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Designing Community Economies

Exploring Alternatives for Infrastructuring Food Waste Activism

Katie Berns

Doctoral Thesis in Information Society at Stockholm University, Sweden 2023

Designing Community Economies

Exploring Alternatives for Infrastructuring Food Waste Activism

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Academic dissertation for the Degree of Doctor of Philosophy in Information Society at Stockholm University to be publicly defended on Friday 22 September 2023 at 13.00 in Aula NOD, NOD-huset, Borgarfjordsgatan 12, Kista.

Abstract

By drawing on past CSCW and SHCI scholarship engaged with how technology can support the collaborative work of organising activism and empowering people to respond to diverse sustainability challenges– my research contributes to the emerging field of digital civics by introducing the human geography concept 'community economies' as a new way to frame and determine the scope of the design of digital technologies for infrastructuring food waste activism. Using a combination of ethnographic research and participatory action research (PAR), the empirical data were collected through two long-term collaborations with food-sharing communities in Denmark and Sweden and through a collaboration with researchers on a related project that focused on a food-sharing community in Germany. The findings and contributions of the work include (1) the identification of the key concerns, values, and existing sociotechnical practices involved in establishing and maintaining activist food-sharing communities, (2) insights into and reflections on the design of sociotechnical practices that support food-sharing as a form of community economy, considering challenges such as recognising the variegated capacities of participants and balancing diverse and sometimes conflicting community values, and (3) the determination of how new food-sharing communities scale their impact in different ways such by growing larger, joining forces with other local food initiatives, or proliferating by learning from similar, more established communities in different locations. The discussion centres around three key dimensions that address the research questions; food-sharing as activism, designing sociotechnical sharing and governance practices, and designing community economies. Within these areas, I discuss the tensions that emerged regarding the role of technology in the three communities and unpack how a combination of existing mainstream technologies and bespoke civic technologies act as an infrastructure for the organisation, enactment, and proliferation of community-led food-sharing initiatives.

Keywords: *Digital Civics, Food-Sharing, Activism, Food Waste, Community Economies, PAR.*

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Abstract

By drawing on past CSCW and SHCI scholarship engaged with how technology can support the collaborative work of organising activism and empowering people to respond to diverse sustainability challenges– my research contributes to the emerging field of digital civics by introducing the human geography concept 'community economies' as a new way to frame and determine the scope of the design of digital technologies for infrastructuring food waste activism. Using a combination of ethnographic research and participatory action research (PAR), the empirical data were collected through two long-term collaborations with food-sharing communities in Denmark and Sweden and through a collaboration with researchers on a related project that focused on a food-sharing community in Germany. The findings and contributions of the work include (1) the identification of the key concerns, values, and existing sociotechnical practices involved in establishing and maintaining activist food-sharing communities, (2) insights into and reflections on the design of sociotechnical practices that support food-sharing as a form of community economy, considering challenges such as recognising the variegated capacities of participants and balancing diverse and sometimes conflicting community values, and (3) the determination of how new food-sharing communities scale their impact in different ways such by growing larger, joining forces with other local food initiatives, or proliferating by learning from similar, more established communities in different locations. The discussion centres around three key dimensions that address the research questions; food-sharing as activism, designing sociotechnical sharing and governance practices, and designing community economies. Within these areas, I discuss the tensions that emerged regarding the role of technology in the three communities and unpack how a combination of existing mainstream technologies and bespoke civic technologies act as an infrastructure for the organisation, enactment, and proliferation of community-led food-sharing initiatives.

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Sammanfattning

I denna avhandling studeras och analyseras sociotekniska praktiker för att skapa och upprätthålla aktivistiska så kallade “food-sharing communities” (individer och organisationer som arbetar för minskat matsvinn och hållbar livsmedelskonsumtion för att rädda överskottsmat och istället omfördela den till andra behövande i samhället). Arbetet bygger på tidigare forskning inom datorstött samarbete (Computer Supported Cooperative Work - CSCW) och hållbarhetsinriktad människa-datorinteraktion (Sustainable Human Computer Interaction - SHCI) som utgångspunkt för hur teknik kan stödja aktivism och ge människor möjlighet att möta olika hållbarhetsutmaningar. Avhandlingen bidrar därmed till det framväxande området “digital civics” (ungefär “medborgarcentrerad teknologi”) genom att introducera det humangeografiska begreppet “community economies” med dess fokus på lokalsamhällens välbefinnande, stärkandet av sociala relationer och främjandet av hållbar utveckling. Begreppet “community economies” används således för att rama in och stödja utformningen av digital teknik till stöd för aktivism för minskat matsvinn.

Empiriska studier har genomförts via etnografiska metoder och deltagande aktionsforskning (Participatory Action Research, PAR) i form av longitudinella samarbeten med två “food-sharing communities” i Danmark och Sverige, samt ett samarbete med forskare i ett relaterat projekt i Tyskland. Resultaten från studierna inkluderar, (1) identifiering av centrala frågor, värderingar och sociotekniska praktiker inom aktivistiska “food-sharing communities”, (2) insikter och reflektioner kring utformningen av sociotekniska praktiker som stöder “food-sharing” som en form av “community economy” och (3) fastställandet av hur nya “food-sharing communities” sprider sin aktivism primärt genom att växa, slås samman med andra matrelaterade initiativ, samt genom att dra lärdomar från andra, mer etablerade grupper. Diskussionsavsnittet kretsar kring tre nyckeldimensioner: i) “food-sharing” som aktivism, ii) design och organisation av sociotekniska praktiker för omfördelning av överskottsmat, samt, iii) designutmaningar för “community economies” i andra sammanhang.

Contents

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Sincerely,
Katie

Included Publications

Paper I

Berns, K., Rossitto, C., & Tholander, J. (2021). Queuing for Waste: Sociotechnical Interactions within a Food Sharing Community. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21) (pp. 1–15). Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3411764.3445059

Paper II

Berns, K., Rossitto, C., & Tholander, J. (2021). "This is Not a Free Supermarket": Reconsidering Queuing at Food-Sharing Events. In C& T '21: Proceedings of the 10th International Conference on Communities & Technologies - Wicked Problems in the Age of Tech (C&T '21) (pp. 319–331). Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1007/s10606-023-09468-5

Paper III

Engelbutzeder, P., Bollmann, Y., **Berns, K.**, Landwehr, M., Schäfer, F., Randall, D., & Wulf, V. (2023). (Re-)Distributional Food Justice: Negotiating conflicting views of fairness within a local grassroots community. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23) (pp. 1–16). Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3544548.3581527

Paper IV

Berns, K., Rossitto, C., & Tholander, J. (2023). Learning from Other Communities: Organising Collective Action in a Grassroots Food-sharing Initiative. Computer Supported Cooperative Work (CSCW). Retrieved from https://doi.org/10.1007/s10606-023-09468-5

Additional Publications

- **Berns, K.**, & Rossitto, C. (2019). From commodities to gifts: Redistributing surplus food locally. In P. Travlou & L. Ciolfi (Eds.), Ethnographies of Collaborative Economies Conference Proceedings (Paper No. 12). University of Edinburgh, Edinburgh, UK. ISBN 978-1-912669-11-0.
- Larsen-Ledet, I., Light, A., Lampinen, A., Saad-Sulonen, J., **Berns, K.**, Khojasteh, N., & Rossitto, C. (2022). (Un) scaling computing. Interactions, 29(5), 72–77. https://doi.org/10.1145/3554926
- Rossitto, C., Lampinen, A., Bødker, S., Light, A., **Berns, K.**, & Hui, J. (2020). Reconsidering Scale and Scaling in CSCW Research. In Conference Companion Publication of the 2020 on Computer Supported Cooperative Work and Social Computing (CSCW '20 Companion) (pp. 493–501). Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3406865.3419409
- Rossitto, C., **Berns, K**., & Larsen-Ledet, I. (2020). Strategies of visibility: Growth, media, and social movements. In The 23rd ACM Conference on Computer-Supported Cooperative Work and Social Computing (p. 5). Presented at the Computer-Supported Cooperative Work and Social Computing, New York, NY, USA: ACM.
- **Berns, K**. (2020). Co-creating a platform for sharing in a Grassroots Food-Sharing Community. In Proceedings of the 18th European Conference on Computer-Supported Cooperative Work: The International Venue on Practice-centred Computing on the Design of Cooperation Technologies.
- **Berns, K.** (2020). Sweden: A City-Centric Sharing Economy Built on Trust. In A. Klimczuk, V. Česnuityte, & G. Avram (Eds.), The Collaborative Economy in Action: European Perspectives (pp. 323–329). Limerick, Ireland: University of Limerick.

“A discarded avocado […] is still unmistakably an avocado (albeit with a bruise or two). On its merits, it is edible once more. Its former stigma becomes negotiable. As such it represents a rebuke to familiar modes of consumption and commerce. Indeed, the very existence of such valuable garbage poses an existential challenge to the taken-for-granted-ness of market norms”

(Giles, 2021, p. 49)

Introduction

Alternative food systems are dynamic structures of food production, distribution, and consumption that manifest in opposition to the conventional, mainstream food system. They are typically small-scale initiatives that operate within or on the fringes of conventional food systems and focus on increasing access to and the quality of food and localising production and distribution (Campbell, 2004). In this thesis, I build on existing knowledge of alternative food systems (Clear et al., 2016; Hearn and Wright, 2014; Prost et al., 2019; Raturi et al., 2017; Trauger and Passidomo, 2012) to investigate the sociotechnical practice of 'food-sharing' as an alternative model of food distribution. Food sharing – the act of giving or receiving food to/from others, has been a longstanding human practice for ensuring access to food and for building social relations to strengthen mutual support systems in small-scale societies (Davies, 2019). Over the last few years, food-sharing practices in the Global North have been connected to efforts toward addressing sustainability goals related to more responsible production and consumption [I] (Ciaghi and Villafiorita, 2016; Davies and Legg, 2018) and focusing on food waste reduction through the (re)distribution of surplus food items that would otherwise go to waste (Davies, 2019).

