of our complicity in the violence perpetuated in Indigenous and otherwise marginalised communities who live in the places where ecological crises are most likely to strike.

9.3 The Dilemma: Mining, Telecommunication, and Community Needs

The destruction in the Amazon is part of the foundation for the development thriving outside of it. Communities in the Amazon region are affected by a series of issues including government negligence, invasion of their land, deployment of big enterprises, and deforestation (Rorato et al., 2020). During 2019, fires destroyed 9700 km2 of the Amazon Rainforest in Brazil – an increase of 30% over recent years (Escobar, 2019). By May 2020, this number was doubled (Mesquita, 2020), by the end of 2020 rose again by 9.5% (BBC, 2020), and by March 2021 deforestation was considered the highest in 10 years (Ansa, 2021). The majority of the fires were man made, to convert rainforest into economically usable land.

At the same time fewer inspectors work in the Amazon since the Brazilian government decreased environmental controls (Betim, 2019). There are now fewer than 700 environmental inspectors in an area that is bigger than the land of the European Union (Gortázar, 2021). Such environmentally destructive practices and

government controls are spurred on by a rhetoric of *development* associated with Brazilian President Jair Bolsonaro. His government aims to open protected and Indigenous forest for mines (Kotscho, 2021) and argues that this development will bring jobs and reduce poverty, which in turn, he suggests, will somehow decrease deforestation (Phillips, 2020b). In 2019, Bolsonaro proposed a mining bill that if approved would affect, counting only the current mining requests, between 47% to 87% of Indigenous lands (Rorato et al., 2020; Associação Hutukara and Associação Wanasseduume, 2021; Raquel, 2021). Many of the people living in those areas fear for their lives and livelihoods, as with the destruction of their land comes the end of their way of life (Lopes and Botsford, 2019; Ramos et al., 2020).

Furthermore, in 2019, it was also reported that the violence due to illegal mining and its occupations has increased considerably (more than doubled) compared to 2018 (cimi, 2019). Violence also occurs in several mining companies investigated, not only for environmental crimes, but also for keeping workers in situations similar to slavery (Aranha, 2018). In 2021 the covid-19 pandemic is yet another crisis that exacerbates these concerns. At this time, the Indigenous Tembés community calls attention to the fact that if they stay, they are killed by the invaders, and if they go to the city, they are killed by COVID-19 (Neto, 2021).

In the Amazon region and over the period of more than half a century, these catastrophes however are not only caused by deforestation and legal large-scale mining (Campagnani, 2016; Fearnside, 2010; Pinto, 2021), which occupies 17% of the Amazon rainforest. They are augmented further by illegal ASM, which occupies 17% of protected areas and 10% of indigenous lands (RAISG, 2020; Maurício, 2020). The Amazon has almost five thousand identified locations where illegal mining is practiced (Angelo, 2020) with a particular focus on the extraction and search for precious minerals and metals. During the Covid-19 pandemic, 72% of the illegal ASM took place in protected areas (Fellet and Costa, 2019; *Em meio à Covid, 72% do garimpo na Amazônia foi em áreas protegidas. Greenpeace Brasil* 2020).

This kind of illegal and small-scale mining remains a main economic activity and functions as motivation for the migration of people (Tedesco, 2015). Bad living

conditions for these migrant workers in areas where ASM occurs, mean that these areas often also become centers for the spread of diseases like malaria, leishmaniasis, hepatitis, tuberculosis and HIV (Freitas, 2016). In South Africa, for example, it was found that the migration of miners and their spending of long times away from their homes increased their likelihood of contracting and ultimately spreading HIV (Corno and de Walque, 2012). Similarly, in the Amazon an increase in sex work has been found, resulting in the migration of people of all genders to the mine, which could explain the increase of HIV infection among those living near them (Tedesco, 2015; Freitas, 2016).

Mining in the Amazon region not only broke deforestation records in the last two years (Modelli, 2020), but has also caused wide-spread mercury contamination. Fish, even those sold far away from the contaminated areas, were found with high levels of mercury (Costa Junior et al., 2017; Pinheiro et al., 2000; Khoury et al., 2013; Arrifano, 2011). This contamination has caused clinical and neurological impacts associated with exposure to mercury levels in populations in the whole Amazon through water, air, or the high levels found in the fish that are eaten by the locals (Rorato et al., 2020).

9.3.1 Ribeirinho Communities in Acará

The Amazon rainforest is home to a large number of communities, including several hundred Indigenous ethnicities, *quilombolas* (communities of former slaves), *ribeirinhos* (communities living alongside the rivers who are not Indigenous, even though they follow some similar traditional ways of life), and other traditional communities. They are communities affected by government negligence, increased incursion by outside capitalist enterprise, and under increasing pressure to become *modern* (reflected in the deforestation and development agenda pursued by the government - see e.g, Boadle, 2020; Phillips, 2020a; Greenfield, 2021). Modernisation and the rhetoric of development that frequently accompanies economic incursion, is certainly not universally accepted within the communities. Rather, for many, it holds potentially disastrous consequences. Nevertheless, modern technologies such as smartphones and the internet continue to reach remote communities in the region:

creating new opportunities and new challenges for the environment and the diverse communities living there.

For several years, the first author worked with members of a specific ribeirinho community in the Brazilian state of Pará, called Boa Vista do Acará – based along the shores of a river. As mentioned above, ribeirinhos are part of the Amazon's non-Indigenous rural populations, numbering approximately 951,000 people (Oliveira and Fridrun, 2006). They are also one of Brazil's most economically marginalized groups (Ribeiro, 1995). Despite economic marginalization, they have a rich local culture of herbal traditional remedies and healing rituals, agricultural production, and the processing of local plants such as cassava and açaí.

Fishing is a common stream of income and food for people in the village and wider region. As the organizer of ecological and permacultural workshops with Boa Vista do Acará, the first author was trying to find ways to increase the communitys' autonomy. In conversations with two different friends from this community, one whose house is next to a river and the other who has a *popopo* (a traditional slow boat) to transport people and goods on the river, the first author heard about the need for help with the construction of fish-farming adaptations in their backyards. They both had already started digging on their land, putting fish into the newly created ponds in an attempt to farm them. However, they had not succeeded. The first author was puzzled: they both had easy access to the river to catch wild fish, so why were they not using that advantage and wanted to farm fish in a pond instead? After further conversations, the first author learnt that, yes, the river was once a rich source of fishing for food and income, but for the last years the large fish had seemingly disappeared and the community was only able to catch very small fish.

9.3.2 Mining Activities related to Technology Production and its Consequences

The rivers around the community of Boa Vista do Acará and the neighbouring quilombola community Guajará Mirim are connected to the Mucurupi river. This larger river flows along the city of Barcarena. Barcarena, located only about 30km

West of Boa Vista do Acará, is home to a Norwegian mining operation with two industrial centers: (1) Alunorte, the largest alumina (the raw material for aluminium) refinery in the world outside of China since 1995; and (2) Albras, the largest producer of primary aluminium (bauxite) in Brazil, which has been feeding domestic and external markets since 1985 (Alunorte, n.d.). Aluminium is everywhere, with the most common applications being in power lines, telecommunications, high-rise buildings, spacecraft components, or consumer electronics. Manufacturers of electronics are using it primarily for cooling CPU and graphics processors, but newer models of electronics are also using aluminium bodies and casing components (Flagel, 2020), specifically because it is 100% infinitely recyclable (Association, n.d.). Thus, also the computing infrastructure at the center of HCI depends on aluminium mining operations like the one in Barcarena.

However, even though the operation of Barcarena is official and supposedly legal, and does not constitute informal or illegal ASM, it has been connected to various instances of environmental catastrophes. For example, in Barcarena, some confirmed cases of water contamination by toxic metal waste have been identified in the rivers near the city in 2003, 2009 and 2018 (Rodrigues, 2018b; Nogueira, 2018; Rodrigues, 2018a; Moser, 2013). While it is crucial to point out that a clear link to the disappearance of fish in the river of Boa Vista do Acará has not been yet established, it is possible to imagine it as a consequence of the mining operation and the pollution that occurs in Barcarena (see the following for more details (Phillips, 2018)). And regardless of official research associated with this, the communities directly around Barcarena have certainly suffered the consequences (Barbosa, 2018; Gama, 2018). As shown in the previous sections, mining embodies the visions of development related to modernity and coloniality and it has been associated with disastrous consequences at both social and environmental levels in various territories in the Amazon region. Despite us not being able to pinpoint evidence for the specific case of Acará due to limitations on available data, the effects documented in other communities in the Amazon are worrisome (Ribeiro, 2021) and more specifically, the livelihood of the community of Boa Vista do Acará as well as their independence and food sovereignty have potentially been negatively affected.

As explained previously, Acará and similar Amazonian communities are under pressure to modernize and *develop*. The inhabitants of Acará have made very clear what kind of development they would want throughout the first author's long-standing collaboration with them (de Castro Leal et al., 2021). In a passionate speech the first author witnessed in 2016, a young woman stated that, as a community, they want to continue their way of life, to maintain their practices while also living relatively independent of the nearby city. However, it has become harder and harder to keep this independence since people are driven to look for work in the city or even further away, pressured to do so, for example, by the disappearance of fish.

To relieve their pressures somewhat, the community have been looking towards digital technologies, especially to improve their internet access for information, knowledge, and routes to advocacy in local government. Furthermore, they are hoping technologies will ease access to healthcare and education for their children, as well as to generate possible new income streams or to promote and increase the sales of their goods. To support them in this effort, the first author has previously collaborated by connecting the village of Acará to the internet network of the federal university in the area (Castro Leal and Wulf, 2018).

Together, the community and the first author started an organization called co-Nectar[2] in 2016, which manages the collaboration with the university as well as the local infrastructure. The organization attempts to further expand this community network to neighbouring towns, villages, and communities. People in Acará have since changed their economic practices. For instance, they have gone from selling agricultural products wholesale to sell these to individual customers or coordinating their activities via WhatsApp rather than spending the day at the market in the city. They have also started to engage in their form of e-commerce, selling various goods regionally via messenger services, organizing logistics networks across the region including friends, family, and mobile phones. Others have engaged in online activism on Facebook and WhatsApp to mobilize resistance against environmental destruction by energy companies (de Castro Leal et al., 2021).

[2]https://coletivo-co-nectar.webflow.io/

Their use of mobile phones and internet to achieve the desired level of indepence and their own vision of development is ironic, tragic, and circular. It is a wicked cycle: cellphones and internet infrastructures help them resist changes and negative impacts brought by development, such as power lines and mining. Yet these advocacy tools to counter environmental destruction, potential health impacts, and resulting loss of income depend on the very raw materials produced through the mining which is constitutive of the development in the nearby community.

9.4 Discussion: Disentangling Wicked Cycles

Through this article we do not aim to legitimize the idea of going back to the Stone Age (even if the stones and its derivatives are what we need most nowadays for the production of technology). Instead, we argue to pay more, and careful, attention to our dependency on minerals and metals. The speed of development, as defined by modernity and coloniality, and the ways in which it occurs in communities in the Amazon is frightening. Local natural and ecological resources are the main source of local communities' sustenance. However, in areas where valuable minerals and metals are found, the development arrives through trees being cut down, lakes and rivers being polluted, increasing inequality, and slow removal of local communities from their food and land sovereignty, traditions, and social relations, making them more and more dependent on external markets. Despite the connection to mining and the associated destruction, the wish for and use of digital, mineral-based technologies is by no means the product of flawed reasoning, but a sensible and effective strategy. In the community of Boa Vista we have witnessed the impact mobile phones have had, not least on their economic independence. We also know that Boa Vista is not the only community who is simultaneously struggling with the impacts of mining and using technologies to their advantage. Elsewhere mobile phones are used extensively to document and fight incursion into protected and indigenous lands (RFCX, n.d.). Mobile phones can clearly be powerful tools in fighting for one's own vision of development and against economic destruction.

The writing process of this paper offered us a space to hold these tensions and understand further the violence we are contributing to as HCI researchers within

global technological supply chains and its deep impacts. This is an issue that has been partially reflected upon by previous researchers and that we considered as part of a wicked cycle. For Araoz, *modern colonial mining* and *technological advances* "are, in fact, the perfecting of the art of war" (Aráoz, 2020, p. 13) which has led us to environmental crisis. This crisis forces us, now, to understand and accept the existence of interconnected worlds; to acknowledge an understanding of the world which is radically different from those of western contemporaries (de Castro, 1998; De la Cadena, 2015; Krenak, 2019a). Following their ideas, we must re-envision design and technologies as design for different ontologies (Hui, 2019; Escobar, 2018), and for understanding the pluriverse as an alternative to the unique universal ontology of one world: a "world in which many worlds fit" (Cadena and Blaser, 2018, p. 10). As a result, we do not provide the customary guidelines or implications for design researchers at the end of the paper. Instead, we raise unanswerable questions to help us think through this, and other similar, dilemmas. We do not give clear solutions to these, but rather provide alternative views of what could be if we lived in a true pluriverse where we meaningfully apply these kinds of critical thoughts to our HCI research. Through these questions and theories, we aim to provide room for others to reflect, to acknowledge our complicity, and to create common spaces for meaningful and respectful action.

The dilemma we introduced through Boa Vista do Acará illustrates several of the actors, relations, and dynamics which hint at global colonial structures of power (Quijano, 2000), and how they specifically play out in the region. We have the *Global North*, in this case, represented by a European company conducting an economic extractivist activity, mining, in a *Global South* territory. The Amazon territory is the place having been exploited for its resources (human and nature) for a long time. Some of its environmental destruction has been documented, including mining which has diverse scales of impact not only in Boa Vista but also in other places of the Amazon region. Developmentalist discourses have promoted these activities as strategies of growth and modernization where the production and use of technology is core to the narrative. These ideas have been prioritized by the government and other actors over more nature-protective forms of dialogue as well as use of nature and its resources as part of the practices of various local communities (ribeirinhos,

quilombos, and Indigenous communities). At the same time, the communities are also aiming to have access to telecommunications, internet infrastructures, and other technologies. It is at this point that we should, as technology researchers, stop and question our practices and roles.

As authors, what we learn from this dilemma and decolonial ways of thinking is that our usual, Western, approach to research and design is not the right way of understanding and dealing with wicked cycles. Changing or adapting our practices will not be enough to tackle these global problems. The scale of change is different to our more traditional research projects in HCI, particularly those that relate to local communities and their empowerment. While the immediate needs of the ribeirinho community with which the first author has worked for many years are important, the level of thinking in this paper does not relate to the local level. Nor does it really relate to the systems level of understanding the use of technologies and their impacts on the community and its surroundings in Brazil. Rather, we are thinking at the scale of global economic change, and the impacts of colonization, coloniality, extractive policies, and the impact of growth culture in the technology sector (and elsewhere).

It is still unclear to us, as authors, what we can practically do to engage in this kind of global change in our economies - perhaps that is why this years' Communities and Technologies conference theme "Wicked Problems in the Age of Tech" felt like the right venue for our thinking. We feel that decolonial ways of thinking have helped us reflect further on some of these issues and want to offer up a similar feeling of (dis)comfort to readers of this paper that we had as a team of co-authors while discussing and working on this paper. Below, we present three different frameworks of thinking that we have discovered in our search for holding tensions, crises, and feelings of discomfort at the intersection of ecological destruction, local community needs in response to the climate crisis, and their need for technologies that created many of these crises in the first place: Ecofeminist Perspectives, Design as Conviviality, and reflections on the Speed of Development. We present these frameworks as potential alternative starting points for others as part of a pluriversal

worldview (Cadena and Blaser, 2018), and hope they will be helpful for thinking through some of the wicked cycles in your own research.

9.4.1 Ecofeminist Perspectives

Industrial agriculture and mining embody a relation to soil that is purely extractivist and profit-oriented, rather than reciprocal. Mining operations not only modify the landscape and erode the soil but also lead rapidly to its desertification and sterilization. It takes minerals without giving or caring for the reproductive capacity of what is physically above the minerals (Lynas, 2018). Vandana Shiva (1988) provides us insight into alternative ways of understanding, working with, and being with the soil. Learning from this ecofeminist lens, we can start to think not only about alternative farming and mining practices, but we can start to change our frame of reference for the extraction of materials from the soil.

Shiva focusses her analysis of colonialism and coloniality on Europe's wealth in the colonial era as largely based on the transfer of resources from the colonies to centers of imperialist power and the replacement of the colonies' biodiversity with monocultures and large mining operations for the production of raw materials for European industry (Shiva and Azevedo, 2003). She argues that this domination, violation, and exploitation of the colonies' nature and people lead to their reduction of nature and people into objects of knowledge rather than recognizing them as beings with agency and rights. Such vision over them was imposed when they were conquered by Western patriarchal structures and systems as part of colonial rule. In Shiva (1988), Carolyn Merchant (1980) relates this reduction to a change in the ways in which we understand nature: from a nurturing *mother figure* to the manipulable matter, which is then, of course, also well-suited to the exploitation of capitalist growth.

Drawing on this theory, what would happen if our relationship to soil would be reciprocal, and not based on such Western scientific ideas around binaries and fragmentations[3]? What if we respected or even worshipped the reproductive poten-

[3]Together with the Western industrial revolution, the Western scientific revolution "transformed nature from terra mater into a machine and a source of raw material" (Shiva, 1988, p. xiv). Such

tials of the land, how would it affect mining? Would mining be possible at all? Or, how would we need to adapt existing mining practices? And ultimately, how would answering these questions reconfigure our practices as researchers in a field in which the very tools we use and design are dependent on mining for their production?

9.4.2 Design as Conviviality

For many decades, philosophers and technicians have pointed towards technology's disastrous potential to disrupt humans' social relations (see e.g., Mumford, 1963; Meadows et al., 2004; Illich, 1973; Marcuse, 1941). These perspectives range from "enhancing each person's range of freedom" to build and create, all the way to an exploration of how technologies have transformed people into "mere consumers" (Illich, 1973, p. 12). Especially Ivan Illich highlights that our economy's need for endless expansion leads to the constant invention of new needs to which industry can respond with new products - creating cycles of needs (re)invention and technology development. As HCI researchers, we are also implicated in this constant need for (re)invention and expansion. Arguably, from a capitalist mindset, this is the ultimate goal for technologies, but Illich's thoughts come from a different perspective. He argues that what follows on from this way of being is an ever-growing dependency on metals and minerals and the destructive consequences of mining - we hope our paper has pointed to many of the ecological, social, and rights-based crises this can create.

To overcome this negative role of technology in society, Illich proposes the concept of *Tools for Conviviality*. He believes that science and technology could be enlisted in the service of more efficacious convivial tools and designs, so that technology serves humans rather than humans being at the service of machines and their societal instrumentations. Some scholars already explored the implications of conviviality for HCI and design (see e.g., Nardi and O'Day, 2000; Caire, 2009; Kell, 2020; Escobar, 2018), pointing out the importance of tools that guarantee

transformation was based on Bacon's contribution to modern science (1561-1626) (see more for discussion Bacon, 1960), which enforced the separation between superstition and rationality, creating binaries such as: "male and female, mind and matter, objective and subjective, rational and emotional, and a conjunction of masculine and scientific dominating over nature, women and the non-west" (Shiva, 1988, p. 15).

freedom and autonomy, eliminating the need for slaves or masters, but limiting the freedom tools are afforded when the freedom of some comes at the expense of the freedom of others or for the capacities of the environment. Computing technologies certainly expand the freedom (of some), but because of the violence and destruction associated with the mining for technology's building blocks, this freedom comes at the expense of nature and of the freedom of communities impacted in different ways by mining.

To slow down world-wide extraction of metals we believe Illich's ideas hold some crucial lessons not just for the design of new individual tools but for the reform of the global digital economy as a whole. How could we, not as individual designers and researchers but as the HCI community, detach ourselves from the need for constant innovation and contribute to conviviality instead? Can we create digital technologies that offer a *better* life for all, without limiting freedom of others or the regeneration of the environment?

9.4.3 Understanding the Speed of Development by detaching Science from Technology

We have seen traditional communities in the Amazon region using and making tools that have been passed through generations and used for economic maintenance and social strengthening[4]. Nardi and O'Day (2000) say that in traditional communities, where tools and technologies do not change quickly, "tool use is learned in interaction with others, not through manipulations staged by unseen designers." The slow speed of technology transformation helps local environmental preservation in contrast to several environmental deteriorations derived from modern lifestyles, such as one that is known by some Brazilian natives as the "people of merchandise" (Kopenawa and Albert, 2015, p. 37), who have an unhealthy relationship with the Earth and represent a threat to them. For some scholars, the speed of technological evolution and its understanding can lead us to reorient our civilization and under-

[4]Tools like *tipiti*, used to squeeze out the juice from the cassava, are made with local resources and passed through generations.

stand society, culture, and ourselves (Mumford, 1963; Cassirer and Lofts, 1930; Hui, 2019).

Varsavsky (1974) proposes that if we want to get out of the problem presented by capitalist technological practices (such as cultural domination, economic dependence, environmental pollution, among others), each type of society must develop its own *technological style*. Vieira Pinto adds that cultural diversity has the intellectual and creative conditions to incorporate modern science and create their own advanced technology without technology transfer processes, no matter how crude the technological stage seems. With this, he critiques globalization and argues that each community has the technological resources to meet their own needs (Vieira Pinto, 2005, p. 297). To understand this kind of development of communities and technologies, we look towards Krenak (2020), a Brazilian Indigenous thinker and leader, whose land was impacted by 50 million cubic meters of mining tailings (Phillips, 2016). He argues that with the arrival of modernity and technologies, science and knowledge were placed in *secret places*, places of exclusivity. People, mostly scientists, "took the voice of science," treating knowledge almost as their exclusive asset, aiming to do the "job of bringing us to this place that we call modernity." He argues that technology can end up being confused with science, not because they are the same, but because they develop alongside one another (Krenak, 2020). Nowadays, what is possible to find in communities like the Amazon region is technological dependence and overexploitation of the natural resources and workforce (Breda, 2019). Krenak says that: "With the advent of industrialization, technology skyrocketed in front of science and started to govern the world we inhabit" (Krenak, 2020).

This distinction between science and technologies is important, because science has a voice that is sensitive to the complexity of the ecology of the planet. Technology instead can be understood as being *in a hurry* to anticipate ideas of progress and the future. As Krenak says: "Technology is the tool of time." From the moment that companies approached universities to encourage research, universities started to commit to the production of responses, devices, and technologies to meet an external demand. Arguably, this is a demand of "the 'people of merchandise' not that of the 'people of knowledge'" (Krenak, 2020). To counter this history in HCI and

beyond, we need a new orientation of science and technology towards "the organic, the gentle, the non-violent, the elegant and beautiful" (Schumacher, 1973, p. 35). We must look for ways to find solutions which reverse the destructive direction that now threaten not only Indigenous people and communities like Acará, but us all.

Building on these thoughts: What if we thought about resources as localized, where only local communities and peoples are able to fairly and justly use them? What if technological development went at a speed that was relational to the speed of environmental regeneration and local practices? And finally, what impacts would this alternative world have on our practice as HCI researchers?

9.5 Conclusions

Decolonial thinking can help us better understand and complicate notions of development and mining, particularly in the Latin American context. It helps to evaluate the impacts of mining, both large-scale and ASM, as the results of a historical extractivist practice which perpetuates colonial structures and dynamics in what we usually understand as post-colonial contexts. Of course, these issues also have wide environmental justice repercussions on the communities who are part of and impacted by it. However, decolonial thinking also allows us as HCI researchers to critically acknowledge the “colonial matrix of power” (Quijano, 2007) in which the research we carry out with communities in *Global South* countries are embedded. It allows us to unpick aspects and issues of our role and address our perpetuation of colonial practices. It gives us tools to reflect on how our research steps, from the funding source, the topic selection, the community we engage with, to the shape in which the research is implemented, as well as its outcomes, is deeply embedded in coloniality and contributes to destructive processes at the foundation of our discipline, but outside our daily view. This is true not only for those of us who engage with mining or communities affected by mining, but all of us. This presents a fundamental problem to our discipline, and our usual tools of researching and designing interaction with technology are not appropriate to address them. We explicitly refrain from presenting easy ways out of this deeply uncomfortable situation. The questions we raise at the end of each of the sections in the discussion

are only a start to think together about how we can address our complicity, and relate to alternative worldviews of environmental justice relevant when thinking about the future of the planet. And we would like to see future papers drawing out long reflections from differing perspectives from them. They could be reflected upon as a suggested premise that human subsistence cannot be prioritized without also considering the priorities of nature (Gebara, 1997, p. 60). At the end, one of the central cores of ecofeminism (and also decolonial thinking) is the interdependence that exists among all beings [Ibid.].

In recent decades work in HCI on issues of sustainability has also explored the complicity of our discipline in contributing to *un*-sustainability, and its complicated role in matters of the anthropocene, as mentioned above. We contribute to this body of work through engagement with the issue of mining, hoping to deepen our understanding of this complicity and enable the development of an appropriate response. To this end, we bring together decolonial thinking in computing, bringing a specific dilemma to think through some of the complexities associated with HCI4D and critical sustainability. In the discussion we have also presented alternative frameworks that we can use to think about research when working with wicked problems and as part of wicked cycles. We realise this paper puts forward a radical perspective, one that strives to address a global system without a solution. But that is why this paper is important. In HCI, we do not only need to engage with wicked problems, but also with the complexities that arise out of wicked cycles. Our paper presents a dilemma that encapsulates what we call wicked cycles. Through the analysis at the global systems scale it allows us to tie further knots to think through our role as HCI researchers rather than untying knots as would be traditional and pragmatic in HCI research. We must do this to hold tensions, to understand our role in the climate crisis and its multifaceted socio-political and socio-technical consequences, and to explore our deeper engagement with the impacts of our research at the community level. Aráoz (2020) calls for a revolution that allows us to reverse the perverse *mining-dehumanization* process and find ways to recognise us as the humus of Mother Earth. After all, we don't have to just *stay with* the trouble as HCI researchers, we have to understand that *we are* the trouble.

10

HCI's Role in the Capitalocene: Lessons Learned from an HCI Master Course Across the Globe

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Abstract. *Various concepts have attempted to capture the nature of the contemporary political-economic system of globalised capitalism and its disastrous consequences for the planet, including World System Analysis or the Capitalocene. Especially Decolonial thinkers see its roots in colonialism. The resulting modernity/coloniality structures many aspects of human life everywhere, including gender identities, relationships amongst humans and with nature. Technology plays a vital part, requiring reflections on how HCI researchers can react to these challenges. In a class of an HCI master program, we have attempted to jointly begin to understand HCI's role in the capitalocene by studying relevant concepts and empirically investigating specific local yet connected phenomena. With participants being distributed across the globe, we were able to study different shared yet locally specific phenomena inspired by multi-sited ethnography. In this paper, we report on the structure and experience of the class as well as our findings.*

10.1 Introduction

This paper aims to show how a semester-long class in an HCI master's program can develop responses to the crisis of the Anthropocene. With our class, we try to fill what we perceived as a gap in the education of HCI scholars as future designers. We believe to fill some of the gap with concepts, activities, and dialogue that generated projects elaborated by the students. Through that process we believe we can find ways in which HCI students can contribute to an emerging understanding of the role of HCI in this crisis, building on their personal experiences. We believe that the combination of 1) concepts that explain the crisis, 2) concepts of HCI and 3) personal interests is a tool to play a positive role in the crisis of the Anthropocene, as part of their future profession.

Although rightfully contested, the idea of the Anthropocene (Crutzen, 2006), and its critical cousin, the Capitalocene (Moore, 2017), accurately capture the home-made crisis our planet is facing at the beginning of the third millennium. It describes the planetary, interconnected and complex nature of processes through which the face of the planet earth is shaped by human activity, resulting in climate change, massive loss of biodiversity, and ultimately threatening the possibility for life on earth, for humans and non-humans alike.

However, whereas the Anthropocene is relatively silent on how we arrived there, vaguely locating responsibility in all of humanity through the use of the word Anthropos, Greek for human, the idea of the Capitalocene, as the name suggests, locates the responsibility firmly in globalized capitalism and its need for *Cheap Nature* [Ibid.]. Therefore, responsibility for this crisis does not fall on all of humanity equally, but on a specific way of living on this planet – capitalism – which is rooted in legacies of colonialism and ongoing unequal global relations and exploitation. This crisis of modernity becomes evident in innumerable instances, from the loss of forests in central Europe to climate change and monocultural plantations (Levia et al., 2020), to deforestation in Brazil (to make way for farmland) (Garcia et al., 2021), oppression of minorities or women to racism, with roots in colonialism and slavery. It is perhaps the - at the time of writing - still ongoing global Covid-19

Pandemic which embodies this most vividly. Brought on by the destruction of nature and human incursion into wildlife habitats (Carrington, 2020b; Carrington, 2020a; Vidal, 2020; Carrington, 2020c) and spread rapidly around the planet with new mutations, the virus has found a perfect host in the globally connected and hyper-mobile humanity. The pandemic also affected education and hence our course, on which we will report in this paper, in some sense facilitating our multi-sited (Marcus, 1995) research, embodied by the projects the participants developed during the course.

HCI and the design of digital technologies undoubtedly play a significant role in the Capitalocene. However, this role is globally distributed. Its complexly systemic nature makes it challenging to grasp for HCI research, let alone decide how we as individual designers and as a discipline are to respond. In this context, some advocate a somewhat utopian vision of technology as a democratic solution to complex problems of human nature (Richard et al., 2015). Others criticize the tendency towards a certain over-reliance on *technosolutionism* (Lindtner et al., 2016). The answer, surely, lies somewhere in between: Research into Sustainable HCI (DiSalvo et al., 2010; Baumer and Silberman, 2011a; Silberman and Tomlinson, 2010; Silberman et al., 2014), for instance, has already made clear that HCI is not only part of the solution, but part of the problem, and through its use of physical resources and energy, digital technology severally contributes to unsustainability. Throughout the years, HCI scholars offered similar reflections about the manifold challenges HCI faces in a globalized world (Light et al., 2017a; Light et al., 2017b; Fritsch et al., 2019; Nardi and Ekbia, 2017). Examples also include notions on Value Sensitive Design (Friedman et al., 2008), Feminist HCI (Bardzell, 2010), Intersectional HCI (Rankin and Thomas, 2019; Rankin and Thomas, 2020), Postcolonial Computing (Irani et al., 2010), Decolonial Computing (Ali, 2016). Here lies the strength of HCI – its considerations of the social, societal, ecological, political, and ethical implications of technology in a globalized world (Hochheiser and Lazar, 2007).