I situate my research within the emerging field of digital civics (Crivellaro et al., 2014; Schrock, 2018; Taylor et al., 2015; Vlachokyriakos et al., 2016), which explores technology as a mediator for empowering civic initiatives to enact social change related to contemporary societal challenges (e.g. food waste reduction). More specifically, my work aligns with the related research areas of computer-supported cooperative work (CSCW) and sustainable human-computer interaction (SHCI). There are clear connections between CSCW and SHCI research. CSCW scholarship has become increasingly engaged with how digital technology can support more informal work practices such as care work (Rossitto, Korsgaard, et al., 2021), volunteer work (Voida et al., 2015), and the work of organising activism/collective action (K. Hansson, Pargman, et al., 2021; Korsgaard et al., 2022). At the same time, there is a burgeoning interest among SHCI researchers in cooperative rather than individual interactions with technology

[I] UN Sustainable Development Goal 12 Responsible Production and Consumption: aims to halve per capita global food waste at retail and consumer levels and reduce food loss along production chains by 2030.

(Silberman et al., 2014) to mediate and support efforts to address complex ecological, social, and economic challenges (L. Hansson et al., 2021). My thesis furthers this line of inquiry by unpacking the informal collaborative work of organising and running surplus food-sharing communities. It investigates how digital technologies can be adopted and/or designed to support this work while considering pre-existing community concerns, values, and practices. Furthermore, my research also explores and critically reflects on the ways in which interactions with digital technologies (e.g. social media platforms, and online forums) can support and transform the collective on-the-ground work of surplus food-sharing initiatives.

While past work has unpacked how surplus food-sharing can be framed in different ways (Chies, 2017; Michelini et al., 2018; Morrow, 2020; Rombach and Bitsch, 2015), namely as a charitable endeavour (e.g. donating surplus items to a foodbank), a business opportunity (e.g. selling surplus items at a reduced price), or a form of community-led activism (e,g., distributing surplus food for free within local communities). My research investigates food-sharing initiatives that fit the community-led activism framing of sharing where surplus food items that are no longer profitable, but still useful (Giles, 2021) are (re)distributed for free within local communities. Similarly, building on existing scholarship that draws attention to diverse digital tools and operational practices adopted by such communities (Davies, 2019; Ganglbauer et al., 2014)–I contribute a detailed account of how digital technologies help to bring together specific configurations of activists and researchers over the shared concern of food waste– and how this can lead to the formation of surplus food-sharing communities. Expanding on this, my thesis contributes new knowledge on how collective action forms around broader social movements (K. Hansson, Pargman, et al., 2021; Kow et al., 2016; Kuznetsov et al., 2011) by highlighting learning as a sense-making process between geographically dispersed sharing initiatives whereby volunteers share their knowledge of other initiatives and consider their adaptability to the new context.

To do this, I introduce the human geography concept of 'community economies'(Gibson-Graham, 1997) to the digital civics research community as a new way to determine the scope of the collaborative work and design of sociotechnical practices in surplus food-sharing communities. Research in this area investigates the emergence of informal economic activities that exist under the radar of the mainstream economy (e.g. care work, volunteer work, non-monetary exchange, and gifting) and unpacks how society might cultivate and learn from these practices. I borrowed this concept as an alternative to the more well-known concept of the 'sharing economy' (Felländer et al., 2015; McLaren and Agyeman, 2015) – which despite its promises of sharing, trust, and community has become highly criticised for ushering dominant free-market practices into previously protected areas of our lives (Light and Miskelly, 2015; Slee, 2017). My work also contributes new knowledge on the challenges and opportunities that can arise when people share food for free (Dombrowski et al., 2013; Ganglbauer et al., 2014) and unpacks how this relates to how the values of different community members converge and evolve over time. Specifically, I highlight how in addition to (re)distributing surplus food, members view the community as a space to bring people together, engage in activism, and develop more sustainable food practices on a long-term basis. Finally, as a more practical

contribution, I present five sets of design sensitivities for researchers, designers, and activists to take into account when tackling similar challenges across diverse contexts.

1.1 Designing Community Economies

My thesis introduces the notion of 'designing community economies' to describe the deliberate and proactive approach to shaping and supporting alternative food distribution practices. This design approach draws from the work of human geography scholars who illustrated how community-centred economic systems are cultivated by nurturing and supporting activities, relationships, and resources that are already present in community settings (Gibson-Graham et al., 2017). Design in this context focuses on how members of community-led food-sharing initiatives collaboratively negotiate and design the shared value system, relationships, sociotechnical practices, and the sharing models and mechanisms around which communities are established, run, and sustained over time.

Throughout my PhD, I have been inspired by elements from a number of design traditions. First and foremost I see the design of community economies as a cooperative and participatory endeavour (Dearden et al., 2014; Foth and Axup, 2006; Muller and Kuhn, 1993; Sanders and Stappers, 2008) and as an intervention that can be facilitated by action research. In particular, I have engaged with Manzini's notion of diffuse design in bottom-up community-driven initiatives (Manzini, 2014). This work highlights the impact of design-led processes carried out by various social actors who, consciously or not, make use of the natural affinity people have for design (Manzini and Coad, 2015), allowing them to imagine, develop, and manage something new, outside of standard ways of thinking and problem-solving (Manzini, 2014). Connected to this, during my research, I have embraced design that takes place in a myriad of contexts and spaces, such as, for instance through structured discussions and workshops but also on an ad hoc basis as part of the practical work of food waste activism (e.g. running food-sharing events).

In the early stages of my research process, I discovered that the intriguing, on-the-ground work of sharing surplus food happened through a set of face-to-face practices and interactions that take place without digital mediation. Interactions with technology were limited to organisational tasks, the intricacies of which have already been unpacked in previous studies (see, for example, Bødker et al., 2016; Ganglbauer et al., 2014; Rossitto and Lampinen, 2018). Considering Schrock's work on civic technology (Schrock, 2018), this led me to recognise that in community-centred food-sharing settings, design is often about supporting social change rather than digital innovation. Therefore I decided to keep surplus food-sharing as a research topic but adopt a more pragmatic approach to research and design (Keates, 2006) engaging with communities in a practical and grounded manner. This allowed me to embrace new ideas and develop new relationships and connections by participating rather than simply observing food-sharing activities. As a result, the focus of my study shifted from investigating current technology use to exploring how to design digital infrastructures that support complex

sociotechnical practices, values, and relationships that are embedded in food-sharing. Le Dantec (Le Dantec, 2016a) argues that a key characteristic of infrastructures is that they are (re)configurable in that they can be continuously renegotiated and reshaped in response to the emerging needs, practices, and understandings of collective action within a community. Considering the work of Teli et al., which describes how designers can act as intermediaries in community settings (Teli et al., 2020; Teli et al., 2022), my role as a designer has been to ensure that diverse perspectives and knowledge sets are brought to bear on design problems– and as an active participant in the community, this also includes my own knowledge and perspectives. A more detailed account of how I have navigated and balanced my dual roles as a design researcher and a community activist is presented in Chapter 4.

In my work, I take into account the broader landscape in which the technology is adopted and used rather than having a product-centric view of design (Manzini and Coad, 2015). Echoing work that troubles techno-solutionist narratives (Jensen et al., 2021) by exploring 'when the implication is not to design' (Baumer and Silberman, 2011) or 'inaction as a design decision' (Homewood, 2019), there are several instances throughout my thesis work when it was concluded that technological intervention was not suitable or would do more harm than good, e.g. hindering social interaction. Therefore, digital interventions are typically aligned with digital civics and civic technology research that advocates that technology should be used as an infrastructure that can support bottom-up activist work rather than as a direct means of problem-solving (Dahlberg-Grundberg, 2016; Fuad-Luke, 2009; Schrock, 2018).

Overall, my thesis work focused on designing sociotechnical practices that can support rather than overtake or replace the instances of on-the-ground collaboration, care work, and community building embedded in food-sharing practices. Community economies thinking helped with this by highlighting the importance of recognising social dynamics and interdependence in diverse economies (Gibson-Graham and Roelvink, 2009), due to the specificity and fluidity of community-led activism (Sendra, 2018), the design work carried out did not result in the creation of new systems. Rather, it resulted in reflections and sensitivities for how technology may or may not act as a mediator for *'the shared dependencies and commitments that define relations within and amid different publics"* (Le Dantec, 2016b, p. 28).

1.2 Drivers of Food Waste

A study carried out by a network of institutions involved in research on and initiatives against food waste in Europe (Canali et al., 2017), outlines how the drivers of food waste in Europe are complex and multifaceted, influenced by various technological, institutional, and social factors. *Technological* factors that lead to food waste include inefficiency and errors in the use of food processing technology, poor storage conditions, inadequate packaging (Canali et al., 2017) and the prioritisation of aesthetic appearance over food safety (Thyberg and Tonjes, 2016). *Institutional* factors such as food production subsidies that lead to overproduction and

An image captured at a surplus food-sharing event in Stockholm, Sweden.

EU date labelling requirements [II] also contribute to waste when retailers or distributors are reluctant to sell products that are close to their *'best before"* or *'display until"* date label even when the food is still legally considered safe to eat (Stenmarck et al., 2016). *Social* factors such as overbuying, poor meal planning, or misinterpreting food date labels (Canali et al., 2017; Toma et al., 2020) also contribute significantly to overall food wastage.

However, while many reports indicate that households are larger contributors to waste than the food retail industry (see, for example, Stenmarck et al., 2016) recent studies indicate that these figures underestimate the actual amount of food waste occurring at the retail level by up to 44% (Cicatiello et al., 2017; Eriksson, 2012). Moreover, much of the food discarded at the retail level is considered as 'surplus' rather than 'waste' as it is still edible but for various reasons is not sold to or consumed by the intended customer (Sert et al., 2014). This means that a considerable amount of the food discarded by retailers has a high degree of recoverability (Ciaghi and Villafiorita, 2016) and typically fulfils the health and safety requirements for donation (Sert et al., 2014).

As will be discussed further in Chapter 4 and Chapter 5 food waste activists have a clear focus on reducing commercial waste, and they engage in activism related to both institutional and

[II] In the EU, *'use by"* dates are mandatory for foods that are highly perishable and could be unsafe to eat after a certain period, and *'best before"* dates are mandatory for foods that have a longer shelf life but may lose quality over time (legislation reference number: 1169/2011)

social drivers of food waste (Berns et al., 2021a, 2022; Engelbutzeder, Bollmann, et al., 2023). Practically, this involves communities working with food businesses to rescue surplus food items that will not be sold due to factors such as the date labels on food products, overstocking, damaged packaging, or season-specific food items, e.g. holiday-themed items. The donated food is then sorted and (re)distributed locally for free.

1.3 Objective and Research Questions

The objective of my PhD research has been to investigate the role of community economies (Gibson-Graham et al., 2017) in developing alternative food systems and how digital technology can support or undermine grassroots activism against food wastage. The overarching focus of my research was to understand the central motivations and sociotechnical practices that help food-sharing communities get started, the practical work of running food-sharing activities, and how initiatives are maintained over time. The initial work served to guide and structure my investigation into the broader landscape of food sharing as an activist movement by developing a nuanced understanding of the key concerns, values, and sociotechnical practices involved in food-sharing communities. Connected to this, my second research goal was concerned with the design of sociotechnical practices that can support the on-the-ground work of collecting, sorting, and (re)distributing surplus food within a volunteer-led food-sharing community. This inquiry led to the identification of a number of the challenges that community members faced while distributing food for free, such as how to break away from more dominant models of food distribution and how to negotiate conflicting perspectives on what constitutes 'fair' sharing. To address these concerns, my third research goal focused on how community economies thinking (Dombroski et al., 2018; Gibson-Graham et al., 2017), which explores alternative economic practices, might help to frame and determine the scope of the design of these sociotechnical distribution practices.

RQ1: *What are the key concerns, values, and sociotechnical practices involved in establishing, sustaining, and running activist food-sharing communities?*

RQ2: *How can sociotechnical practices be designed to support food-sharing as an alternative to mainstream models of food distribution?*

RQ3: *How can a community economies perspective help to frame and determine the scope of the design of such sociotechnical practices?*

1.4 Outline of the Research Approach

Over the five years, I adopted an ethnographic and participatory action research (PAR) approach to understand and contribute to a decentralised set of affiliated food-sharing initiatives in Denmark, Sweden, and Germany. My research is structured around three case studies. In Case Study I, I investigated the Danish initiative FoodSharing Copenhagen (FS-CPH), an es-

tablished community that has been operating since 2016. In Case Study II, I investigated the Swedish initiative FoodSharing Stockholm (FS-STHLM), a newly established community that I have been involved in since its inception. Coinciding with this, I also joined and contributed to Case Study III, a related project investigating the food-sharing initiative FoodSharing Siegen (FS-SGE) in Germany that built on the earlier conceptual work of my research.

By adopting a pragmatic PAR approach (Hayes, 2011, 2014), the research in my thesis was conducted in collaboration with the two central communities introduced above (FS-CPH and FS-STHLM). This research approach was adopted as a way to address issues that affected each specific community while also understanding the role of digital technology in infrastructuring social change more generally. This meant that members from each food-sharing community were active participants in the research process. In the first case study, I spent several months conducting fieldwork to understand the nuances of the FS-CPH community, before organising workshops to define the goals of the research and explore the design of possible interventions. In the second case study, participation in the research process began right away when the group came together to set up the community; together we investigated the process of organising food waste activism from the ground up. Similarly, my co-authors in Germany also adopted a PAR approach in the third case study, working with FS-SGE community members to unpack how diverse food resources could be distributed in a fair and just manner. Overall, the PAR approach enabled me to share control of the research process and outcomes with fellow community members (Vines et al., 2013); for instance, they participated in deciding on the focus of the study and data analysis.

1.5 Overview of Publications & Contributions

The contributions of this thesis were published in the four papers listed below; there are two conference papers presented and published at the CHI conferences (2021 & 2023), a paper presented and published at the Communities and Technologies conferences (2021), and an article published in the Springer CSCW journal (2023). In what follows, I provide an overview of the four publications, describe the division of work between my co-authors and me, and summarise the central contributions of the work.

Paper I

***Katie Berns**, Chiara Rossitto & Jakob Tholander. (2021). Queuing for Waste: Sociotechnical Interactions within a Food Sharing Community. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (CHI '21) (pp. 1–15). Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3411764.3445059*

This paper is the result of my collaboration with the FS-CPH community. I was in charge of the research activities, which included planning and carrying out the interviews, observations, and workshops, as well as taking the lead on the data analysis. I had the main responsibility in

writing this paper but was assisted by my co-authors Chiara Rossitto and Jakob Tholander who contributed to the text and provided comments and suggestions on how to situate the findings within past work and articulate the design sensitivities. This paper contributes to work on digital civics with an enhanced understanding of how alternative queuing practices (the act of waiting in line for goods or services) are organised at non-monetary, surplus food-sharing events. The paper illustrates how members of the FS-CPH community have experimented with three different systems of queuing at events in an attempt to structure food distribution in a manner that would align with the community's core values and motivations, e.g. supporting mutual relationships and community building.

The paper contributes a set of sensitivities to consider when designing sociotechnical queuing mechanisms in community settings that disrupt the dominant narratives of individualism and efficiency to instead foreground discourse around food waste activism and processes of commoning and care. It investigates how queuing might be designed differently in community economies that exist on the fringes of the mainstream economy. These sensitivities serve as inspiration for other food waste activists and designers to experiment with alternative queuing systems that move beyond the standard first-come-first-served model that is standard within mainstream market models, e.g. supermarkets. They highlight how these alternative systems reflect the environmental activist and post-capitalist values of the community by, for example focusing on reducing waste rather than feeding people, considering fairness, and prioritising relational, rather than transactional, interactions. Moreover, the study reveals concerns related to how queuing can impact feelings of appreciation and reciprocity for the unpaid labour of community volunteers further illustrating how mundane practices like queuing can transform community dynamics.

Paper II

***Katie Berns**, Chiara Rossitto, & Jakob Tholander. (2021). "This is Not a Free Supermarket": Reconsidering Queuing at Food-Sharing Events. In C&T '21: Proceedings of the 10th International Conference on Communities & Technologies - Wicked Problems in the Age of Tech (C&T '21) (pp. 319–331). Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/346156*

This paper is also part of my collaboration with the FS-CPH community in Case Study I. For this study, I was responsible for planning and the collection of data, which consisted of collecting observations, and a co-design workshop. Chiara Rossitto assisted with the facilitation of the workshop. I took the lead on the data analysis with my co-authors providing assistance later in the process. I was the main author of the paper and Chiara Rossitto and Jakob Tholander contributed to the writing process and provided comments and feedback on the related work and overall structure of the findings.

Building directly on the work of Paper I, this paper contributes to the field of digital civics by developing knowledge on the design of value-sensitive, digitally mediated queuing systems. Through a co-design process, FS-CPH members envisioned what queuing at food-sharing events might look like if it was centred around certain values e.g. efficiency, care, safety, or education. Moreover, the participants explored how these values could be supported using different digital and non-digital artefacts e.g. a digital information kiosk, QR codes, or items of clothing. This design work offers insights into how seemingly mundane practices such as queuing can help to communicate activism around food waste and allow people to encounter others at events by creating transparency in queuing practices. Based on this knowledge my co-authors and I put forward a set of design sensitivities that highlight how queuing in community settings might be designed to; facilitate different constellations of people (e.g. families or friend groups) rather than just individuals, allow queuing to take place in different settings (e.g. sitting in groups) rather than requiring people to wait in line, enable people to start queuing before an event takes place (e.g. using digital tools), and reflect different reasons for queuing.

Paper III

Engelbutzeder, P., Bollmann, Y., ***Berns, K.****, Landwehr, M., Schäfer, F., Randall, D., & Wulf, V. (2023). (Re-)Distributional Food Justice: Negotiating conflicting views of fairness within a local grassroots community. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23) (pp. 1–16). Association for Computing Machinery, New York, NY, USA. https://doi.org/10.1145/3544548.3581527*

The project presented in this paper is the result of a collaboration between my co-authors Phillip Engelbutzeder and Yannik Bollmann and the FS-SGE community. My co-authors were responsible for planning and carrying out the data collection and analysis. Under the guidance of Professor Volker Wulf and Professor Dave Randall, Phillip Engelbutzeder was the main author of the paper and invited me to join the project during the analysis phase. The research presented in this paper was in many ways influenced by my earlier conceptual work on the unexpected and transformative effects of queuing practices at food-sharing events. I also contributed by researching and writing the related work section to situate the findings within past digital civics work, and my previous analytical work that showed how fairness becomes a practical concern food-sharing activists need to deal with when they are planning and enacting community work.

Paper III contributes to digital civics research on food-sharing communities by questioning the narrative that redistributing surplus can be considered a sustainable food practice as it typically treats the symptoms rather than the cause. My co-authors and I illustrate how combining food waste reduction practices with other digitally mediated efforts such as localised food production, community kitchens, and food literacy programs can lead to a more 'deep change' in conventional food practices. Connected to this, the paper develops new knowl-

edge on how digital technologies may help or hinder connections and coordination among a diverse set of food initiatives working toward more sustainable and just food practices in different ways. Considering this added complexity, the paper zooms in on how fairness and reciprocity are conceived of across these non-monetary, community settings by articulating five different conceptions of fairness, namely charitable fairness, contribution-orientated fairness, equality-based fairness, no-waste fairness, and systemic fairness.