However, such concepts are of less value if they are not reaching those who are potentially developing technology. As educators of (future) designers, universities arguably have a responsibility to draw their students' attention to such concepts

and sharpen their mindset in the process. We might require a drastic shift in HCI curricula, including ways to evaluate putative *knowledge* and opening up spaces in educational settings where diverse students can bring a growing body in their situated perspectives. Raising topics such as the ones mentioned above entails a transition of thinking *HCI standard education* or *one fits all solution of learning* to an HCI that matters to each student. It also demands building trust and rapport through sharing, getting to know the interest of one another, and aiming towards the development of something more critical for society. Eventually, it might mean confronting students (and lecturers) with topics they might feel uncomfortable about.

In this paper, we report the attempt to embed this need for change and transition into a graduate course we called "HCI for Transition" (HCI4T). The course is part of a master's program in Human-Computer Interaction. We introduced concepts and studies that explore and illustrate the challenges of the third Millenium and jointly attempted to understand HCI's role in the Capitalocene through four specific and globally distributed case studies conducted by the students. Due to the ongoing global pandemic, we found ourselves unable to convene and study in the same location but were distributed worldwide, from South America to North America, Europe, Africa and Asia. This allowed us to bring together locally specific perspectives and experiences on shared issues and explore similarities and differences in global phenomena manifestation.

The contribution of this paper is as followed: 1) We report on the setup of the course, including its conceptual foundations, as well as the various activities we conducted as part of our shared learning experience, and how these created a foundation for a mutual, collaborative and often a very personal learning experience. 2) We shortly present case studies from the students that were the base for their assessment to present the individual outcomes of the course. 3) We discuss our lessons learned, which form a basis for our subsequent proposal of ways for a more mindful HCI education and encourage other educators to pick up our experiences. The first three authors of this paper are the lecturers, and the last author is the supervising professor of the department, while the remaining co-authors attended the

course as students. As this is a personal report which reflects sentiments of everyone involved, the following descriptions will frequently use the term *we*. Where we try to separate the activities and experiences we use the terms *facilitators* and *participants* or *students* to show the respective perspective and avoid potential confusion for the reader.

10.2 Conceptual foundations

In recent decades, scholarship outside of HCI has with increasing urgency attempted to grasp and conceptualize the interconnected nature of crises humanity and the planet face. They hinted to aspects such as mass extinction of non-human life and loss of biodiversity, forced migration of millions of people (Sabie et al., 2019) from war, poverty and (directly or indirectly) consequences of the climate crisis, the often hostile response to migrants by for example the European Union as well increasing racism, discrimination and right-wing populist politics. Often, the idea of the Anthropocene serves as a successful starting point for such attempts. It was proposed in 2000 by meteorologist Paul Crutzen as a term for the current geological era, describing the central role humankind has come to play in shaping the planet and its ecosystem (Crutzen, 2006). Even though it did not yet gain acceptance as the geological epoch's de facto term, it has quickly gained popularity. However, it has also inspired substantial criticism, as we have alluded to in our introduction, and the creation of alternative terms, including the plantationocene (Haraway, 2015), the chthulucene [Ibid.], or the Capitalocene (Moore, 2017). While these terms are not meant as serious contesters as titles of the epoch, they embody specific critiques and ideas, making them tools to think with. For the sake of this class, we have primarily engaged with the critique embodied in the term Capitalocene. Proposed by Moore [Ibid.], the term does not deny the entanglement of human history and planetary history and the most profoundly destructive influence humans have on the planet but tries to address how we arrived there. Whereas the Anthropocene vaguely points to all of humanity as the culprit for the current state through its use of the term Anthropos, the Capitalocene strictly locates responsibility in global capitalism. It draws attention to the fact that not all humans have contributed to this crisis equally, but rather through globalized capitalism and its unequal global economic

relations, some contribute much more to this shaping of planet earth than others (e.g., through CO2 emissions, extractivism, mining, etc.). A specific mode of being on this planet and relating to it has led to the current state: global capitalism and its reliance on Cheap Nature. The term also points out that global capitalism is a historical process, with roots in colonialism that has led to what Wallerstein calls the modern (capitalist) world system (Wallerstein, 2004) and its division into centers and peripheries. Recent anthropological studies such as the work of Anna Tsing have aimed to empirically, ethnographically examine this world system, for example through the ethnographic study of supply chains (Tsing, 2009) such as those of the Matsutake mushroom (Tsing, 2015b).

Such conceptualizations of the World System and its investigation led us to decolonial thought, especially Latin American decolonial thought, including the work of e.g., (Walsh, 2010; Mignolo and Walsh, 2018; Grosfoguel, 2011; Quijano, 2007; Escobar, 1995). By studying the influences of historical colonialism, they point to the many ways in which colonialism shapes modern life. While historical colonialism has ended, its influence is ongoing as "Coloniality." Grosfoguel (2011) highlights how colonialism created a world system through the introduction of several hierarchies, including (amongst others) global class formations and an international division of labour, a global racial/ethnic hierarchy that privileges Europeans over others, a global gender hierarchy that privileges males over females and patriarchy over other gender relations, a global sexual hierarchy that privileges heterosexuality over homosexuality or other forms of sexuality, and a religious or spiritual hierarchy that privileges Christianity over other spiritualities and more. These hierarchies make up modernity. To highlight the impossibility of dissecting modernity from its colonial roots, they proposed the term modernity/coloniality, which we understood as a sister term to the Capitalocene as they refer to the same time and point to similar challenges. To further this line of thought and explore the role of racism, sexism, and discrimination in our time, we explored issues of diversity and the lack thereof and concepts that aim to address and remedy this inequality. We analyzed different facets of identity that shape people's lives and experiences (such as sex and gender, sexual orientation, ethnicity, socioeconomic and family status, physical abilities, religious, cultural and political beliefs, etc.) as well

as matters of intersectionality (which describe the nature of multiple oppressions) respectively multiple identities. The aim was to reflect on one owns gender identities to gain an understanding of being a gendered being as well as the implicit values, assumptions and stereotypes that come along with socialization. We also explored the several, often contested, forms of feminism which all examine at the very least the various reasons for gender inequality and share a similar understanding of emancipatory potential. While some forms of discrimination and violence, including the patriarchy, have existed in various ways before the onset of globalised capitalism, both the literature on Capitalocene as well as some decolonial literature including Ramon Grosfoguel (2011) introduced above argue, that colonialism has introduced specific forms of systemic discrimination, including sexism and racism, and that these make up an integral part of the Capitalocene or modernity/coloniality. Oyèrónké Oyeronke (1997), for example, has studied how colonialism has changed gender relations and gender discrimination for Nigerian Yoruba society. Others, such as ecofeminist Vandana Shiva and Azevedo (2003) have highlighted how colonialism and coloniality invalidate and eradicate other ways of knowing and belonging to the earth - a process that Sousa Santos terms epistemicide (Santos, 2008). Drawing on Carolyn Merchant (1980), for example, she makes the point that a shift from understanding earth as a nurturing mother to manipulatable matter, this facilitates exploitation and destruction in the capitalocene. The entanglement of various forms of discrimination, economic systems and environmental destruction are complex and deserve further attention. However, for our class we presented them as related issues, joined together in the Capitalocene, following the work of Moore (2017), Grosfoguel (2011), Oyeronke (1997), and Shiva and Azevedo (2003).

Throughout all of this exploration, we intended to link back to HCI work wherever possible to consider how the abovementioned notions influence design and usage of computing technologies. We dove into feminist HCI (e.g., Bardzell, 2010) and intersectional HCI (Rankin and Thomas, 2020; Rankin and Thomas, 2019), to understand how HCI scholarship and design addresses issues of gender and sexual discrimination. We explored post- and decolonial HCI (Irani et al., 2010; Ali, 2016) as well as the reliance of computing to mining and extractivism, including the violence and ecological destruction associated with it. We discussed sustainable HCI

(DiSalvo et al., 2010; Nardi and Ekbia, 2017) and examined attempts to include spirituality in HCI (Wyche et al., 2006; Woodruff et al., 2007; Markum and Toyama, 2020). Furthermore, we included research ethics and morals in general as well as methodological HCI considerations such as Participatory Action-Research (Freire, 1987; Kemmis et al., 2014; Fals Borda, 2009), Participatory Design (Björgvinsson et al., 2010) or Value Sensitive Design (Friedman et al., 2008).

Scholarship in HCI has also begun to address the global, complex, and interconnected nature of these challenges through a small number of publications (Light et al., 2017b; Light et al., 2017a; Fritsch et al., 2019). Especially previous LIMITS conferences have provided a home for debates on HCI's role in climate change, (un)sustainability, capitalism, decreasing survivability or the challenges of refugees and migrants (see e.g., Burnell, 2018; Sabie et al., 2017; Sabie et al., 2019; Tomlinson and Aubert, 2017; Mann et al., 2018; Lepawsky, 2020). Nevertheless, HCI faces considerable difficulties in understanding and examining its role in the Capitalocene, its contribution to it, and the potential ways of departure it might offer. On the one hand, this difficulty lies in the fundamental role computing technology plays in the Capitalocene. It both directly depends on extractivist modes of relating to the natural world and Cheap Nature through the use of metals and minerals in the manufacturing of its physical components but is also part of the infrastructure that enables economic expansion and globalization - itself a product of complex global economic relations as well as deeply rooted in Eurocentric humanism (Thomas et al., 2017; Ali, 2016). How is one to escape from this fundamental entanglement? On the other hand, the academic tools of HCI are ill-suited to investigating and addressing the distributed, in a way place-less nature of the Capitalocene. HCI studies investigate behavior in *specific* places and contexts, whether they are online or physical, and develop technological artefacts and interventions in specific places and contexts. However, as Light et al. point out (Light et al., 2017a), one meaning of the Anthropocene is that all of life is forced to interact with human technology. How can we conceptualize and enact such a distributed and involuntary form of interaction?

In our view, these are crucial questions for HCI to answer in order to develop an appropriate response to the crisis that terms like the Capitalocene describe. With our class then, we aimed to fill what we perceived as a gap in the education of HCI scholars and future designers. We wanted to introduce these modes of thinking about our world and the interconnected challenges we face and jointly begin to understand ways in which HCI needs to undergo a transition to play a positive role in the Capitalocene, and how HCI might be able to contribute to a transition in other domains. Hence, we named our course "HCI for Transition" (HCI4T).

10.3 Activities of our course

The name was inspired by the Master program "Economics for Transition" completed by the first author at Schumacher College (*Schumacher College* n.d.). The college has a reputation for transformative nature-based and cutting-edge learning. The College is located in the same city where the movement *Transition Town* (TN, 2016) was founded – a grassroot community movement that aims to increase self-sufficiency and community awareness about the climate destruction, and economic instability. In that direction, HCI4T followed a socio-constructionist (Gergen, 2015) perspective on learning and education. Such an approach understands knowledge as a contextual and situated collaborative construction process. Knowledge is thus created by the process of negotiation and sharing meanings amongst the involved parties. This approach requires an active role from the learners which presents a drastic shift from the teacher-centered *chalk and talk technique*. The lecturers explicitly understand themselves as co-learners, as they receive the viewpoints of their students. Their main task is to prepare the lectures and offer stimuli in the form of learning content, thus proposing meaningful hooks for discussion and activities. This relies on a high degree of communication between all parties involved and a certain level of equality of the interacting partners. Constructionist paradigms emphasize work on personally meaningful topics or artifacts which is why additionally we followed notions of project-based learning (Raju and Sankar, 1999). The latter emphasizes active construction, student autonomy, and high-quality group work (Burke, 2011) by engaging students in complex problem situations (situated learning) over a longer time (Krajcik and Blumenfeld, 2006; Holm, 2011). The two

main outcomes of this process were: (1) inspired students who are encouraged and challenged to act and to be uncomfortable; (2) paper reports which formed the base for assessment (see below).

According to our aims, the course description contained questions such as *"What role does HCI research play in a world increasingly characterized by humanity's desire for accumulation - of capital, data and destruction? How can we make HCI research relevant in a time of planetary degradation and mass extinction?*". HCI4T was a non-mandatory, elective course. The number of participants was limited to 15, as vivid discussions were a major requirement. In the end, eleven students took the class (some more students enrolled as well but had to drop out due to scheduling conflicts).

The lecturers' intention was confirmed by positive reactions from the outset. Even before the course started, a student replied to the lecturers via mail: *"I have never read a more amazing course description! I am already very excited."* The same sentiments could be felt during the first until the last session.

The three lecturers of this course have diverse expertise and research interests, ranging from the role of digital technologies in rural Latin American communities, designing for challenges of migration to Feminist HCI. All three are PhD students. Usually, they held the course together which surely is unusual in university learning settings were only one tutor is responsible for a lecture in a classroom setting. We however experienced a substantial benefit in it, as it contributed to the creation of community between lecturers and master students. The three lecturers are of Brazilian, German and German-Iranian heritage. The course drew students with heritage from Germany, Mexico, Iran, U.S., Ghana, South Korea, Paraguay, Bangladesh, Colombia and Sri Lanka/Indonesia. Although we initially planned at least a hybrid-format, which would have included walks in the forest, the pandemic situation only allowed a digital format. Thus, the course was entirely held via Zoom. This however also opened up opportunities. By being unable to come to Germany, where the university is located, the students participated from all over the world.

Countries of residence at the time our course took place hence included Germany, Netherlands, Iran, South Korea, Mexico, Paraguay, Bangladesh and the U.S..

Our course consisted of 14 lessons. Throughout the initial lessons we introduced the concepts mentioned above in lectures, followed by discussions. During this first half we presented various concepts drawing on work outside of HCI and trying, where possible, to find related work within HCI. The discussions served as an opportunity to relate the concepts to the personal experiences of facilitators and learners alike, as well as to the field and practice of HCI. In parallel to the theoretical discussion, in every session we would engage in personal conversations, where we would present our ancestors' path, share and connect to the nature in our neighborhood, talk about our family, music tastes, musical abilities, cook, etc. At the end of the first half of the class, we engaged ourselves to add our interests in the Miro board. Based on that, we were ready to move to the second half of the course, where we would combine the learners interests (what matters to each of them), the HCI4T concepts, and HCI themes.