Paper IV

***Berns, K.**, Rossitto, C., & Tholander, J. (2023). Learning from Other Communities: Organising Collective Action in a Grassroots Food-sharing Initiative. Computer Supported Cooperative Work (CSCW). Retrieved from https://doi.org/10.1007/s10606-023-09468-5*

This paper is the result of my collaboration with the FS-STHLM community. I was responsible for all research activities, which included planning, carrying out, and documenting contextual inquiries and participant observations, as well as planning, implementing and reflecting on a number of design interventions that took place as part of my PAR approach. I took the lead on the data analysis with my co-authors providing assistance later in the process. I had the main responsibility in writing this paper, and my co-authors Chiara Rossitto and Jakob Tholander contributed to the conceptual framing of the paper, in addition to contributing to the structure of the analysis and situating the contributions within past work.

Paper IV contributes to the digital civics research community by providing a detailed firsthand account of how the work of setting up the FS-STHLM community was considerably simplified by learning from and adopting many of the sociotechnical practices of similar established communities. The paper draws attention to three central themes that illustrate the role of previous experience in setting-up FS-STHLM: setting up the community, setting-up sharing, and exploring governance models. By drawing on social movement studies, investigations into the organisation of collective actions, and grassroots governance, to help understand how community initiatives develop together, this paper provides an understanding of food-sharing practices from a meta-perspective with a concept we have described as 'collective histories of organising'. This concept captures the distributed but cooperative work of setting up and governing surplus food-sharing communities and continuing the cycle of learning from other communities; the paper also contributes with design sensitivities for configuring capacities, sharing, and participation in grassroots food-sharing communities.

“Technology should be thought of as social and community infrastructure. So if you are tempted to ‘hack technology’, think first about how you’re changing community infrastructure as a whole.”

(Schrock, 2018, p.54)

Background

Three strands of previous scholarship can be used to situate the contributions of my thesis within a broader research area. In Section 2.1, I draw on work that investigates the role of technology in alternative food systems, focusing on how digital technologies support community-led food production, distribution and consumption practices. Following this, I look specifically at previous literature on the role of technology in community-led food-sharing initiatives. In Section 2.2, I summarise related work on the role that digital technologies play in supporting and infrastructuring community-led initiatives. In this section, I begin by outlining past work on organising activism, social movements and the design and formation of publics (K. Hansson, Sveningsson, et al., 2021; Klandermans and Oegema, 1987; Le Dantec, 2016a) that articulates the ways in which individuals come together and engage in collective action around shared issues of concern. Building on this I look specifically at the concept of *infrastructuring* (Le Dantec and DiSalvo, 2013) as a means by which publics can form and unpack work on collective artefact ecologies (Korsgaard et al., 2022) to frame the intricate relationship between communities and technologies. In Section 2.3, I engage with past scholarship on grassroots governance that addresses the challenges of successfully sustaining and scaling community-led initiatives over time. Finally, in Section 2.4, I outline the gaps that I have found in the existing literature that I address in my thesis.

2.1 Food-Sharing as An Alternative Food System

My research builds on a growing body of HCI and CSCW research devoted to alternative and community-led food systems that aim to promote more sustainable, equitable and socially just food production, distribution and consumption practices (Svenfelt and Zapico, 2016; Weber et al., 2020). The literature has explored how technology can support unconventional and regenerative agriculture practices, such as permaculture (Doggett et al., 2023) and seed sharing (Heitlinger et al., 2018), how technology can support alternative food distribution models, such as community-supported agriculture (CSA) (Landwehr et al., 2021), food-sharing (Ganglbauer, 2013), and local food networks (Prost et al., 2018)– and how technology can support alternative food consumption practices, such as plant-based diets (Lawo et al., 2020) and food waste

reduction (Ciaghi and Villafiorita, 2016). This interest in community-led or collective food practices can be seen in HCI research on food and sustainability, with an increasing focus on more complex network-based approaches that strive to understand material circumstances, social practices, and the celebratory aspects surrounding food (Engelbutzeder et al., 2020; Grimes and Harper, 2008; Heitlinger et al., 2018), rather than changing the 'problematic' behaviour of individuals (Hedin et al., 2019; Mantel and Prilla, 2019).

Alternative Food Systems in SHCI

Work by Heitlinger et al. investigated how SHCI research can support fairer and more sustainable food systems by focusing on urban food-growing communities (Heitlinger et al., 2013), and food commons (Heitlinger et al., 2021). Their work discusses the implications of designing grassroots urban food-growing communities. For example, they illustrate the importance of designing for face-to-face communication by taking into account that many people choose not to use mobile phones and laptops when engaging in farm activities and designing for communal action by supporting collective action towards sustainability (Heitlinger et al., 2013). Connected to this, subsequent work investigates the co-design of interactive systems with urban agricultural communities to support more sustainable and culturally diverse food production and consumption (Heitlinger et al., 2018), as well as, exploring how new algorithmic technologies such as the blockchain could be used to create a more fair and sustainable food system and focusing on how food can be managed for collective benefit and technologies can be used to recognise and value the contributions of other organisms, such as bees or soil microorganisms (Heitlinger et al., 2021).

Relatedly, a recent study by Landwehr et al. (Landwehr et al., 2021), investigates a German CSA initiative that developed a distribution system using its own currency called the 'Luzerne' to facilitate the distribution of products among its members. The currency is intended to represent the value of the products ordered each month and is used as an accounting instrument and as a feedback mechanism to allow members to estimate their expenses. The article discusses the solidaristic principles on which the movement is based and techniques to mediate between consumer wishes and the constraints of local agricultural production. The authors highlight how blockchain technology would clash with the long-term community value of sustainability and propose that alternative distributed ledger technologies should be taken into account.

Prost et al. have conducted extensive research on the concept of food democracy (Prost, 2019; Prost et al., 2018), which emphasises equal access to healthy, sustainable, and culturally appropriate food for all individuals. Working with socio-economically deprived communities in the U.K., the authors investigate the role of technology in empowering communities to have a say in decision-making processes related to local food production and distribution. The authors unpack the development of a local food network using the *Open Food Network*, an open-source piece of software to manage online farmers' markets. Through their inquiry, the authors illustrate the tensions that emerged around diverse environmental, social, and economic goals within the network, and they highlight the importance of earnestly consider-

ing factors such as social and economic justice and democratic governance when designing technologies to support alternative food movements (Prost, 2019; Prost et al., 2018).

Digitally Mediated Food-Sharing Initiatives

Food-sharing initiatives are alternative food systems that promote and support more ecologically sustainable food distribution practices (Chies, 2017; Engelbutzeder, Randell, et al., 2023; Ganglbauer et al., 2014; Rombach and Bitsch, 2015). Although food-sharing is a long-standing human practice, contemporary food-sharing practices are predominantly driven by a desire to reduce waste by (re)distributing surplus, rather than simply throwing it away (Giles, 2021; Michelini et al., 2018). Moreover, food-sharing practices today are often mediated through digital technologies such as social media or even purpose-built platforms that support the logistics and organisation of food sharing (Davies and Legg, 2018).

Past research highlights that people can have complex relationships with food (Holweg et al., 2010; Prost, 2019; Quested et al., 2013) and that these relationships can influence how food is accessed. For instance, studies have documented the stigma and feelings of shame attached to accessing food banks (Garthwaite, 2016; Purdam et al., 2016) and how people often connect free food to indigence and prefer to pay for food, even if the price is just symbolic (Holweg et al., 2010), while others view any form of discounted food as suboptimal (Cicatiello et al., 2019). A clear example of this emerges in Paper III; FS-SGE volunteers spoke of instances when there would be considerable amounts of food left after sharing events because potential recipients were concerned about taking it away from people who needed it more, ultimately resulting in that food going to waste.

Therefore, the nature of food-sharing for waste reduction can vary depending on factors such as the type of food being shared, with whom it is shared, and the reasons that sharing takes place. As mentioned in Chapter 1, past work has helped to make sense of the diverse motivations and sociotechnical practices of different surplus food-sharing practices by identifying three emerging models; profit, charity, and community (Michelini et al., 2018). This framework helps to distinguish between sharing that is carried out as a green business opportunity whereby businesses sell surplus food to customers at a reduced price (Zeinstra and Haar, 2020), food that is shared to support people experiencing food insecurity (Vlaholias et al., 2015), and food that is shared for free by community-led initiatives as an activist response to food waste (Chies, 2017). While all efforts to reduce waste are valuable, it is important to recognise that digital interventions must be tailored to fit the specific framings, values, and needs of these diverse approaches to the reduction of food waste.

Research has examined the collaborative efforts involved in organising activism (Menendez-Blanco et al., 2017; Mosconi et al., 2017, illustrating the intricate sociotechnical network of systems, information, individuals, values, and ideologies that define activist initiatives (Bødker et al., 2016; Brünker et al., 2019; Erete, 2015). This is also true for digitally mediated food-sharing that adopts a range of tools such as social media (Davies, 2019), online platforms (Ganglbauer et al., 2014), mobile applications (Harvey et al., 2020), and messaging services

(Engelbutzeder, Randell, et al., 2023). However, scholars have also unpacked the different ways in which these tools shape social interactions and dynamics within food-sharing communities. For instance, although tools like Facebook can help community-led sharing initiatives to manage organisational tasks (e.g. advertise events) (Berns and Rossitto, 2019) and enable them to reach larger audiences (Davies and Legg, 2018), research has also illustrated how these tools can sometimes be misaligned with the core values of community members (Ganglbauer et al., 2014; Rossitto, Lampinen, et al., 2021).

Moreover, even purpose-built civic technologies specifically designed to align with the activist values of communities such as solidarity and commoning (Chies, 2017; Ntouros et al., 2021), can sometimes facilitate unintended, conditional forms of exchange. For example, a study of the German food-sharing platform foodsharing.de found that the affordances of the platform allowed individual participants to limit food sharing to recipients who fit their specific interpretation of 'in need' (Ganglbauer et al., 2014). This undermined the principles of the community by creating distinctions between help-seekers and help-givers, resulting in feelings of shame and discouragement among recipients.

2.2 Infrastructuring Food Waste Activism

Throughout my PhD, scholarship from the field of digital civics has helped me to understand the role that digital technologies can play in supporting bottom-up social change and empowering people to engage in activism related to social and sustainability issues (Balestrini et al., 2015; Vlachokyriakos et al., 2016). Most prominent was the concept of *infrastructuring* which refers to the underlying systems and structures that support the interactions and relationships between people, places, and objects. This focus on integrating digital artefacts within the specific social and organisational contexts in which they exist is pertinent for supporting grassroots activism and social movements; promoting social, environmental, or political change is more important than digital innovation (Amenta and Polletta, 2019; Selvanathan and Jetten, 2020).

Social Movements and Publics

To investigate how digital technology can support and infrastructure food waste activism, I look to past work on activism, social movements and the formation of publics (K. Hansson, Sveningsson, et al., 2021; Klandermans and Oegema, 1987; Le Dantec, 2016a). Past CSCW scholarship has delved into the process of online activism, highlighting how it begins with a shared passion for a political cause (for example, (Larsen-Ledet and Rossitto, 2023)) and unpacking how information and communication technologies (ICTs) play a crucial role in developing the culture of these initiatives, connecting local activism to global movements, and utilising technology as a means of fostering relationships (K. Hansson, Pargman, et al., 2021). This work aligns with earlier research in CSCW and HCI that examined the concept of 'publics' (Dewey, 1954; DiSalvo, 2009; Le Dantec, 2016a); a public refers to a specific configuration of

individuals who are affected by a shared set of issues. Along with shared issues, Le Dantec highlights two other concepts that are central to the constitution of publics (Le Dantec, 2016a), namely infrastructuring (as outlined above), and attachments which account for the emotional connections that people have with each other, places, and objects.

For more than a decade, researchers have explored how the intentional design of spaces or platforms (e.g. physical locations or online communities) can bring people together around shared issues and support community initiatives to foster attachment to shared concerns and sustain engagement in collective action (DiSalvo, 2009; DiSalvo et al., 2014; Le Dantec, 2012, 2016a). As civic participation requires ongoing involvement, a sense of effecting change and a sense of belonging to a process (McCarthy and Wright, 2015), this often requires practical on-the-ground work. LeDantec argues that this type of action is a central part of designing and participating in publics and that the prevailing lack of engagement with public life is not due to a lack of motivating shared issues but rather is a result of people feeling helpless in their ability to address these issues (Le Dantec, 2016a). Although related work highlights how such designs can help activists to reach a broader audience, facilitate collective action, and create a sense of community and solidarity among participants (Fuad-Luke, 2009), LeDantec argues that people also need mechanisms to meaningfully connect and act on these issues (Le Dantec, 2016b).

Technology as an Infrastructure

As introduced above, infrastructuring is a term used to describe the process of creating and sustaining the material and social conditions necessary for publics to form and engage in collective action (Le Dantec, 2016a). Past digital civics scholarship has emphasised the interplay between social and technical interactions when examining how practical activities, values, and social structures are intertwined with the design and use of technology (DiSalvo, 2009; McCarthy and Wright, 2015; Schrock, 2018). Work by Schrock highlights how 'technology should be thought of as social and community infrastructure' (Schrock, 2018, p. 54) and should therefore align with and support the existing social practices and values of the community. Le Dantec argues that a key characteristic of infrastructures is that they are (re)configurable in that they can be continuously renegotiated and reshaped in response to the emerging needs, practices, and attachments within the community (Le Dantec, 2016a). Therefore infrastructure design is an ongoing and iterative process that relies on the expertise of those involved in collective action (McCarthy and Wright, 2015) as it is important to understand that when one 'hacks' or reconfigures technology, it is necessary to think about how the community infrastructure will change as a whole (Schrock, 2018, p. 54).

Connected to the concept of infrastructuring, is work on artefact ecologies (Bødker and Klokmose, 2011, 2012; Jung et al., 2008). While e work on artefact ecologies is also concerned with understanding and designing technological systems in relation to their sociocultural contexts it pays particular attention to the interconnections and interdependence of different artefacts (both physical and digital), the contextual understanding of their use, and the emergence of properties from combinations of artefacts (Bødker et al., 2017; Vasiliou et al., 2015). Later

work on *collective artefact ecologies* (Korsgaard et al., 2022) unpacks how artefact ecologies in collectives are typically not created strategically but rather are the result of the various contributions and knowledge of the community members and shows how they interact with, complement, or even conflict with each other (Bødker et al., 2017). Because of this, it is important to understand the specific context in which artefacts are situated, as creating effective artefact ecologies relies on the in-depth knowledge and local expertise of community members (Vasiliou et al., 2015). As these artefacts are chosen by, and often adapted by, members of a collective, it is argued that artefact ecologies should be viewed as instances of design as opposed to considering the interactions between collectives and artefacts simply in terms of how they are used (Korsgaard et al., 2022).

Related work also outlines how infrastructuring as an approach emphasises the importance of designing *with* rather than *for* local communities (McCarthy and Wright, 2015; Schrock, 2018) and how participatory design can help to foster a sense of ownership and investment in the technology, which can, in turn, encourage users to become more engaged in civically focused activities (Preece, 2001). Moreover, when designers have a better understanding of the social and political context in which the technology will be used, this can ensure that the technology is relevant and effective and help to ensure that these decisions are made with consideration for the social and political implications of the technology (J. Bardzell and Bardzell, 2013). Past work unpacks how the process of designing digital infrastructures includes a recognition of the capacities (i.e. the abilities, skills, or resources of individuals or groups) that can be built through the design process itself (Le Dantec and DiSalvo, 2013). Le Dantec and Disalvo refer to this as a shift from 'design-for-use' to 'design-for-future-use' (Le Dantec and DiSalvo, 2013, p. 16). The authors argue that the shift of focus from activities that occur prior to use to activities that might occur in the future means that the work of design is no longer about the product per se but instead about creating the conditions in which solutions to future issues can be considered.

2.3 Governing Food-Sharing Initiatives

Past work has highlighted how small, locally organised civic initiatives such as food-sharing communities can struggle to sustain their efforts over time (Biørn-Hansen and Håkansson, 2018). Challenges such as coordinating and aligning goals, strategies, and actions while respecting the autonomy and diversity of participating members (Tandon, 1997) or building and sustaining trust, mutual respect, and accountability among members (Flores and Samuel, 2019) can lead to conflicts or even the eventual dissolution of the initiative. Therefore, research has highlighted how it is important for civic initiatives to have a clear vision, strong leadership, and effective strategies for addressing challenges in order to increase their chances of success (Dana et al., 2021).

The Challenges of Self-Governance

Past HCI and CSCW work has investigated the intricacies of self-governance across different contexts such as maker-spaces (Schmid, 2021), community-based recycling organisations (Davies, 2009), feminist activism (K. Hansson, Sveningsson, et al., 2021; Larsen-Ledet and Rossitto, 2023), open-source software development communities (N. Schneider, 2021b), and platform co-operatives (Cherry, 2016). These examples draw attention to the myriad of challenges that can arise while striving for democracy in grassroots initiatives, such as enabling flexible participation, juggling burnout from volunteer work, documenting work and transparency, negotiating rules and norms, balancing structure and openness, managing emotional labour, and balancing community ethics, ideologies and pragmatism. In my thesis, I align with scholarship that describes grassroots democracy as being *'practised through a system of norms, values, societal processes and institutional arrangements fueled by the commitment and capacities of ordinary people'* (Tandon, 1997, p. 4), rather than as a system based on formally defined rules and procedures.

Past work shows how finding a balance between formal and informal governance structures can be difficult. For instance, technology and democracy scholar Nathan Schneider (N. Schneider, 2021a) exemplifies how despite the democratising potential of the Internet, technology often assumes that there should be admins or mods with nearly absolute power to censor or exile members when conflict occurs. However, in another article, the same author (N. Schneider, 2021b) warns of the 'tyranny of openness' that he has seen emerge in peer-production communities with regard to open-source software licensing. The latter publication is inspired by Jo Freeman's 1972 essay 'The Tyranny of Structurelessness'. (Freeman, 1972). The central argument of this essay is that structure will exist whether it is formalised or not, and that groups that purport to be leaderless and non-hierarchical will simply end up with leaders and hierarchies that emerge regardless; this can happen among socially privileged participants or more active volunteers ultimately creating communities he regards as undemocratic. To counteract this Freeman encourages activists to adopt simple, explicit forms of 'democratic structuring' and make power structures that participants can use or challenge visible (Freeman, 1972).

Templates for Organisation

Connected to these challenges, a recent book by Dana et al. named Community Rules (Dana et al., 2021) serves as a practical guide for individuals and groups attempting to navigate the process of creating and sustaining healthy communities, both online and offline. The book acknowledges the ease with which communities can form and grow through online social networks, but it also highlights the potential challenges that arise in terms of power sharing and conflict resolution. Nine templates for organisational structures that communities can adopt/adapt to suit their specific needs are presented in the text. Examples include *Benevolent Dictator* a structure in which one person holds the ultimate decision-making power until the group is ready for a more inclusive structure; *Do-ocracy*, a structure in which those who take initiative to do something in the group can decide how they do it; and *Circles* a structure in

which units called circles have the ability to decide and act on matters in their domains (Dana et al., 2021).