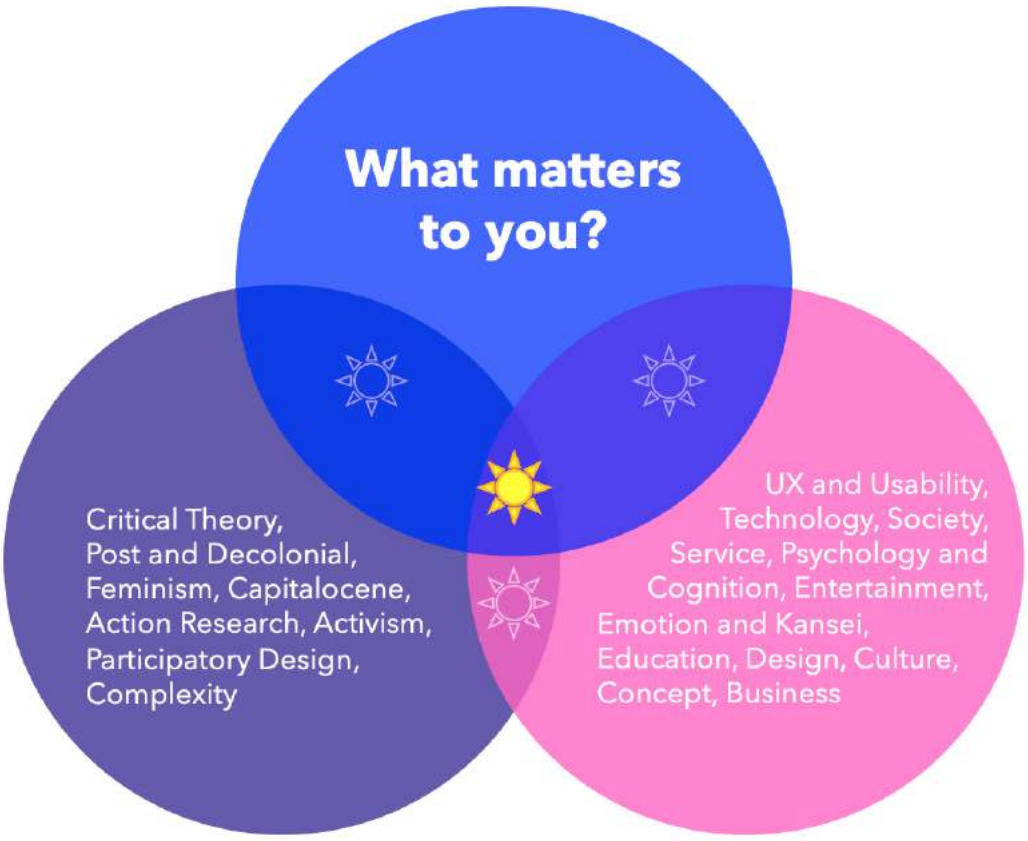

Fig. 10.1: The three main interest of the course

The second half of the course was dedicated to project work. For this part, the participants built on the previous discussions, especially their personal experiences and interests in relation to the introduced concepts, and develop projects that would help us answer the broad and open-ended question: what role does HCI play in the Capitalocene? Students formed four groups of three people each and decided on topics or phenomena in alignment with personal interests and passions that they were going to investigate empirically and analyze using the works introduced before. This resulted in the four projects and essays which we describe in Section 4 below. These projects each investigated specific phenomena that embody aspects of the Capitalocene, modernity/coloniality and the crises described with these concepts, and where possible formulated potential means for HCI to act in relation to these phenomena. Together, they loosely form a multi-sited ethnography in and of the world-system (Wallerstein, 2004) in the sense of George Marcus (1995).

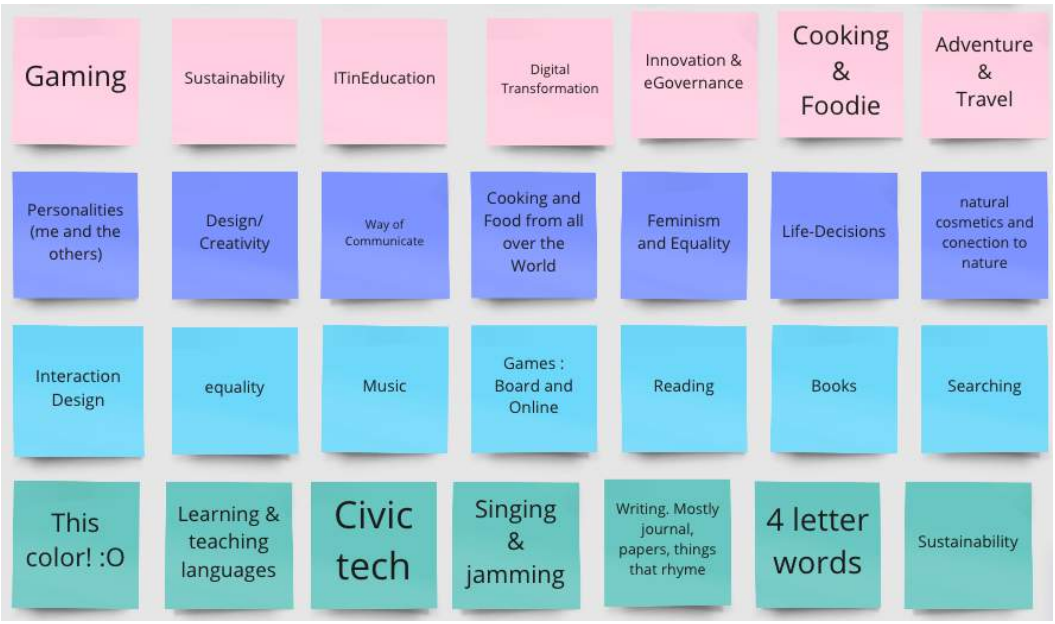

Fig. 10.2: Examples for personal interests

Throughout the course we also engaged in a variety of activities that do not follow the traditional model of lectures, but were intentionally designed to create trust, companionship between lecturers and students and facilitate the sharing of questions, interests, and emotions including doubts and fears. Often, these activities included an element of discomfort that needed to be addressed and dealt with, but also included the sharing of (free) gifts and engaging in a meditation session under the guidance of an external facilitator trained in European Shamanism. What

we learned in the course thereby became entangled with how we learned, both representing a mutually supporting divergence from HCI *business as usual*.

These activities included, for example, to look into the eyes of another participant for a minute in silence, type in the Zoom chat nice characteristics about each of us, or to share a personal element of their surroundings. Here, participants shared trees outside their apartments or houses, or an altar constructed for the Mexican *Día de los Muertos*. For some of these activities everybody was encouraged to engage in them, with the option of not participating also open to everybody, but other activities included a voluntary sharing of e.g., an experience in the last week that we felt grateful for, or a creative output. In some sessions, participants would read poetry, share drawings or perform music. The aim of these activities was on the one hand to build trust, familiarity and openness, and thereby create a safe space, where all of us would be able and comfortable to share how the topics of the course affect us personally, including feelings of doubt, uncertainty, vulnerability or fear. On the other hand, the discomfort of the activities built on the allegory of the growing lobster: when a lobster grows, it begins to feel the discomfort of a shell that has become too small and has to finally leave the shell. Its growth and discomfort are directly connected (Twerski, 2016).

To make sense also of the emotional and individual aspects of our learnings, the student participants were encouraged to keep voluntary journals of their experiences throughout the course, which they could submit at the end together with the results of the project work. The journals could take any form the participants felt comfortable with, written text, blog post[1], poetry, drawings or other kinds of images. The students that submitted their diaries made ample use of this creative freedom and included pictures, screenshots, doodlings, text and content from other sources where they found additional inspiration during the course. The diaries included references and memories of specific sessions, notes about the content but also about emotional reactions or personal questions that emerged during the process.

[1]https://www.notion.so/HCI4T-Diary-daef577f37184fb49a3f52e344fa4649

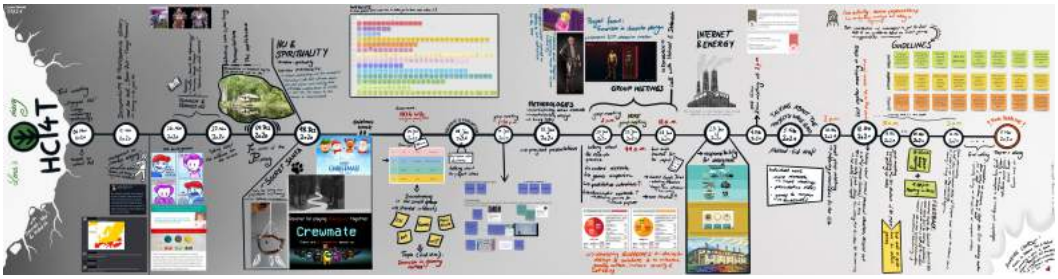

Fig. 10.3: Diary of one of the authors Lena Hieber

In a similar manner, the close entanglement of HCI with the crises of the Capitalocene is bound to create discomfort, when we discuss how our discipline and profession contributes to these crises. It often arises through an ongoing voluntary blindness to our planetary limits, that now involve the unlimited digital world. During our class, students were engaged in measuring the footprint of their own or favorite website (GreenWeb, n.d.; *"Carbonalyser"* n.d.), in learning what is the carbon footprint of streaming a video (*Factcheck* 2020), where the metals and minerals needed for their electronics come from (HarvardGrwthLab, n.d.) and about the consequences in the *Global South* when those minerals are demanded by the *Global North* (Mantz, 2018). Together, we also estimated that for each Zoom call, each participant would release 250 grams of CO2, and in total the HCI4T emitted at least 56 kilos of CO2 during the four months of classes. At the end of the 90s there was the believe that the internet would lead to reductions in energy consumption and greenhouse gas emissions. However, as we are heading towards infinite data production and accumulation, the technological waste generated to make the digital world work is growing. During the course, we presented cases that show that the Internet is the largest coal-fired machine on the entire planet and make us aware of the consequences of lack of limits in the generation of data, use of digital traffic and cloud storage.

10.4 Project works

A crucial element of the HCI4T experiment was project work undertaken by the course participants. Building on Marcus' Multi-sited ethnography (Marcus, 1995), the plan was to divide into small groups and ethnographically investigate phenomena close to the students (geographically and emotionally) and analyze them

using the concepts introduced in the earlier half of the class, as mentioned above. Through this process we wanted to obtain a distributed, situated and necessarily partial understanding of HCI's role in the Capitalocene. The projects were also the foundation for the participants' unfortunately necessary evaluation, a dilemma we will discuss in a later section of the paper.

Picking appropriate topics was not a trivial task. In order to find common interests between the individual participants, we asked everybody to share a list of interests, hobbies or passions on a common online whiteboard (figure 2). As a next step, everybody picked a limited number of these interests, and briefly presented them to the rest of the group. Everybody was also encouraged to think about how these interests manifest in their own lives and neighborhoods, and how they relate to the concepts and studies discussed so far in the course. Based on these presentations and the list of interests, which were also visually recorded in the shared whiteboard, the facilitators suggested group constellations to the students, including possible topics. Some students switched between groups, thereby also reframing the topics slightly. This process resulted in four groups with three members each. The groups then had three months to work on their projects. They could decide between several deliverables: 7-8 pages of essay, or 3-5 pages of essay in addition to a concept for a technological artefact, either in writing, or sketches, wireframes - how they want to communicate their concept was left up to them. Importantly, each group was expected to engage in some kind of ethnographic inquiry and relate their work to the concepts discussed in the course as well as HCI literature, which they were expected to research themselves. Below we will describe the work of each group.

The role of the class facilitators was that of a consultant. Throughout their project work the students were free to contact them anytime with ideas, questions or results for feedback. We also continued to have joint sessions, where all groups were required to present intermediate work once and discuss it with the other participants.

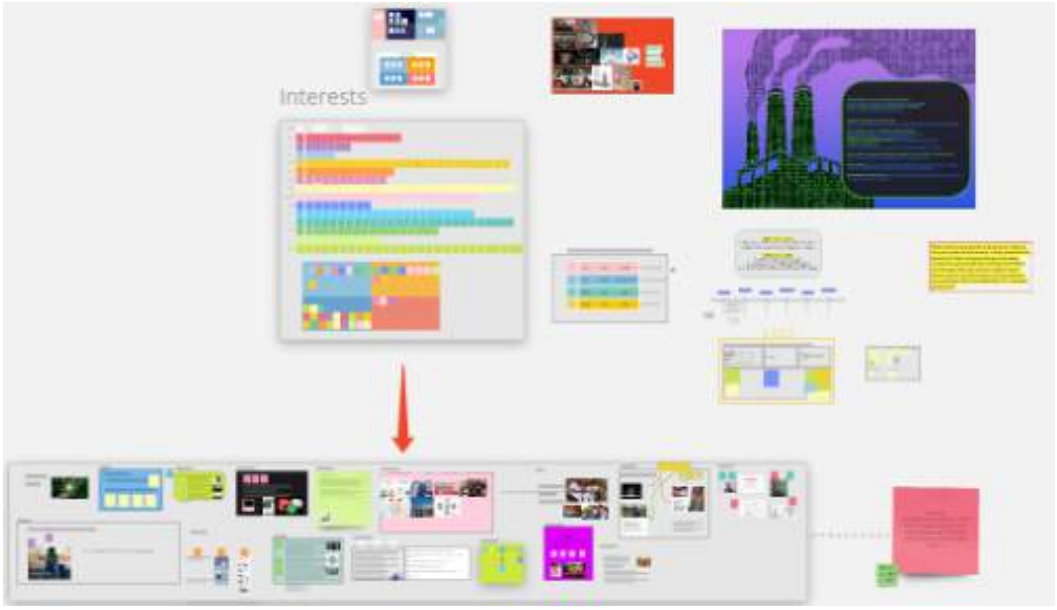

Fig. 10.4: Overview of our Miro board

10.4.1 Waste

In this project a male student from U.S., a female student from Mexico and a female student from Germany investigated waste and its role in the modern world system (Wallerstein, 2004). In order to study the *global-ness* of waste as a shared phenomenon all over the planet as well as the local and specific differences in its treatment, the three drew on their own experiences with and emotions towards waste. To this end, they followed the sadly globally familiar figure of the disposable face mask on its journey in the three countries. This elicited three similar yet also surprisingly diverse stories, illustrating familiarity and difference of waste and waste treatment.

In Germany, masks are - in the best case - already separated within the household into the residual waste bin. As part residual waste the mask is then collected separately from e.g., organic waste, and delivered to waste treatment plants. There it is further separated into re-usable or recycle materials. What is left is burned to provide energy e.g., for district heating. 25% of the material remains after burning and is either used for e.g., road construction or ends up in a landfill.

In Mexico, the mask is also sorted into the non-organic waste at home. It is picked up by the trash truck and brought to a landfill, 25 minutes outside of the city, located next to a community of around 3,000 people. There, the mask becomes part of a peculiar landscape: the flat terrain is now the foundation for an alpine landscape of compacted trash. The landfill was officially closed in 2017 but continues to be used and is now at the verge of collapsing, posing significant health risks to the neighboring community. At the landfill the mask is received by informal workers that further separate the trash and bring it to specific collection spots, where they receive payments for certain kinds of waste. This is where the mask's journey ends. It would stay there in the landfill on top of the trash hill, or it would fly away and cling to a tree in the surrounding area, creating an alien mutated landscape where trash grows on trees.

In the USA, the mask is also separately disposed of at home and located by private waste processing companies that transport it to their private sorting facilities and then to a private landfill. But this is not where the journey ends, neither in Germany or Mexico: whether it is burned or not, the mask slowly decays, turning into leachate, from solid into liquid, in the worst case then seeping into the ground.

All three reflected on the similarities and differences of waste separation and the conditions to separate waste, including awareness about its importance as well as the necessary infrastructure. Such aspects become clear through the story of the mask. The group then went on to conceptualize a system that would tell such stories of waste when materials are disposed of in the household, with the aim of inspiring change in waste behavior. A sensor on waste bins would detect what kind of item is thrown away and trigger an exemplary story this specific item would take through the local waste system, starting at the trash bin.

10.4.2 Game Design

This project examined current issues in the gaming community with special regard to gender and equality within computer games (Paaßen et al., 2017; Consalvo, 2012; Consalvo and Paul, 2013; Taylor, 2012). The discussion is of particular social

relevance with video games being a growing and influential medium. Video game companies with first and foremost economic interests, especially developers of AAA-games, tend to market games towards lucrative, male *hardcore gamer geeks* (Gray et al., 2018) (for feminist discussions on market conditions being a patriarchal system fueled by manipulation and ideological control, see Judith, 2011). The group consisted of a female student from Germany, a female student from South Korea and a male student from Bangladesh. Taking Feminist HCI as a starting point, they took a closer look at the possibilities for feminist approaches in gaming, focusing on how women are depicted in video games and as participants in gaming culture. As previous research has shown, there are still severe problems regarding harassment, bias and gender-based division in games, despite the fact that nearly half of all gamers are women (Chappetta and Barth, 2020; Vermeulen et al., 2016; Jenson and de Castell, 2010; Cassell, 2002; DiGiuseppe and Nardi, 2007). As the core of their work, the group analyzed several current video games regarding the roles and representations of player and non-player characters in the games.

The group found that female characters were depicted stereotypically in several ways. They are more often portrayed in revealing (and impractical) clothing and characterized as helpless or innocent. Their characters were often less powerful than male characters, and more often female characters were given supplemental roles in games. A common role was the "damsel in distress", a helpless woman in need of rescuing by male heroes (Gray et al., 2018). Current games were found to sometimes differ from this stereotypical character design, such as "Horizon Zero Dawn" (*Horizon Zero Dawn* n.d.), where women characters are designed with every class, age, social status, sexuality and with a female main character, many minor female characters and with (female) Non-Player Characters having their own agenda, history, interests and community. Other games like *Raiders of Scythia. Renegade Game Studios* (n.d.) provide an equally women-centered story, and *Cyberpunk 2077 from the Creators of The Witcher 3* (n.d.) allows for gender neutrality and gender-mixing, breaking with stereotypical male-female representation in many other games.

Based on their analysis, the group then went on to develop a set of guidelines for more just and equitable character design in video games. The guidelines cover aspects such as camera angle with which players view characters, ensuring that depiction of female characters fits the setting and avoids sexualized and inappropriate clothing, the depth with which characters are developed, including their own narratives and motivations to act, their own character traits, and also allow diverse, non-binary combination of features. Their guidelines can be understood as a provocation, as a manifesto for more than just video games that points to the current inequalities and discrimination, but also as a practicable tool for game designers.

10.4.3 Digital Colonialism

In response to our shared exploration of historical colonialism and ongoing coloniality/modernity, a female student from Mexico, a male student from Ghana and a male student from Colombia were interested in the role of digital technology in this coloniality and what can be described as *digital colonialism* (building on e.g., Pinto, 2018). In preparatory discussions for their project work, the three talked about the powerful roles multinational digital companies as well as foreign states play in their respective home countries. Foreign companies provide critical digital infrastructure, outside of public control, to extract digital data from citizens. Foreign governments extract natural resources at low costs to develop their own economies and technologies. To give their study direction, they decided to investigate the arrival of ride sharing apps in their respective home countries. In Mexico, Ghana and Colombia, Uber has become a crucial component of local mobility infrastructure. The service has created considerable conflict with existing local means of transportation, especially taxis, as well as local alternatives. The group drew on their own experiences with the app, conversations with drivers and customers as well as secondary data such as company texts to analyze the process by which Uber has become a crucial part of their infrastructure. Their project came to the conclusion that the company's success depends on the neglection of negative social consequences brought on by its arrival, such as destruction of formerly paying jobs in favor of Uber's self-employed Gig economy model which neglects social security and health insurance of drivers. In Colombia the government has declared the company's

operation illegal, but Uber continues to operate through the exploitation of legal loopholes. Uber successfully positions itself against existing means of transportation through a narrative of superior technology and business models. In a process not unlike historical colonialist prophecies of the arrival of Aztec gods which Spanish colonialists were able to exploit, Uber's arrival was styled as a prophecy to inevitably fix all existing mobility problems through this superior technology.

The group characterized Uber's operation as digital colonialism, as it mirrors historical colonialism in its exploitation and dispossession of lands, resources and people, which translates to modern days dispossession over digital infrastructure, exploitation of privacy and people's data as well as gaining control over systems beyond their jurisdiction.

10.4.4 Feminist Internet

The project group consisted of three female students from Paraguay, Iran and Germany with a South Asian background. Taking the *Feminist Principles of the Internet* as their starting point, the three had extended discussions amongst themselves, sharing how they experienced the internet from their personal and geographic standpoint. The aim of these collaborative auto-ethnographic investigations was to reflect on how women's experience online differs, how feminist values are represented online but also where their representation is crucially lacking.

The Feminist Principles of the Internet are the result of a workshop that took place in Malaysia in 2014, hosted by the Association for Progressive Communications (APC). 50 activists from various domains including digital rights and women's rights participated in the workshop and the formulation of the principles. The principles are divided into five categories: Access, Movements, Economy, Expression and Embodiment. The group discussed each category separately, sharing their own experiences and points of views with each other over several online meetings. The conversations were documented and then consolidated, retaining the personal narrative and individual standpoints but significantly shortening the presentation.

The three women found that a *digital gender gap* was clearly manifested in their experience online and that they all were very keen on changing that. They also found, however, that the way in which this gender gap was experienced differed significantly for each of them. The culture and history of the countries each of them was located in had an influence on their positions as women, as well as the geographic location of each of them, which entailed a disparity in regard to the extent in which each principle applied into their countries and daily lives. These differences are also related to the degree in which women's rights are implemented or given importance in the different locations. They found, for example, that they experience regarding *Access* differed significantly. In Germany and Paraguay, it is relatively easy for them to access any site on the web, whereas in Iran a VPN is required for a similar experience. This led to a discussion over how power over access is differently distributed, with occurrences such as an *Internet shutdown* or how online censorship by governments govern what is accessed and by whom. Such power perpetuates violence, discrimination, and oppression online, as it limits what women can access but also how they can safely express themselves online.

10.5 Implications for HCI Education

We hope that our experiences present interesting insights into how broad concepts such as the Capitalocene and coloniality/modernity, as holistic critiques of this century and the associated crises, can fruitfully and practically be included in HCI. Our experiences resulted both in insights about the complicated role of HCI on the Capitalocene as well as on practical education approaches. All of which resulted in rich co-creation of knowledge to better understand HCI's role in planetary and distributed crises. It served as a space to defoliate multi-layered perspectives, bringing them to the fore, and creating possibility like skipping stones create waves in water. Below, we will summarize and reflect on our insights along two axes: 1) We discuss insights regarding HCI and the Capitalocene, this way demonstrating the creative and reflective potentials our collaborative efforts were able to unleash. 2) We provide reflections on the *system* of HCI education and the co-construction of knowledge regarding critical issues for (and with) future designers.

10.5.1 Approaching the Capitalocene

A core goal of our course was to understand the role of HCI in the issues of the Capitalocene and envision possible ways to respond to this role and contribute to a transition. As outlined above, after an introduction of concepts and related work from within the HCI community, this was mainly approached through the participants project group work, attempting to approach the question through a process of multi-sited ethnography. As formulated by George Marcus (1995), this refers to the impossibility of studying places or phenomena by themselves: in the modern world-system, as outlined by Wallerstein, places do not exist outside of globalized capitalism and are inevitably affected and thereby connected. The projects addressed a wide variety of topics and phenomena from a wide variety of (geographical) standpoints. While this on first glance obscures conceptual coherence and the conceptual relation between the different studies, in this diversity also lies their strength. First of all, each study by itself connects to the overarching concepts in a unique way and studies specific aspects of it, which become clearer through their situated, diverging analysis.

The waste project illustrated this in a rather poetic way, using the central character of the mask and accompanying it on a fraction of its journey. The mask and its disposal show waste as a global phenomenon and practice, existing in Mexico, Germany and the U.S. in very similar ways. In each place the concept of waste separation exists, waste is separated in the home and picked up to be disposed of elsewhere. It also shows crucial differences in this process: whereas in Germany (supposedly) a certain amount of the waste is recycled as a source of energy or building material, in Mexico it fills and shapes a landscape, as a health hazard for communities neighboring dumpsites and dystopian decoration for trees. But yet again, in neither of these places recycling is perfect, and certain components of the waste are left, unused, decomposing and seeping into the environment. While the project also exhibits a certain Euro-centricity, by highlighting the seemingly more sophisticated separation and recycling system of Germany, it also shows the imperfection of such an approach. Furthermore, the project points to many possible strands of investigation, embodied by the story of the mask: Where does it come

from? Where is it made? What elements is it made of and how are these assembled? How does it travel to its place of use? The further unbecoming of the mask holds similar possibilities for investigation, and as the project rightfully points out, the story does not end in the landfill. Decomposition occurs at many stages, depending on the processing of the waste. When burning waste, certain elements are released into the air, when decomposing different elements are released into the soil, the water. Where do they go? Lastly, the project proposes a positive role of HCI, as a tool to visualize these stories of travel and unbecoming, to inspire a different relation and treatment of waste.

The project on the ride sharing platform Uber focusses on a much more direct entanglement of computing technologies with the Capitalocene (Moore, 2017) and coloniality/modernity (Mignolo and Walsh, 2018). In this investigation of the operation of Uber in Mexico, Colombia and Ghana, the project attempts to show how digital technology has become a platform for the continued enactment of colonial global relationships, where actors from the center of the world-system, in this case the U.S. Westcoast, in the interest of financial profit and growth actively exploit peripheral countries, undermining local legislation and siphoning data off of individuals to be owned and processed in the center for the benefit of the center. Computing technologies also serve in a narrative of *superior technology* that facilitates *superior business models*, a notion of progress presented as inevitable, inescapable, thereby mirroring narratives of historical colonialism to assert dominance by the colonial powers. By building on the idea of digital colonialism (Pinto, 2018), the project does not point to positive possible responses, but contributes to a deeper understanding of the complicated relation HCI has to coloniality, stressing a need for transition without providing easy answers for what we are to do about it. The project thereby contributes and expands in debates on de- and postcolonial computing within HCI. The project thereby contributes and expands in debates on de- and postcolonial computing within HCI (Ali, 2016; Irani et al., 2010) including the relation with capitalism (Tomlinson and Aubert, 2017) and the celebration of entrepreneurship and innovation - the last of which has been highlighted many times as central for HCI, as well as highly problematic (Jackson, 2014).

The other two projects investigate different aspects of sexual and gender-based discrimination. As Grosfoguel (2011) has outlined, such ongoing discrimination is a crucial component of coloniality/modernity, being introduced by colonial powers and thereby enmeshed with the Capitalocene's need for Cheap Nature, in which nature is often used to discriminate against other human beings and exclude them from *humanity*. One project shows how discrimination is encountered by women online, but also how the experience of discrimination differs with geographic location, providing a personal and nuanced analysis of such situated experiences. The other takes on a more generalist approach, studying sexism in the design of female game characters. The group then went on to formulate suggestions for a more equitable approach to game character design, addressing not only the visual representation of characters as well as camera angle, but also story line, roles of non-player characters as well as diversity in a wider sense, touching on intersectional discrimination in video games.

Overall, the different projects then begin to unravel the complicated relationship between HCI and the Capitalocene. In several instances they illustrate how HCI contributes to the crises of modernity, highlighting its role in coloniality, sexism and waste production. In other instances, they point out possible opportunities for HCI to play a more positive role, by changing how ICTs are designed, such as in the case of game design, or by highlighting how ICT can be deployed to support the telling of complex stories, as in the case of the waste study.

It needs to be said however that these studies are also necessarily partial and limited. Each study is only able to hint at the complicated relationship between its specific subject and the role of HCI, leaving much to study, and many threads untouched as we have pointed out above for the waste project. While our brief analysis hopefully shows each study has a clear relationship to the issues of the Capitalocene and modernity/coloniality as a whole, the relationship between the studies, how they paint a picture of the Capitalocene deserves further unpicking. Nevertheless, we believe the studies as a collective highlight the possibility of coming to understand HCI's role in the Capitalocene in a patchwork manner, with each

study contributing to what is a continuously unfinished yet growing tapestry of the Capitalocene.

10.5.2 Potentials for HCI education

As mentioned in the earlier part of this paper, we did not follow a teacher-centered chalk and talk technique for our course, but instead employed a project-based learning approach (Holm, 2011; Krajcik and Blumenfeld, 2006), attempting to co-create knowledge, involving students and facilitators as learners. The course was created as an open-ended process, with facilitators serving as guides, as creators of a learning space, but also with an interest in learning from and with the students about the relationship between HCI and the Capitalocene and about their personally situated perspective as well as experience of this relationship. To this end, facilitators strived throughout the course to lower hierarchies between participants through a variety of activities to engage in mutual sharing. Despite the obvious limitations of the projects given the scale of the question alluded to in the previous section, we would argue that this process has been quite promising. While project-based learning has been broadly written about, we here reflect on our application in approaching HCI's role in the Capitalocene, building on the participants personal experiences and standpoints.

In a self-directed manner, driven by personal interests and experiences, and in many cases taking these experiences as the starting point for their investigations, the projects present exploratory studies into new domains for HCI research, hinting at promising lines of investigation. They bring together shared yet disparate experiences as well as positions from various locations and standpoints and make these differences a central asset of their inquiry. We would argue that such a self-directed and intrinsically motivated approach is necessary for the rather difficult topic of the course and the introduction of the concepts into HCI education. While they certainly have found wide purchase in academia, the concerns presented here are arguably hard to apply in a commercial setting, where many HCI and design students will find employment. While some of them certainly matter for business and are somewhat translatable into commercial appeals e.g., the narrative of sustainable growth, the

renewable energy sector, such a translation also diminishes the fundamental nature of the critique as embedded in concepts like Capitalocene or modernity/coloniality. Such concepts take aim at the very foundations of capitalist business. Therefore, it becomes the work of self-directed future designers to embed such lines of thinking (and feeling) (Fals Borda, 2009) in their chosen professional settings outside of academia. The *transition* from the title of the class, therefore does not only refer to the transition of HCI or a contribution HCI can make towards transition, but also to a possible personal transition from which future designers explore these issues and translate them into their professional contexts.

We also want to clearly note that the pandemic crucially shaped the co-learning process described in this text. All sessions of the course were done virtually via Zoom. We were dispersed all over the planet due to travel restrictions and the common sense of not moving around the planet (thus avoiding contributing to the pandemic and its ongoing suffering). While this has provided challenges such as finding acceptable time frames to meet (on a side note, Friday afternoon turned out to be a quite nice date for this specific course, creating some positive *TGIF-vibes*), it has also allowed us to make use of the diversity of locations we found ourselves in and the diversity of views this affords on shared issues. Arguably, this has strengthened the studies in ways that would have been considerably difficult if we would have found ourselves in the same location. In addition, it provided all of us with a space where not only educational but also personal notions were shared, thus creating bonds between like-minded attendees. This unleashed a special power during an era of turmoil with its dramatic impacts on social and economic life. During times of lockdowns, contact bans, potential isolation and other worries, our weekly coursed offered a hook of consistency and something to look forward to. With the current experiences and lessons learned of the pandemic, there are vivid discussions about the future impacts on our society, including work- and education related contexts. This includes the following questions: How do we want to understand the future of university education and campus life? Which kind of emotional support and attachment can the (HCI) education of the future bring to all parties involved? We are hopeful that sharing our experiences here offers some food for thoughts in this regard.