2.4 Identifying Research Gaps

Previous research has advanced our knowledge concerning the use of digital technologies for sustainable, equitable, and socially just food practices. However, further research is needed to understand food distribution in diverse and unconventional economic models. Engaging past work has explored topics such as negotiating crop distribution in CSA memberships (Landwehr et al., 2021) and digitally mediated food commons (Heitlinger et al., 2021). However, we lack an understanding of the on-the-ground efforts that make sharing possible. For instance, we lack knowledge concerning the work of coordinating the real-time distribution of food at events at which donations vary in terms of the quantity and types of food, and the number of recipients who will attend events is unknown. Similarly, past studies have examined surplus food-sharing practices focused on reducing food waste with different approaches and values (profit, charity, community). However, a research gap exists when it comes to designing digital interventions that align with community-centred, activist food waste reduction efforts. Previous work shows that even purpose-built food-sharing platforms may inadvertently replicate dominant distribution models that do not match the community culture (Cicatiello et al., 2017; Ganglbauer et al., 2014).

Past digital civics work (Crivellaro et al., 2014; Fuad-Luke, 2009; Giles, 2021; Le Dantec, 2012) provides insights into community engagement, participatory practices, and collective decision-making (Le Dantec, 2016a). However, there is a gap in understanding how publics are collaboratively created and sustained in food-sharing communities. Detailed research is needed on the practical aspects of organising and hosting public sharing events and how technology can potentially support alternative food distribution models that consider social ties and horizontal relationships in shaping sharing practices. Additionally, while previous studies have examined the role of complex artefact ecologies in sustaining and scaling community efforts (Biørn-Hansen and Håkansson, 2018; Bødker et al., 2016), there is a need to explore the efforts, processes, and labour required to initiate communities from scratch.

There are also significant knowledge gaps in governance practices within food-sharing communities that require further investigation. Existing research primarily focuses on online communities like open-source software development (N. Schneider, 2021a). or online activism (K. Hansson, Pargman, et al., 2021). However, an understanding of how food-sharing communities adopt and renegotiate governance and decision-making models over time is lacking. This research would critically examine decentralised community building and power dynamics both online and offline, enhancing our understanding of grassroots governance in food-sharing communities.

“Community economy names the ongoing process of negotiating our interdependence. It is the explicit, democratic co-creation of the diverse ways in which we collectively make our livings, receive our livings from others, and provide for others in turn.”

(Gibson-Graham et al., 2017, p.6)

Community Economies

To address the research gaps defined in Chapter 2, I introduce the concept of 'community economies', which was first developed by two scholars from the field of human geography who publish under the joint pen name J.K. Gibson-Graham (Gibson-Graham, 2016; Gibson-Graham et al., 2017; Gibson-Graham, 1997). Over the past thirty years, their work has inspired numerous researchers and activists (myself included) to rethink the economy as a space of political possibility (some examples of this work include Dombroski et al., 2018; Frost, 2019; Gordon, 2016; McKinnon and Kennedy, 2021). Resonating with my work, this concept offers insights into imagining and enacting local collective actions that can diversify the economy beyond the mainstream activities that are typically associated with the term, such as wage labour or commodity markets (Gibson-Graham et al., 2017). Through this diversification, unconventional and informal economic activities such as volunteer work or non-monetary exchange that typically exist under the radar of the mainstream economy (Gibson-Graham et al., 2013) emerge as relevant and valuable. In my thesis, I apply this thinking to explore the design of digital infrastructures that align with the practices and values of activist food waste reduction efforts– while also recognising the interdependence (Gibson-Graham et al., 2017; Gordon, 2016) that exists between food-sharing communities and business enterprises such as supermarkets that donate the surplus food that is shared.

Aligning with my chosen research approach, community economies scholars often engage in action research (AR) (Dombroski et al., 2018; Gibson-Graham, 2007). Past work provides concrete examples of how people can develop spaces of ethical connection and negotiation by using new markets to connect with places and one another e.g. peer-to-peer exchange networks (Trauger and Passidomo, 2012), or collaborative rather than competitive sharing (Frost, 2019). The central idea of community economies scholarship is to draw attention to economic diversity that already exists but is often marginalised (Cameron, 2015). The concept explores possible ways to 'reclaim' (Gibson-Graham and Roelvink, 2009) or 'take back' (Gibson-Graham et al., 2013) the economy by de-centring dominant forms of economic activity as the only ones that 'matter', namely wage labour, commodity markets, and capitalist enterprise (Gibson-Graham, 1997). The community economies literature illustrates how, in

the Global North, these dominant activities have become so commonsensical and intuitive that they often inhibit the articulation and dissemination of alternative ideas (Gibson-Graham et al., 2017). As a way to counteract this, rather than placing 'the economy' (i.e. wage labour, commodity markets etc) at the centre of social change, researchers work to emphasise the plurality of 'economies' that also include diverse forms of economic organisation, exchange, remuneration, finance, care, and ownership.

I use this concept as a new way to frame the sociotechnical practice of surplus food-sharing, beyond the more familiar concept of the 'sharing economy' (Botsman and Rogers, 2011), which does not capture the nuances of surplus food-sharing. Although it originated as an alternative and sustainable approach to consumption, the concept of the sharing economy has largely become associated with for-profit platforms such as Uber or AirBnB (Lampinen, 2021). This association has faced a slew of backlash and criticism for creating regulatory uncertainty and prioritising one-off transactional forms of sharing rather than more long-term relational forms of sharing (Scholz, 2015; Schor, 2016). Additionally, even non-monetary (Fedosov et al., 2019), or more place-specific framings of sharing (Light and Miskelly, 2019) in the sharing economy are inherently different from the practice of sharing surplus food in that items can be shared multiple times and the quantity and types of the items being shared are known, whereas in food-sharing contexts these factors are highly variable (Giles, 2021; Morrow, 2019b).

Considering the variability connected with surplus food-sharing, the concept of community economies can be a helpful framing of infrastructuring food waste activism. Rather than striving to design an innovative system or standalone tools to disrupt existing sharing practices– community economies thinking reminds us to foster community resilience, promote local practices, and strengthen social connections by identifying and amplifying ethical economic practices that already exist (Gibson-Graham, 2006) within larger networks of social practices, norms, and values. Examples of community economy initiatives include local farmers' markets, community gardens, local currency systems, and neighbourhood-based cooperatives (Gibson-Graham et al., 2013). Therefore, in my thesis, I unpack how activating communities as part of economic systems provides a more direct focus on the role of social ties, everyday relationships, and collectively being together in framing sharing practices, not just considering the role of exchanging resources.

3.1 Diverse Economic Practices

J.K Gibson-Graham use an iceberg as a metaphor to describe how fundamental economic practices are considerably more diverse than those that are captured by mainstream economics. This metaphor highlights the complexity of the world and acknowledges that multiple factors and interactions shape our reality, instead of simplifying the world into a few dominant factors (Gibson-Graham et al., 2013). Recognising that there is no single solution or strategy for addressing the complex environmental and economic challenges we face (e.g. food waste)

can open our minds to how even seemingly small and insignificant economic practices can have a significant impact (Gibson-Graham et al., 2013). Thus, understanding the diversity in economic practices encourages a more nuanced approach to understanding and transforming our societies. Surplus food-sharing, like other bottom-up approaches to food waste reduction such as dumpster-diving (Rombach and Bitsch, 2015) or gleaning (Morrow, 2019a) can be framed using a diverse economies perspective.

To practically unpack the idea of diverse economies, past work outlines five key identifiers of economic diversity that capture the social and material resources that enable different economic activities, namely, diverse labour, diverse enterprises, diverse transactions, diverse property, and diverse financing (Gibson-Graham et al., 2017). Diverse labour focuses on amplifying labour practices that are utilised by households, communities, and civic institutions that are unpaid but improve the well-being of people and the planet, e.g. volunteer work, housework, and care work. The diverse enterprise factor identifies three capitalist categories, namely organisation capitalist (e.g. corporations), alternative capitalist (e.g. state-run or socially responsible firms), and non-capitalist (e.g. cooperatives and social enterprise) and considers how they can be configured within community economies. Similarly, diverse transactions include market (e.g. supermarkets), alternative market (e.g. community-supported agriculture), and non-market transactions (e.g. gleaning). Diverse property highlights different forms of ownership, including private, state-run, and open-access ownership Finally, diverse financing outlines the multiple market (e.g. bank loans) and non-market (e.g. donations) resources that might be marshalled to secure better social and ecological well-being for the present and the future.

Design through diverse economic perspectives can help to trigger our imaginations concerning what the world might look like if we were to shift our focus from the dominant ways of thinking that have become so naturalised and normal that they are inherited as common sense (Liboiron, 2021). For example, what might it look like to decentre profit or growth from the design of economies (Nardi, 2019; Wizinsky, 2022). What might it look like to decentre humans as our main focus in design (de la Bellacasa, 2017). This would require us to shift away from the 'business-as-usual' mentality that surrounds Western neo-liberal societies. These design perspectives strive to establish and maintain design that can systematically remake social, political, and economic relations through a shared focus on interdependence, and more importantly, through a sensitivity to the power differentials and the responsibility that this entails (Ávila, 2022).

3.2 Care(ful) Community Economies

Care is central to community economies with a focus on the transformation of our economies to allow human and more than human communities to 'survive well together' while caring for planetary health (Dombroski et al., 2018). Community economies and care are two related concepts that focus on valuing and promoting relationships, mutual support, and collective

well-being within communities. In many community economies, care work is valued and prioritised over profit-driven activities (Gibson-Graham, 2006). This can involve practices such as collective decision-making, mutual aid, and sharing resources, all of which contribute to building relationships of trust and support within communities (Gibson-Graham et al., 2013). Dombroski et al. suggest that scholars should view care as work and as a distributed and ubiquitous starting point for transforming economies (Dombroski et al., 2018). At the same time, notions of care have been much explored within recent CSCW and HCI scholarship (Key et al., 2021; Nielsen et al., 2023; Rossitto et al., 2022; Rossitto, Korsgaard, et al., 2021). Research has, for instance, highlighted the need to focus on the role care plays in relationships between people and Internet of things (IoT) technology in the home (Key et al., 2021); it has also highlighted that care work is often invisible and typically recognised as 'work', and therefore it is typically rendered as irrelevant to technology design (Rossitto, Korsgaard, et al., 2021). Relatedly, more recent work has explored the ways in which care is enacted by asylum seekers' caseworkers while they navigate digitalised data-centred bureaucratic systems (Nielsen et al., 2023).