At the same time, this significantly makes use of and contributes to the *unsustainability* of HCI and digital technology. Our two-hour long video calls drew excessive energy, resulting in CO2 emissions, that would have been prevented if we had met in person. In-person meetings on the other hand would have required air travel, again resulting in CO2 emissions. Measuring this impact of such a course is no straight forward process as we have discussed in our course and has been debated also within the HCI community (Tomlinson et al., 2011; Baumer and Silberman, 2011b). Nevertheless, if HCI4T, including HCI education, really wants to move towards transition out of the crises of the Capitalocene, new computing systems are necessary, that need less energy and use fewer material natural resources in their construction.

Lastly, our course had to fit into the formal regulations of our university to comply with European legislation, which limits the freedom we want to apply to alternative approaches. As a non-mandatory course, the small group with intrinsically motivated students surely benefited the discussions of sensitive topics and the sharing of personal sentiments. Managing a larger group of participants with higher diversity, also perhaps in terms more diverse mindsets, attitudes etc., might be challenging. However, we believe that our course generally offered a broad set of hooks to match a multitude of interests. Also, having three lecturers with different expertise was hugely beneficial for the course and arguably luxury, especially considering the economisation of education in the Capitalocene (Collini, 2012). This approach is, we acknowledge, resource intensive. In addition, our course is bound to formal aspects of assessment. As we noticed towards the end of the class, the co-constructive aspect runs into difficulties when it comes to evaluating and grading work. Despite breaking boundaries with regard to course setting, each student eventually has to receive a grade in the end which appears in their transcript. A carefully constructed equality as learners between facilitators and students flares up to a steep hierarchy again, when the facilitators have to grade student work, even though everybody, facilitators and students alike, were learners during the course, engaging in a mutually trusting learning experiment. Scholars already hinted to the challenges of assessment in constructivist project based learning environments (Reeves and Okey, 1996; Bell, 2010). In a course setting which is built on closeness and rapport between attendees

and which advocates low hierarchies, assessment can be a tricky thing for educators. This is especially true in a somewhat experimental environment like ours. What are 'fair' criteria for assessment regarding this approach to teaching? This 'hierarchy and fairness problem' could be somehow solved by alternative ways of assessment as proposed by other scholars e.g., a self- and peer-reviewing (Nulty, 2011; Topping, 1998) or 360-degree feedback (Tee and Ahmed, 2014; Sadeghi and Loripoor, 2016) where one has to rate the other. This would, eventually, lead to a more democratic approach to learning. The question of scale, however, remains unanswered. Even if the experiences we detail in this paper are perceived as valuable, applying them to larger classes with the aim of reaching more participants, the way our class played out is at least partially due to the small class size. This smaller size allowed for the creation of relationships between participants and the emergence of trust, which was the basis for the personal reflections, relating the learning to personal experiences and reflections. As mentioned above, creating such spaces is increasingly a challenge in the Capitalocene. Blevis (2010) reported on similar project-based educational experiences and reflects on the question of scale, being able to offer educational experiences to significantly larger groups. While this potentially holds lessons for future courses, creating valuable smaller spaces is increasingly a challenge in the Capitalocene, as mentioned above.

10.6 Conclusion

In our text above we have reported on a semester-long course we have created as part of an HCI masters education program. The course aimed to explore the various interconnected crises of our time, building on concepts such as the Capitalocene and modernity/coloniality and begin to unravel the role of HCI as a discipline and practice in these crises - both as a contribution to the dilemma as well as an opportunity to transition away from it. To this end we have designed the course as a co-constructive learning experience, in which facilitators and master students co-construct knowledge on this role of HCI in the Capitalocene, through four ethnographic inquiries, building on George Marcus' concept of multi-sited ethnography. Together, these studies have leveraged the divergent geographically and personally situated standpoints of the participants to develop nuanced pictures

of HCI's relation to various aspects to these complex concepts and issues, highlighting both HCI's complicity as well as glimmers of hope. We argue that such an approach presents a valuable and innovative approach to HCI education. This value lies both in the chosen topics, which we believe are urgently needed in the education of future designers, as well as its methodological approach of project-based learning and the co-construction of knowledge between facilitators and students. Arguably, these two elements are required in combination, as the class aims to create knowledge about conceptual and practical territory that remains underexplored within HCI, attempting to define an HCI for Transition. This transition needs new knowledge along emerging lines of inquiry within the wider HCI community, which our course has begun to extend.

11

Discussion

The hegemonic perspective on the Amazon has long been that the rainforest region is responsible for suppling energy, mineral, woods, and agricultural resources to the development of the rest of Brazil and the rest of the globe, regardless of the socio-environmental cost and regardless of what are the desires of the local population. There is almost no consultation about the way the development should occur in those regions. Dams and power lines are built to provide electricity to mining companies, while those community affected by the construction has no access to electricity. Mining (legal or illegal) causes water shortage, pollution, and sickness. However, the demand for varied minerals is increasing exponentially (Aráoz, 2020) for sustainable energy infrastructure, and communication equipment that digital economies need nowadays. Those needs are result of a globalised economy build by and for the global North. Modern colonial mining and technological advancements, according to Araoz, "are, in fact, the perfecting of the art of war" (Aráoz, 2020, p. 13). This dilemma pushes us to recognize and accept the presence of interconnected worlds; to admit a worldview that is fundamentally different from that of Western contemporaries (de Castro, 1998; Cadena and Blaser, 2018; Krenak, 2019a). Following their lead, we must rethink design and technology as design for various ontologies (Escobar, 2018), and as a means of comprehending the pluriverse as an alternative to the singular universal ontology of one world.

11.1 At the periphery

I will briefly re-introduce the two communities, focussing on their relation to global capitalist systems.

11.1.1 Boa Vista do Acará

As I have discussed in chapter 8, Boa Vista do Acará is a small and rural community in the Brazilian Amazon. While located in the forest along a large river, the village is only a 45min boat ride away from the capital of the state of Pará, Belém, a city of 2 million inhabitants. Apart from their geographical location, several aspects locate Acará at the periphery of the modern-colonial capitalist world system. The community is considered a ribeirinho community, one of Brasils many social groups. This already sets them somewhat apart from the population of Belem. Ribeirinho is less an ethnicity but a culture, a way of life, influenced by geographical location of the community close to the river, in the forest. Traditionally, community members of Acará lived from fishing, hunting, cultivating, and gathering fruits in the forest as well as small scale agroforestry, growing and processing plants such as manioc and açaí, which are staple foods in the region, and selling them in the surrounding markets. Nowadays, as we described in detail before, many of these activities continue. The growing of herbs is also a prevalent activity in the community. Some families grow herbs in large quantities to sell them to a large cosmetics company, who make perfume and soaps out of them. Others grow and collect herbs for their traditional use in religious and spiritual rituals such as scented baths. Despite a relative proximity to the city, not all households have electricity, and while most people have a smartphone, 3G/4G reception is so low that it is almost negligible. Some families pay for a private WiFi connection to improve connectivity in their homes, and my own work in the community established a community network, through which internet becomes accessible in a few households and a few public locations.

The lifestyle of the community is thus markedly different in several ways from that of the city of Belém or even other large cities in the country. Yet, as I detail in 8, the community is feeling increasingly pressured to adapt and change this way of life. Younger generations do not want to take up the professions of their parents, such as processing cassava and often their parents even warn them of the hard physical work these professions entail. There is basic educational opportunities, in a Western sense, in the community and many seek education elsewhere, as well as

jobs. Yet there is also a wish to remain apart, as I detailed in chapter 8. Economic expectations are specific, and, to a certain extent, the stance of some community members can be described as a tacit or implicit resistance to modernisation, development, and capitalisation of their lives. Similarly to the mushroom pickers, of Anna Tsing's account (Tsing, 2015b), it is thus somewhat serendipitously positioned at the periphery of global capitalism and the modern world system, not fully rejecting it, but also remaining decidedly apart. However, I also need to point out that this is not a unitary stance in the community, and individuals of course have different preferences for their ways of life, yet individual choices sometimes have community-wide consequences, as it is stressed by modernity/coloniality. Maintaining this position is also not always comfortable or easy, which I will reflect on in more detail in chapter 5.

11.1.2 FARC ex-combatants

The camp in which I met the former FARC-EP guerrilla, was first called ETCR and which for the time being is their post-conflict home, is remote, located in the Colombian Amazon Forest, a two hour 4x4 drive away from the closest city. The neighbouring village of around 600 inhabitants can be reached by foot in one hour. Suffice to say, it is located rather remotely from the centers of Colombian mainstream society. Lack of contact / isolation is furthered by the specific infrastructure of the community. The camp is only reachable by dirt road, which makes the transportation of people and goods rather difficult. Electricity is provided via a generator, run on petrol. The mobile phone signal connection was very weak or almost impossible to be reached. Ironically, the tower that existed to make the signal stronger was destroyed during the war by the FARC-EP guerrilla out of fear of the signal being used to discover and target their location, as I describe in chapter 6. At the beginning of their transition, the internet was secured via a tower, located about 4km away from the community and through a program called Vive Digital (de TIC, 2020) which covered the cost of internet access for the first year of their arrival. These geographical and infrastructural conditions limit the possibility to reach out and connect with wider Colombian society, in a social, economic or cultural manner, as well as any connections to global capitalism and similar global structures. But this is

also hindered by a general pre-existing lack of connections to mainstream society. Prior to the Peace Agreement of 2016, the members of the guerrilla group lived largely in isolation from the rest of Colombia, including their family members and friends, as I detailed in chapter 6. Communication with persons outside of the group were reduced to an absolute minimum, consisting for example of a handwritten short note, sent every few years, and later phone calls, but also only very rarely. Even when mobile devices became more widely available, the guerrilla refrained from using them for security reasons, as I detailed in chapter 6. The community is thus not only difficult to reach for others, by the time of the Peace Agreement they also did not have many strong ties to the rest of the society, and needed to rebuild them, since the social rifts of the conflicts and its wounds do not close immediately with the signing of the Peace Agreement, and hurt and distrust remain on all sides, as chapter 7 describes.

The long removal from social and economic life of the rest of the country also means that the economic skills of the community are possibly somewhat at odds with the demands of the national economy. In the peace agreement it was planned that the camp sites would also be places for training, especially focussed on supporting the former guerrilla in developing entrepreneurial skills. Since the financial support promised under the Peace Agreement ended, they are faced with the difficult task of finding means to adapt their skills from their life as a guerrilla army to the current economy. Some do so with success, running small hotels or a tailor shop, but others struggle, as the accounts in chapter 7 make clear. The difficulty, however, is not only in a mismatch of skills and experience. There are also ideological differences that remove them from wider Colombian society. FARC-EP was a Marxist-Leninist communist group, and the political and economic ideals of the members are often in conflict with the capitalist economy of the country. For many, this creates the feeling that the Peace Agreement was a defeat, that they are now forced to give up their ideals and visions for society and adjust to what they had been fighting against for decades. Some of the community members try to find a middle way, by organising their economic agricultural practices in cooperatives. Supported by national structures of the newly founded FARC party, this is the attempt to continue their ideals within the cooperative, even if the overall organisation has to operate in

a neoliberal market. All of this should make clear that the encounter between this community of former guerrillas and globalised capitalism is all but seamless, but conflicted, patchy, characterised by conceding and resisting in various ways, seeking closeness in some aspects of life, and struggling to remain apart in others.

Together with the previous chapters, this brief description should make clear how both communities are located at the periphery of the modern-colonial global capitalist world system. While there are significant differences between them, for example FARC-EP's previous armed resistance to exactly this system, which the inhabitants have not engaged in, not even in an ideological sense, there are also strong similarities. Both communities engage in different social, economic, cultural practices, some of which connect them and move them closer to the center of the World System, but some of which also keep them at a distance. They are thus not fully removed from it but remain at the edge - at the periphery.

In maintaining their position at the periphery, digital technologies play crucial roles. In the next chapter I will discuss how both communities use digital technologies in their practices to maintain this position.

11.2 Digital Infrastructures of proximity and distance

A central infrastructure of the modern World System of the 21st century and of processes bringing the periphery closer to the center is the internet. The creation of so-called telecenters was one of the first methods to make this connection to happen (Reilly and Gómez, 2001). Another one is the Facebook's Free Basics programme that provides access to a number of online services via an app (Sen et al., 2017). The endeavour, called "Walled Garden" by some (Best, 2014), has been heavily criticized for violating net neutrality (Sen et al., 2017). The expansion of internet connectivity is often accompanied by a rhetoric of development and has been a central concern of HCI4D or ICT4D (Zhao, 2008; Bonina et al., 2021; Heeks, 2018). Although there are numerous definitions of development in ICTD (Avgerou, 2010), decolonial theorists have pointed out that progress frequently reflects and advances capitalism and modernity at the expense of local economic models (Escobar, 1995;

Mignolo, 2011; Quijano and Wallerstein, 1992). Perhaps because it owes more to postcolonial and decolonial argument, this is rarely questioned or addressed in the ICTD literature. As previously stated, ICTD is at risk of failing when local culture is dominated by Western assumptions (Andrade and Urquhart, 2009; Díaz Andrade and Urquhart, 2012), such as universalist or neoliberal views about global capitalism, or the nature/human dichotomy at the heart of the Anthropocene.

Yet the experiences of the two communities show that this is not a simple process. In Acará, Nature has emotional as well as monetary value, and some of its residents are reluctant to exchange elements of the surrounding nature for economic profit, in line with the critique made by proponents of the Capitalocene (Moore, 2016). Traditional values and customs are interwoven into the community of Boa Vista's economic operations, such as the production of herbs or açaí, and trustful social relations are the cornerstone of e-commerce operations. In the ETCR, the reaction of members to this challenge has been to work together to improve their farming practices. For example, by organizing their work in cooperatives based on their political principles and pooling their resources, they can produce fewer perishable goods, purchase machinery to dry fruits and vegetables, and maintain fish tanks. Neither do internet technologies only create closeness to global politico-economic systems - they also serve to remain distant - nor is closeness universally desired. Any notion of development must thus necessarily be pluralistic, leaving room for "a world in which many worlds fit" (Cadena and Blaser, 2018).

In the case of Acará, several community members are engaged in the production of agricultural goods that are desired in global markets. Sometimes, digital technologies support them in creating closer connection to global supply chains, for example in the farming of herbs for an international cosmetic company. Members use their phones to verify, corroborate, or disprove information provided by the company in personal conversations, improving their power to influence negotiations in their favor. Yet in other cases, phones serve to support a tacit resistance to the growth logic of global capitalism. Several of the community members harvest and sell açaí, a local fruit considered a healthy *superfood* the world over. It is a product of the Amazon region where it is staple food, yet desired and consumed not only all

over Brazil but also abroad. It is commonly sold in a large open-air market in the states capital, Belem, where producers from the region gather early in the morning to sell their produce, as explained in chapter 8. One of the community's members, however, avoids this market, thanks to digital technology. He uses his phone not to sell more, but to collect orders in advance, deliver the pre-agreed amount, and spend less time in the market selling his goods. Instead, this allows him to make sure he has a steady income, and the secure income allows him to keep some of the produce for his own consumption, instead of trying to grow his business to sell more, something which he has little interest in. This is thus at odds with neoliberal ideas of global development through economic growth and represents a desire for a different kind of life.

While this specific practice is not rooted in an explicit ideology, some of the practices of the former guerrillas in Colombia are. As mentioned above, many of the members of the ETCR organise their economic activities in cooperatives, as a means to bring some of their Marxist-Leninist values to life within an otherwise capitalist economy, echoing their refusal of neoliberal values (although in a more explicit fashion), unlike those few members from Acará. The cooperative of this specific ETCR is supported by the national FARC organisation and embedded into a network of local and national cooperatives, coordinated by the FARC-EP party. This coordination largely takes place via the messenger service WhatsApp. As this represents a new activity for the former fighters and a new economic landscape to operate in it requires collaborative learning which is facilitated via WhatsApp. Members are in exchange with members of other ETCRs as well as with national cooperative to share experiences and questions with each other and coordinate their activities.

If these two activities represent a somewhat tacit or implicit resistance to the capitalist World System, sometimes this becomes more explicit, in the shape of outright protest in areas close to ETCR and also in Acará. As detailed in chapter 8, some members of Acará successfully used Social Media platforms to stage a protest against the incursion of a large company, connecting a nearby dam to the also nearby operations of a mining company through the vicinity of the community. These

activities and the heavy equipment it required destroyed the natural environment around the community, silting ponds and cutting down trees, without even notifying the community, let alone seeking their consent. One community member used various social media channels, especially his WhatsApp status to quickly mobilize the community to act, and thereby successfully managed to force the company into negotiations with the community.

It is perhaps crucial to mention that these exemplary practices, while representing tacit or explicit forms of resisting to capitalist forces, are not representing a complete withdrawal. All of them are means of engaging with capitalist structures yet with the aim of determining what these relations look like, of relating according to ones own preferences and values rather than simply embracing the connection. A similar description is presented by Anna Tsing when she states that matsutake pickers description of foraging as a statement of independence and an alternative to city job (Tsing, 2015b). A second reason for pointing towards these practices as resistance, however tacit they may be, is that Wallerstein's World System Analysis (and the early Marx he builds on) do not sufficiently deal with the notion of resistance to capitalist forces and the expansion of the world system. Given the highly theoretical level of his argument, he is largely silent about how the expansion of capitalism is actually met on the ground, so to say, and underplays the notion of resistance. The experiences detailed in this thesis then show that this meeting of capitalism is not uniformly accepting, but that people at the periphery of capitalism's reach try to shape this meeting in different ways and also resist to it in different ways, whether that is guerrilla warfare or the refusal to seek bigger markets for ones agricultural goods. Capitalism then does not expand uniformly.

Some practices, however, are less ambivalent and explicitly seek closer connection with the centers of the World System. Such a stance is for example exhibited in the realm of economy by Acará's dealings with the international cosmetics company. Here, the community connects to global supply chains of luxury cosmetics by growing and providing medicinal herbs to be used in skin care products. The connection was created and coordinated by the company, yet the community is willing to embrace it, as it creates considerable wealth for those who involve themselves

in it. This connection creates several translations. First, the traditionally grown herbs, used for example in spiritual baths, become commodities, marketed with their traditional value, yet devoid of this value as a product. Second, the practice of finding or cultivating the herb in the small quantities required for its traditional use is transformed by the community under the guidance of the company into a rather large-scale operation, where the community signs up to supply a pre-specified and rather large amount annually to the company. Third, community members sell the final products of the cosmetic company through internet, even though the infrastructure needed to make the internet work depend on the social capital of the community.

Digital technology and the internet play a simple yet crucial role here, facilitating the overall communication and coordination between the community members and the company. Yet even here one can find *pockets of resistance*, equally mediated by digital technology. During meetings with the company, for example, the community members use the internet to confirm claims made by the company and access information that would strengthen their own position in negotiations.

The most radical example of a refusal of connection to world systems and the role digital technologies play is perhaps exhibited by the practices of FARC-EP when they were still an active guerrilla army, as told to me by my interlocutors and friends at the ETCR in 2018 and which I term *counter appropriation* in chapter 6. There is on the one hand an escaping of digital and other high technologies as directly used against the guerrilla group by the Colombian army with the support of the United States of America, often with the intention to facilitate killing. Furthermore, there is an outright rejection of almost all digital technologies and the internet, explicitly because they themselves represent connection to the powers and structures of the center. Cell phones, laptops and the internet were actively avoided and their use punished, as usage entails the danger of being detected, even when not used directly against FARC-EP for the purpose of detection. To the guerrillas, these technologies represent connection, but as this connection itself is dangerous, even lethal, there is not even an attempt to appropriate, control or in some way shape this connection. Unlike what we see in other examples, there is only utter avoidance

of connection and of the technologies that facilitate it. Furthermore, the statements by an ex-combatant regarding *imperial technology* illustrate their awareness that these technologies are not in some way neutral, simply facilitating connection or communication, but that they themselves already embody the center, and shape the relation they facilitate. They do not enable a neutral or equal manner of relating to each other, but one that is already shaped in favour of *imperial forces*, skewing the power scale towards the center.

Similar to the embracing of the supply chain in Acará, yet addressing social rather than economic relations, the former guerrilla use the internet, especially Facebook, to make contacts with wider Colombian society, reconnecting to family members outside the guerrilla group or to former friends, thereby also reaching out, in a way, to persons who are closer to the centers of the World System, having never turned their back in the same way as FARC-EP members did when joining the guerrilla group. The newly formed political party's social media activity can also be read as an embracing of connections to larger social systems, yet equally represents the wish to shape these systems through political means and take control of their relation to these systems and their own representation in a pro-active manner. Just like the overall fight of the former guerrilla group, this is not a complete refusal, a walking away, but a pro-active practice to shape the relationship and determine which position one takes in relation to the political-economic systems. The idea of being on the periphery of the Capitalism, Pericapitalism, has been useful to understand the economic practices in Boa Vista do Acará, which are connected in many ways to the capitalist world system, but are often guided by other, non-capitalist-oriented values, as in communities like ETCR. While pericapitalism might offer hopeful glimpses into a possible non-capitalist future, the edge of capitalism is also a risky and destructive place to be for communities like Boa Vista, turning items into commodities to be traded on the global market, their artistic practice into mass production, craftspeople into global entrepreneurs and at least some relations between villagers into hostile competition.

11.3 Behind the Glorious Digital Capitalist Development

As I have shown in the description of Acará's and ETCR's economic activities, both communities are participating with broader globalised capitalist institutions in certain ways while keeping a distance in others. Those friction put light on the pressures that exist inside and outside of the communities. The inside pressures for development, in such less privileged areas, are related to the lack of not only basic public services like access to sewage system, transportation, waste collection and postal service, but also beneficial economic, social, and political change in their community. As I showed in 8, people feel the need to send their kids to the capital for education, instead of learning traditional professions in the community. While basic and public service do not reach those area, internet has been seen as the infrastructure that can bring the change. The internet is contemporary capitalism's nervous system, linking capitals, rural villages, and everything in between into a worldwide network. Internet connectivity, together with the friction of development, makes new forms of power-relationships appear, while also making some old and traditional relationships to excel. Those sensitive and complex relationships are needed, even though not always desirable, to make the digital development work. In this section, I will bring some examples of those needs that I encountered in different communities: rural, environmental, HCI, and Academia.

11.3.1 In the Environment, Wicked Cycle

In chapter 9, I discourse on how mineral and metal extraction are an essential part of the technologies used in development. As a result, understanding the role of mining, including the severe environmental and social consequences, is important for HCI research and applications. Communities living near mining and industrial sites, especially in the Amazon region where Acará and ETCR are located, are affected by ecological impacts, while they rely on digital technologies to effectively advocate for their own local visions of development. Fishing is a popular source of income and food for residents of the village and the surrounding area. However, big fish have mysteriously vanished in recent years, and the people could only capture small fish. A large river, called Mucurupi, is connected to the rivers that

surround the community of Acará and the city of Barcarena. Barcarena is home of a Norwegian industrial operation for alumina (aluminium's raw material) refinement and aluminium production. Aluminium is used in a variety of applications, the most frequent of which include power lines, telecommunications, aerospace components, and consumer electronics. Electronics manufacturers generally employ it to cool CPU and graphics processors, but newer models are also incorporating aluminium bodies and casing components (Flagel, 2020), since it is 100 percent indefinitely recyclable (Association, n.d.). As a result, the computing infrastructure at the heart of HCI is likewise reliant on aluminium operations such as those inside of the Amazon rainforest. Even though the case presented in chapter 9 is small, together with a wealth of literature on small and large scale mining (Jacka, 2018; Aráoz, 2020), it illustrates how the patterns of economic exploitation of the colonies resources that began during historical colonialism continue in the age of modernity/coloniality, even if in disguise of global trade and relying on language of development (Quijano and Wallerstein, 1992). Resources are taken from the Americas to support the development of the centers of the capitalist world economy, even if this presented as a way to develop the place of extraction, the majority of profits flow back to the center (Loomba, 2005). The computing industry, and HCI as an extension, a central component of this structure.

As shown in the chapters 9, 7 and 8, there is thus a level of vicious, ironic, and wicked cycle. Cellphones and internet infrastructures assist people in coping with changes and negative consequences of development, such as the example where community members in Acará use the social media to protest against the destruction that the deployment of electricity power lines causes - those power lines connect damns to mining industries. However, the tools used to combat environmental degradation, potential health effects, and subsequent loss of income are reliant on the very raw materials provided by the mining that is at the heart of the nearby community's development.

The dilemma we highlighted through Acará exemplifies a number of relationships and processes that point to global colonial power structures (Quijano, 2000) and how they play out in the region. In this scenario, the Global North is represented

by a European business engaged in economic extractivism in a Global South country; transforming those raw materials into goods to be sold to the communities that fight against their footprint (see more about inward and outward growth in (Tavares, 2000)). As seen in chapter 1, the Amazon territory has been exploited for its resources (human and natural) for centuries in a process that began during colonialism and continues in modernity/coloniality. I would dare to say that the speed of exploitation/destruction of Amazon resources became deeply intertwined to the demand of minerals in the development of digital technologies, as most of the deforestation in the Amazon is illegal, linked to crimes like illegal mining (WWF, 2020). Even more dramatic, it is the shift to renewable energy that will increase demand for minerals (Watari et al., 2019). We are not attempting to justify the idea of denying all the technological advancement. Instead, we propose that we pay closer attention to our reliance on minerals and metals. The rate of development as defined by modernity and colonialism, as well as the ways in which it occurs in Amazonian communities, is terrifying.

The wicked problem happens as a result of development decisions that have consistently undervalued the environment while prioritizing economic expansion. Technological advancements have contributed to the enormous demands that some human behaviour have placed on the world. However, there are plural ways of living (see more about it at chapter 8) that have tangible reflections that sustain and give significance to the various types of social organization seen in hundreds of Indigenous cultures. They have created truly sustainable experiences that can guide our future decisions and maintain human survival. Not only concepts of coexistence with other species of nature, and great regard for the land, but also concepts of reciprocity between people, and fraternal companionship.

11.3.2 In the Community, Social Capital Extermination

As shown in the 8 and 7, both communities, Acará and ETCR, lack individual zip codes and postal service in the region. However, those services are crucial to order and deliver products online, which forces members to be creative with the logistics of products that they buy and sell. In the case of Acará, the consultants

use different trustful contacts to make it happen. Some use the address of relatives in the capital, others use the address of businesses or restaurants of families and friends. The travel costs are not added to the product's price, so many of them pay from their own pocket to make the logistic effective.

The relationship built in the community, before the arrival of the internet, was extremely necessary to make the economic change happen through the internet. I use here the importance of the *bonding social capital*. Bonding and bridging capital are types of social capital, a concept introduced by Gittell and Vidal (1998) that Putnam (2000) explored in the U.S. Bridging social capital refers to social capital that enables a community to build relationships with others. Bonding social capital refers to social capital that strengthens bonds within a community. In this case, I use this concept to analyse how communities like Acará and ETCR, became stronger because of their abundant bonding social capital. Years of building a strong social network amongst them led to valuable outcomes, such as trust, cooperation, a strong feeling of community and shared values. Those outcomes are necessary infrastructure for gaining access to products bought/sold online. However, an improved internet connection also seems to erode this social infrastructure. This is exemplified by the stories of cosmetic consultants in chapter 8, that sell cosmetics from brand catalogues. They now solely use the paper catalogue to photograph the pages and send them to clients over WhatsApp. There's also the option of transmitting the whole digital version over WhatsApp, where the client can select the goods they want, but this requires adequate bandwidth and data packages on both ends. The relationship between consultants and clients has an important social component and the act of participating in the sharing of product knowledge is itself regarded as a pleasant experience. The relationship is clearly a trustful one, some consultants who restricted their service to the WhatsApp messenger complained that they miss going to the clients' houses to chat. The physical distance that the online connections can create can also damage the social capital built for many generations, as it was shown in the case of Acará.

An example of the importance of bonding social capital to bridge new social capitals with the internet support, was shown in chapter 7, when ex-combatants

were looking for family members, who were not part of FARC-EP, through Facebook. Instead of starting a conversation with them online, they would count with the help of other ex-combatant (a bonding social capital) to contact family members in person (a bridge social capital), often traveling long distances, to inform ex-combatants' family members that she or he is alive and wants to reconcile. Here again, the internet alone would not work without the social capital built for many years before the Peace Agreement. Furthermore, bridging social capital is more difficult to develop than bonding social capital since it develops among people who do not share common aims, beliefs, or viewpoints. Even though the social media (Facebook and WhatsApp) strengthen the bonding and bridging social capital of both communities, we do not know how it will evolve in the future as nowadays even bonding social capital is mostly maintained through social media. This can be understood as a form of *extermination in data colonialism*, a term used by Couldry and Mejias to refer to "the gradual elimination of social spaces that can exist outside data relations" (Couldry and Mejias, 2019, p. 216). They compare historical colonialism's eradication of cultures, languages, and ways of life to the media's homogenization agenda, in which diversity is suppressed in the name of conformity. Those impositions are the basis for the power structures like Coloniality of Power, Knowledge and Technology; where different ways of thinking and living and lack of high or digital technologies impoverish and devalue the society.

11.3.3 In the Academy, Knowledge Disregarded

It would be a mistake to believe that the Global North or its sciences are to blame for all the problems that Third World cultures are facing at this time in history. Legacies of oppression and exploitation exist in many other societies as well. However, the balance sheet for contemporary sciences and other knowledge traditions looks uneven. Even the most intelligent non-European people got used to seeing themselves and their communities as an *infra-humanity*, meaning that their destiny was to occupy a subordinate position for the European population growth (Ribeiro, 2007). The feeling of inferiority is also found within the former colonized nations, like Brazil – eternal disciple of Europe (Pinto et al., 1969). Much of the

reason is because the process of whitening the country did not work well (read more about it at Santos and Hallewell, 2002).