Looking specifically at care in community settings, Rossitto et al. illustrate how caring practices are entangled with the work of organising community-driven initiatives, focusing in particular on the interdependencies between the often juxtaposed concerns of care and efficiency:

> 'As caring practices are directed to both humans and material objects, including digital technologies, [...]sociotechnical assemblies and objects are matters of care: what comes to matter is always configured through unfolding relationships. This foregrounds the ways technologies can foster, or neglect, sociotechnical assemblages, and human-machine configurations that value – or not – relations of care'. (Rossitto, Korsgaard, et al., 2021, p. 4).

The authors detail how aspects of caring in community settings are multifaceted and can encompass multiple caring agendas simultaneously; how tension can arise between work and care when communities adopt existing technologies designed for different contexts, e.g. Facebook; and how even sociotechnical systems aimed at supporting community initiatives can result in technical features that can interfere with, or even disrupt, care and caring aspects that are central to the communities (Rossitto, Korsgaard, et al., 2021; Rossitto, Lampinen, et al., 2021). Connected to this, in the book *Matters of Care*, de laBellacasa unpacks how care requires maintenance and practical labour, not mere emotional orientations, and presents a three-dimensional vision of care as entailing labour/work, affect/affections, and ethics/politics (de la Bellacasa, 2017, p. 5). She describes how these three dimensions 'are held together and sometimes challenge each other in the idea of care' (de la Bellacasa, 2017, p. 6) and yet are not typically equally distributed nor do they interact without tensions and contradictions. Unlike normative visions of care as the good, kind and selfless works of a (usually female) carer, de laBellacasa's work describes care as situated and entangled with the specificities of places, people, practices and problems (de la Bellacasa, 2017; Philo and Parr, 2019).

Care in the Context of Food-Sharing Communities

As will be unpacked further in Chapters 5 and 6, my thesis draws attention to conceptions of care in food-sharing contexts and how they influence the adoption of digital technology among community members. In my work notions of care in food-sharing settings are captured through the sociotechnical practices of commoning, gifting, and negotiating fairness.

Commoning. Bringing aspects of community involvement and care to the forefront, commoning is concerned with practices of coexistence that recognise and constitute the commonality of being (Gibson-Graham et al., 2013). Practically this might involve embracing and valuing multiple forms and layers of participation by, for example, respecting the decision of some people to participate by attending sharing events but not organising them or by advertising events openly online. Connected to this is the concept of a 'commons', which indicates a resource that is cared for by a group of people and is built on principles of self-governance, community, and local action (Gibson-Graham et al., 2013). Research has explored a commons approach to food waste (Chies, 2017; Morrow, 2019b), recognising that a food surplus is not a commons in the traditional sense: surplus food is something to reduce rather than reproduce. However, the concept can be useful for thinking about how to infrastructure the communal care and sharing of surplus food by, for example, designing new sociotechnical practices to support alternative models of food distribution.

Gifting. In my work ideas of commons and stewardship manifested through ideas of gifting and the concept of a gift economy. Gift economies are systems of exchange in which goods and services circulate without explicit expectations of direct compensation (Cheal, 2015). Gifting in community economics is described as the act of giving without the expectation of receiving something in return (Gibson-Graham, 2007). It is often used as a means of building social capital and fostering trust within a community and can take many forms, such as donations, volunteering, or simply sharing resources and knowledge. In gifting economies, resources and services are exchanged without the use of money or other forms of currency (Cheal, 2015). Gifting can also be a way to challenge the idea that everything has a monetary value and to prioritise the well-being of individuals and care for communities over profit (Gibson-Graham, 2007; Giles, 2021).

Fairness. Fairness has been a central concern across all three case studies. Past work on community economies describes fairness as the equitable distribution of resources, benefits, and opportunities among members of a community. It involves creating a system where everyone has equal access to resources and opportunities, regardless of their social or economic status (Gibson-Graham, 2007). In a fair community economy, there is a shared commitment to ensuring that everyone has the chance to thrive, and the community works together to create an environment where this is possible (Gibson-Graham et al., 2013). One example of fairness in community economies is the practice of cooperative ownership This can help to ensure that resources and opportunities are distributed fairly. Ultimately, fairness in community economies involves building a sense of shared responsibility and working together to create a thriving, equitable community.

An image captured at a food-sharing event in Stockholm, Sweden.

A FS-STHLM volunteer preparing to transport donated food to the event location.

“There is a tendency in research to keep a professional distance from the subject of enquiry to be able to document and learn about it. This is generally an emotional distance that enables the researcher to produce an organised account by playing down the disorienting messiness of everyday experience”

(McCarthy and Wright, 2015, p. 15)

Research Approach and Methodology

My investigation into the practice of surplus food-sharing began with an ethnographic inquiry to obtain a rich and in-depth understanding of food-sharing contexts and practices. In combination with this, I adopted a participatory action research (PAR) approach (Hayes, 2014, 2018) to collaboratively explore with community members new ways to infrastructure and support food-sharing as both a form of activism and an alternative form of surplus food distribution. PAR emphasises collaboration and active participation, ensuring that community members and stakeholders are involved in all phases of the research process (McIntyre, 2007). In the two central case studies included in my thesis, I invited members from each food-sharing community to be active participants in the project, meaning that research was conducted not *on* the community, but *with* the community. Actively involving the community in the research process gives members the opportunity to share their knowledge, perspectives, and ideas. This empowerment and amplification of community voices is crucial for ensuring that the research outcomes truly reflect the needs and values of the community (MacDonald, 2012). As a result of this, a plurality of perspectives, knowledge, and experiences helped to shape the scope and questions of the research, as well as to produce a rich data set that was highly relevant to each local context. Moreover, this participatory approach enhanced the relevance and validity of the research, as it directly reflected the needs and realities of the community (McIntyre, 2007).

PAR is, of course, also an action-oriented approach that focuses on addressing social problems and achieving social change (Hayes, 2011). In my case studies, the research aimed to address specific issues affecting each food-sharing community while also examining the broader role of digital technology in facilitating social change. Throughout my PhD, I aligned my research with the goal of achieving practical outcomes and having a positive impact on the communities involved. This action-oriented aspect ensured that the research was socially relevant and had real-world implications (Hayes, 2011). This meant taking a pragmatic rather than theoretical approach to research to allow me to contribute to tangible improvements in the communities' sociotechnical practices, while also contributing new academic knowledge. Additionally, PAR involves reflexivity and ethical considerations throughout the research process (Kemmis et al.,

2013). Over the past five years, I engaged in ongoing reflection and self-evaluation, ensuring that my research process was transparent, ethical, and respectful of the community's needs and values. This reflexive aspect of PAR helped maintain ethical research practices and foster a respectful and trusting relationship between the community members and me.

Finally, the iterative nature of PAR allowed the continuous refinement and improvement of research questions, methods, and outcomes. By working closely with community members at sharing events and design workshops, I was able to articulate multiple research questions and develop a general direction that incorporated their ideas and emergent insights (as illustrated in Figures 1 and 2). This iterative AR process of 'plan, act, reflect, repeat' ensured that the research was responsive to the evolving needs and dynamics of the community, resulting in more comprehensive and nuanced findings. By embracing the iterative nature of PAR, I maximised the research's potential to generate valuable insights and contribute to the development of effective solutions for community-led surplus food-sharing initiatives.

4.1 Case Studies

Three case studies form the empirical work of my thesis. Each case study investigates community-based food-sharing from different perspectives across three different countries: Denmark, Sweden, and Germany. The food-sharing communities in each case are independent, locally organised initiatives, however, they also exist within a broader social movement against food wastage.

Case Study I: FoodSharing Copenhagen

In November 2018 I commenced a two-and-a-half-year study of FS-CPH, a community-led initiative addressing the large amounts of edible food that usually go to waste in urban areas. I was aware of the community before the study began, through having previously participated in food-sharing events as both an attendee and volunteer from 2016 -2018. This previous participation was what inspired the collaboration and, of course, helped in terms of gaining access to the community due to my ability to personally contact a community member, with whom I had contact, which led to gaining more participants for initial interviews. My past involvement in the community was limited since I had only participated occasionally in a limited number of roles, so I lacked a nuanced understanding of the community, its members, how work is organised, and what tools are used. With the goal of gaining an understanding of FS-CPH as an example of an alternative food community, my investigation focused on: the organisation of the community; the motivations of participants; the practices of collecting and sharing food on a citywide scale,i.e. running food sharing events; and the relationships between the three key participant groups involved in the community, namely volunteers, donors, and attendees.

Case Study II: FoodSharing Stockholm

In September 2019, I commenced a long-term participatory action study of a new food-sharing community– FS-STHLM. I have been involved with the community as both a founder and as a researcher since it began in September 2019 and continue to participate to this day. My research on FS-CPH provided detailed insights into how an established surplus food-sharing community was run day-to-day and how large-scale food-sharing events were organised. When the opportunity arose to participate in setting up a new initiative in Stockholm, I was eager to continue my research on the practice of food-sharing from a different angle, focusing on how to get new food-sharing organisations up and running. I began my investigation while the community was in the phase of establishing its main practices and collaborations with third parties. My research goal was to understand aspects such as the sociotechnical practices of infrastructuring the community's efforts and making them sustainable over time, along with the volunteers' attitudes towards growth. Unlike the previous case study, I had access to a broad network of actors engaged with FS-STHLM, such as the food donors and three charitable organisations that the community engaged within their community-based sharing activities resulting in a more in-depth data set.