I pointed out in chapter 5 that Western science has an unjustifiable dominant position in the globe, which is expressed even more forcefully by decolonial intellectuals and Indigenous and Native communities through *epistemic disobedience* (Mignolo, 2009b). We must do something to overcome an often unjust and unequal relationship when working with people who have different ways of knowing the world - and to avoid the *epistemicide* de Sousa Santos (2015) has warned about. It's also critical to be willing to unlearn what one already knows if that knowledge isn't beneficial or even harmful in a certain situation, and to collaborate to develop new knowledge and practice. For example, as academics, we must *deschool* (Illich, 1971) our own worldviews as a "permanent decolonization of thought" (Castro, 2014, p. 40). A new *emancipatory common sense* that rejects the Western's innate intellectual privilege and respects the richness of local knowledge everywhere (de Sousa Santos, 2015; Smith, 1999; Pinto et al., 1969).

To live and thrive in this new era of unlimited expansion, we must rethink growth in a way that honors the connection between people and between people and the earth and have in mind that the footprint of the wealthy is making worse the lives of those who live with less. For example, an Indigenous or ribeirinho person, whose stewardship helps maintain most of the world's tropical forest, offset the carbon emissions of a Western person of the world's richest 1% (UNDP, 2020). Nonetheless, those Amazonian people's knowledge continues to be seen as outdated, not wise. Those local, Indigenous, rural, and traditional knowledge are disqualified, as shown in chapter 2. Through *coloniality of power* and *of knowledge* (Quijano, 2000), decolonial thinkers point the need of a more diverse ways of thinking, recognising the historical processes in which those knowledges have been turned into subaltern forms of knowledge.

In that sense, as shown at chapter 8, most of the community's practices rely on knowledge that has been passed down from generation to generation, and from the surroundings. Some rural producers from Acará sell just the amount that the

environment can give to them – instead of looking for more clients or to produce more. Ancient and traditional ways of farming açaí and cassava-based products have been disturbed by smart phones, where most of these products are sold through WhatsApp. Nonetheless, environmental limitations remain the same besides the use of digital technology. Despite the fact that their increased market connection may enable them to sell more, the overall amount produced—and sold—remains unchanged.

On the other hand, Amazonian practices such as *Banho de Cheiro* (spiritual herbs bath rituals), which were once only known by some elderly people, are now featured on the pages of international cosmetic outlets, and the resources used are even sold by descendants of the traditional knowledge retainers, such as the consultants we mentioned earlier. The corporation with which the community is interacting used this former non-capitalist activity and its foundation in ancestral knowledge to boost the value of its products, which are created using herbs from communities like Acará, and turn them into commodities. For that reason, some members of Acará learnt how to grow herbs on a large scale to use them in cosmetics. Each year, approximately 20–50 tons of the herb and root in their natural state are sold to the international cosmetics company.

Another form of exploitative pericapitalism is how native products like açaí and cassava have been taken for harvesting and processing. Their manufacture requires specific skills passed down from their forefathers, and the supply chains for those items are entirely reliant on the continuation of these practices and the knowledge required. Young members move to the city to work on small or big companies, using their manual strength and traditional skills to work on açaí or cassava, instead of working close to the family. The village's way of life may not last much longer due to the arduous labour, the poor value associated to cassava farming, and the elders encouragement to the youth to learn another skill.

11.4 Consequences for HCI

To conclude the discussion, I briefly try to break down these deliberations for HCI research and interventions. While I do not attempt to draw out any concrete implications for design in the two contexts I studied, I believe my research and my engagement with the concepts I introduced and discussed so far holds various lessons for an HCI practice that attempts to intervene in contexts at the periphery of the modern/colonial world system.

As I outlined in chapter 2, members of the HCI community as well as private companies and NGOs have attempted for quite some time to improve internet access in rural communities (Dye et al., 2018; Nemer et al., 2013) and to *connect the unconnected*, as such attempts are frequently called, even though this terminology ignores the many ways in which people are connected to each other and to global systems, without a reliable internet connection. These attempts include so-called Telecenters, large-scale industrial initiatives such as Elon Musk's starlink network or Facebooks Freebasics program or community-driven bottom-up community-networks which are often initiated and supported by NGOs. Apart from receiving criticisms for violating net neutrality (Sen et al., 2017) or extracting data from users in unfair ways (Avila Pinto, 2018; Young, 2019), my work provides another angle from which such initiatives can be scrutinized. Following the lines of thought of decolonial thinkers such as Mignolo (2000), Quijano (2007), and Grosfoguel (2011) and Wallerstein (2004), such attempts can be understood as connecting communities to the structures of modernity/coloniality or Wallerstein's World System. All initiatives, whether academic, corporate or community-driven proclaim to improve connection for the benefit of these communities. There are however many different ways to connect to these structures of modernity/coloniality, as my studies show, and different underlying wishes of how to connect. The *how* in question here does not refer to the underlying technology, whether an improved connection is achieved via WiFi or Satellite link, but what kinds of social, economic cultural connections and practices an improved internet connection enables. In my studies, outlined in the previous chapters and the subchapters, include connections that range fro fully embracing economic relations with multinational companies and their global supply

chains, seeking closeness, to tacit or explicit resistance. These different preferences are in my work unearthed through detailed ethnographic studies, listening closely to people and most importantly an participatory and egalitarian approach to research that searches to build personal and trustful connections.

However, HCI and especially HCI4D has been largely unattentive to the different conceptualisations and especially the criticism of development, as has been pointed out not last by (Díaz Andrade and Urquhart, 2012). Being unattentive then runs the risk of working in service of coloniality, of creating or infrastructuring exploitative economic relationships, of destroying or replacing local knowledges, practices and relationships in the name of development.

Ethnography has arguably been part of HCI4D and other HCI interventions before, as for example embedded in the socio-informatics approach (Wulf et al., 2018). Even though part of my argument is to highlight the importance of such careful ethnographic studies attentive to the different material practices and desires based on which community members connect to global structures, I would also argue that such studies are not sufficient. As I have mentioned before it also requires knowledge of and sensitivity to the problems and injustices of modernity/coloniality, as well as reflexivity and the ability and willingness to unlearn and re-learn what one believes.

The argument and the implication for HCI is then not simply to abstain from or to fully embrace connectivity improving interventions, as the same technology can facilitate many different ways of relating to global structures and *development*. While possibly destructive, they can also be immensely helpful to communities in determining their place in relation to the world system or modernity/coloniality. Nevertheless, there is reason to be hesitant and critical. On the one hand, internet connectivity and especially the use of platforms and tools such as Facebook, WhatsApp or Google tools is not a neutral activity but one that works in favor of these companies. For surveillance capitalism, their dominant underlying business model, it does not matter whether community members use WhatsApp to sell products to multinational companies or to organise resistance against them - what counts

us *use*, as any activity and the data that can be extracted from it is economically valuable. Secondly, hardware and the business of computing and thereby of the academic discipline of HCI is built on exploitative and destructive structures such as the extraction of minerals from countries such as Brazil to, e.g. the United States or China to produce computing devices, from chips to cases. Thirdly, those massive production affects the technological style of the rest of the world. Where the coloniality of technology reinforce the solution-oriented and capitalist technological practices, which may include cultural domination, economic dependence, or environmental pollution.

This is thus a serious dilemma interventionist, well-intentioned and even decolonial-minded HCI researchers are faced with. While my thesis offers insights into the nature of this dilemma, it offers no solution. As I and my co-authors mention in chapter 9, this is something we as HCI scholars have to deal with, sit with and cannot ignore, but need to address together.

12

Conclusion and Outlook

Through the various chapters of this thesis, diverse aspects regarding use of digital technology in two rural communities in the Amazon rainforest were explored. They are both located at the periphery of the global capitalist world system, participating in this system without being fully absorbed by it. One community is located in the Brazilian region, with traditional and some Indigenous values, and the other in the Colombian region, formed by FARC-EP former combatants, with strong Marxist values, and being reintegrated to the Colombian society. The dissertation takes a detailed look at the economic life of such *pericapitalist* communities and reports and reflects on the process of building the relationship in those community as an activist-academic and the process of building a safe space in the academy as an academic-activist.

In the first part of my dissertation, I bring personal motivations to engage in the academic world, and the reasons for why I chose to write my thesis on my work with communities in the Amazon rainforest. I outline the context of the region and the pressures to *develop* the region. In the sequence, I introduce important concepts like Decolonial thinking, World System Analysis, Capitalocene and Pericapitalism.

In the second part, chapter 3, I describe the community of Acará and ETCR and a brief description of my engagement with each of them. In chapter 4, I describe and reflect on the traditional and decolonial methodologies used during my engagements with the communities. Here I also include a paper written with two colleagues where we discuss the connection between activism and academia, approaches that support such a viewpoint, and the challenges we faced.

The third part is divided into five chapters, each of which corresponds to a single paper. Two papers focused on the use of digital technology in Acará, two papers focused on the use of communication technologies by ex-combatants before and after the Peace Agreement, and one paper focused on the HCI's role in the Capitalocene.

The fourth and last part is the conversation of all six papers where I reintroduce the two communities with a World System and decolonial lens. Then, I discuss what is behind the *glorious* digital capitalist development and the discomfort and destruction that it causes in the environment, in the community, and in the academy.

By pointing out those discomforts about the Digital Capitalist Development I do not mean to warn against HCI interventions but indicate the importance for detailed studies to inform interventions, and the need to investigate the economic assumptions, models, and knowledge contained in HCI initiatives, as well as inside ourselves as HCI researchers. It is important to realise that technology presents itself as the discussion about ways to substitute practices and produce something. This production is constituted by theoretical considerations of a field of human knowledge that consolidates such reflections. My thesis alerts to the seriousness of involving reflexivity in those processes, or a critical examination of our own role as HCI researchers in the creation of this knowledge, as well as the values and epistemologies contained in our research procedures and technical instruments, allowing this examination to affect the interventions we carry out.

HCI projects, rather than promoting a false universalism embedded in modernity, can help to build a pluriverse, as recommended by decolonial philosophers (Escobar, 1995; Mignolo and Walsh, 2018; Quijano, 2007) and proponents of decolonial computing (Ali, 2014). Decolonial researchers' works warn against a universal and eurocentric worldview, criticize the concept of progress, and propose alternative concepts like Buen Vivir as a way to start questioning our own preconceptions. They do not give us specific recommendations, but they assist in better understanding the demand circumstances for any HCI intervention and how they differ from our own thoughts and expectations. In Boa Vista, this could entail focusing on ways to support the social network (see e.g., Garrison et al., 2021) that underpins the cosmetics

business, rather than replacing it with infrastructure that may be more efficient but erodes social cohesion and general social contact, as several merchants have already expressed concern. It could mean supporting communication with clients, in order to encourage scaling down rather than scaling up local productions. In the ETCR, this could mean supporting the communication between the numerous cooperatives created after the Peace Agreement or help them to maintain the social bonding capital built before the Peace Agreement. Listening in this way, comprehending and reflecting on the conditions that emerge during the research, may even lead us to conclude that demand for HCI interventions is not actually existing (Baumer and Silberman, 2011a).

This is particularly pertinent when I consider the tensions felt in Acará or ETCR, as well as the diverse reactions I observe to the disruptions caused by capitalism's reach and assisted by communication technologies. However, sensitivity to the pluriverse, I believe, serves as a counterbalance to the colonial viewpoints criticized above, allowing us to focus on the local culture's existing strengths, interests, and assets (Pei and Nardi, 2019). The relationships between economic practices and global economic systems are explored in this thesis. Finally, the lessons I learn from rural Boa Vista and ETCR practices, as well as the literatures I address here, are applicable not only to HCI projects in peripheral areas, but also to larger HCI interventions. If HCI is to contribute to global human (and non-human) well-being, we must think more profoundly about our relationship to the economic systems in which we work. The ongoing destruction of the planet, which will eventually affect human life even more, is a product of a particular way of being in this world, of nature unnecessarily made cheap and stretched beyond its limits to satisfy capitalisms growth imperative (Moore, 2016). Rural communities like Boa Vista and ETCR demonstrate what it means to resist growth and labor within nature's constraints, relying on local resources, and promoting social cohesiveness. These lessons, I believe, are applicable to a wide range of HCI domains, not just *4D*, and can help to question an economic and academic demand for more and new technologies.

In those communities, Acará and ETCR, there is no interest, on the part of telecommunication companies, in providing quality internet in areas where there is not a minimum of contracted data package plans by the population, as explained at 8. However, those communities contract expensive private or deploy an autonomous telecommunication network because they cannot find alternative communication technologies that will serve their needs better. In the care in which we design things to improve their use of those communication technologies, every tool should pay careful attention to local circumstances. What are the resources needed and what is going to be sacrificed to have that new practice? Is there a way to replace the local practices that are *exterminated* by the internet? For example, with the internet in Acará, the door-to-door relationship between the consultant and client was broken. How can the internet support or contribute to restore them?

Acará and ETCR members use their WhatsApp status to announce parties, gatherings, and football tournaments, which makes the social capital stronger. However, companies like Meta, want to know even what is happening when users are not on the internet. How can it be guaranteed that our designs do not contribute to the *Surveillance capitalism* - a business model based on the commodification of personal data with the primary goal of profit (Zuboff, 2019)? Nevertheless, many apps already claim to turn what would be an insignificant private act into a social celebration, like the example mentioned by (Couldry and Mejias, 2019), where a novelist says: "I have contracted out one of the essential functions of my body to a piece of software," referring to an app that reminds users to drink water regularly while tracking progress. In that sense, social media companies, like Meta, want to offer free internet in the Amazon rainforest, so that the contract comes in the form of user data. The inversion of values is puzzling, as there is a big fuss about connecting people to the internet, but not to electricity or a garbage collection system. In the same way, the person is connected to electricity and must pay for the electricity bill, even though they cannot afford it. The person connected to the internet uses it, either addictively or productively (economically or socially), and pay for it in the form of their data.

The growing use of social media in rural areas is subordinated to the data and cultural consumerist ideology that empties the meaning of existence and collective belonging. The increasingly exclusive use of social media for communication in communities such as Acará and ETCR not only dissolves social relationships and transforms traditional knowledge into a commodity appropriated by large companies, but also contributes to environmental devastation (due to the minerals needed to access data and the energy consumption to maintain data). I believe the *rule* used to measure technological development in the world is only causing damage. Can technology be measured in compliance with Indigenous knowledge, like understanding the capacity of the nature to regenerate? Or the number of externalities as consequence of the production of a specific technology? Where are the regulatory bodies to challenge those powerful companies of data colonialism? What direction the capitalization life is expected to take in the future, and what kind of societal order/disorder this will imply in rural and non-rural communities? Forms of human connection should be free of the costs of data colonialism's regime, and the traditional or Indigenous ways the internet is used should be respected.

The internet supports the communication and selling of my friends' productions, but luckily some do not feel the need or pressure to sell more because of their awareness about the resources available or, the most important, they have a clear understanding about the environment and the regeneration speed of the nature. We have a lot to learn from them. The Indigenous philosopher Ailton Krenak points out that when we remove the self-identity from the river, or the mountain that contains minerals, for example, when we remove their senses, thinking that this is an exclusively human attribute, we allow these places to become residues of extractivist industrial activity (Krenak, 2019a).

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