Case Study III: FoodSharing Siegen

In August 2022 I was invited to join and contribute to this case study which investigated food-sharing in Germany. The data are the result of over two years of practice-based research and PAR carried out by my collaborators at Siegen University. Focusing primarily on a local grassroots community in Siegen that shares 'rescued' surplus food donated by food retailers, e.g. supermarkets and bakeries, as well as other 'food resources' such as seedlings, fruits, and vegetables shared by a community gardening project, and even cake brought by a guest. To facilitate sharing the community runs both face-to-face food-sharing events and a food-sharing hut that is accessible 24/7. The data include informal conversations and field notes collected by my co-authors Phillip Engelbutzeder and Yannick Bollmann while they were active participants in the community, as well as nine semi-structured interviews with participants. Interviews were also conducted with members of another German food-sharing community in Giessen. I was invited to join the project as a result of similar work I had published on the FS-CPH community that also focused on the role of ICT in grassroots settings and the opportunities and challenges involved in sharing surplus food. I was not directly involved in the data collection in this case, but I contributed to the project with the insights and knowledge that I had obtained over the previous four years, helping to build a mutual understanding of the evolving nature of food-sharing as an activist movement.

A Note on Terminology

Each of the communities are volunteer-led organisations; surplus food items are donated by food retailers and distributed to members of the local community for free. However, one important difference between the communities that I would like to make clear is the terminology used within each of the communities to describe the central actors in their organisations.

- The first group of actors are those who have set up the community and do the groundwork to organise food collection and distribution. In FS-CPH, the community described in Case Study I, these actors are referred to as *volunteers*; in FS-STHLM, the community described in Case Study II, these actors are referred to as *food-sharers*; and in FS-SGE, the community described in Case Study III, these actors are referred to as either *volunteers* or *helpers* depending on their level of participation in the community.
- The second group of actors are the food businesses e.g. supermarkets, bakeries, and wholesalers who donate surplus food items to the community on either a regular or irregular basis. In each of the communities, these actors are referred to as *food-donors* or sometimes simply *donors*.
- The third group of actors are the people who attend food-sharing events or go to sharing points to collect surplus food to take home and consume. In FS-CPH, the community described in Case Study I, these actors are referred to as *attendees*; in FS-STHLM, the community described in Case Study II, these actors are referred to as *food-savers*; and in FS-SGE, the community described in Case Study III, these actors are referred to as *guests*.

To respect the culture of each food-sharing community, these community-specific terms are used throughout the four papers included in the thesis. However to avoid confusion, in the subsequent chapters of the thesis in which I discuss the communities collectively, I will keep things simple by using more generic terminology across all cases; namely, *volunteers*, *donors*, and *recipients*.

4.2 Data Collection

Participant Observations

Throughout case studies I and II, I conducted multiple hours of participant observations (DeWalt and DeWalt, 2002) during food collection, sharing events, volunteer meetings, and participant recruitment processes, which enabled me to gain first-hand experience in the organisational and practical work of surplus food sharing. In the FS-CPH case, approximately 55 hours of observations took place over the course of twelve 12 food-sharing events (four-five 4–5 hours each) spread across three data collection trips between November 2018 and

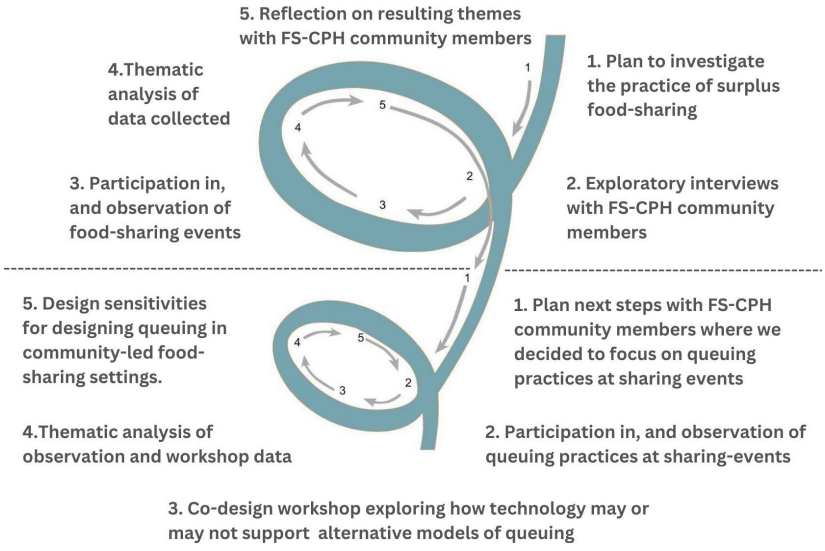

Figure 1: The PAR spiral of Case Study I

February 2020. The sequence of these observations in the context of the PAR spiral is illustrated in Figure 1. These observations made it possible to gain first-hand insights into how the activities unfolded in practice at food-sharing events and the values underlying them, e.g. how to identify and rescue edible food. Moreover, event attendees were observed while they queued outside the event venue and collected food to take home. Here, attention was drawn, for instance, to the activities they engaged in while waiting, their interactions with other participants and friends, the amount of food they collected, and whether being at the event seemed to be an enjoyable experience. The data collected were documented through photographs and video material that show, for example, volunteers handing out queuing tickets and giving a welcome speech at the beginning of the food-sharing event, attendees queuing for food, and volunteers explaining how they sort the food. I also kept a field diary which was annotated after each instance of participation. The diary described what had happened at events, what I had experienced while taking part in them, and reflections about the attendees' and volunteers' queuing experiences. More detailed descriptions of how these participatory observations were conducted can be found in the methods sections of papers I and II.

In the FS-STHLM case, observational data were collected between September 2019 and December 2022 by means of complete participant observation (see DeWalt and DeWalt, 2002) carried out at meetings, sharing events, and during the processes of enrolling new food-donors

and volunteers. As observations were carried out on an ongoing basis throughout the entire data collection process, they are not explicitly documented in the PAR spiral in Figure 2. Complete participant observations require the researcher to have an active role as both an observer and a core member of a social group. As I have been a member of the community since it was founded, my observations captured both the process of setting up the community and the phases of maintaining the main practices and collaborations with third parties, the research engagement with the community was important for understanding aspects such as the sociotechnical practices of infrastructuring the community's efforts, and how to make them sustainable over time along with the attitudes of the food-sharers' (volunteers) towards growth. I also kept a field diary during this process that was annotated after each instance of participation. The diary described what happened at volunteer meetings, what happened while I was organising and running sharing events, and what I experienced while taking part in them. More detailed descriptions of how these participatory observations were conducted can be found in the methods section of Paper IV.

Interviews, Questionnaires, and Informal Conversations

In the early stages of data collection in the FS-CPH study (November 2018), eight semi-structured interviews were conducted with active volunteers from the community (see, Figure 1). At this stage my research questions were still quite open and exploratory, and therefore the questions covered diverse topics such as the reasons members became involved in the community, their specific roles within it, and what their jobs entail as well as how they unfold in practice. The interviews also delved into the role of digital technology in supporting food collection and distribution, along with setting up, advertising, and managing events. The interviews were on average 20 minutes long, and they were audio-recorded and transcribed for documentation and analysis. Interviewees were recruited by reaching out to the community founder, who suggested contacting 11 highly active volunteers. I invited each of the 11 persons to take part in the study via Facebook Messenger, and the purpose and details of the study were explained. Additionally, short questionnaire-style interviews were carried out with 21 event attendees as they waited in line in order to gain an understanding of their reasons for participating in the food-sharing events, how they learned about the community, and how long they had been attending the events. More detailed descriptions of how these participatory observations were conducted can be found in the methods sections of Paper I and Paper II.

Throughout the data collection period for FS-STHLM, many of the rich insights that were gained were the result of numerous informal conversations and structured discussions created rich understandings of the community. In contrast to the more formal interviews conducted in the FS-CPH case, these conversations took place organically as part of the day-to-day work of organising and running the community. Informal conversations brought to light diverse topics such as questions related to fairness, reports of minor conflicts between volunteers and between volunteers and recipients, and concerns regarding the workload or emotional labour. Meanwhile, structured discussions typically covered more high-level organisational work such as the scope and structure of the community e.g. creating working groups and agreeing on

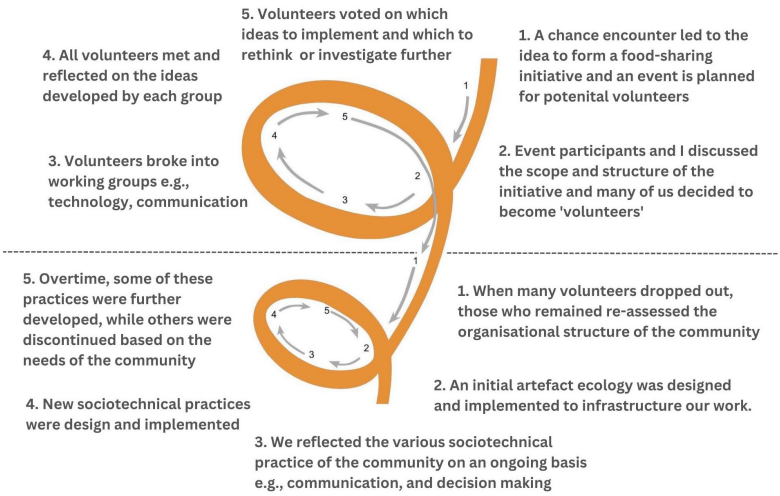

Figure 2: The PAR spiral of Case Study II

decision-making models. Discussions regarding similar communities also took place through a combination of informal and structured conversations. For instance, a volunteer casually shared knowledge about their previous experiences in other initiatives, and discussions took place in prearranged online meetings with the organisers of other communities in other cities. The most pivotal discussions that took place throughout the case study are illustrated in the PAR spiral in Figure 2.

Design Explorations and Interventions

As outlined in Section 1, section 1.1, rather than adhering to a single design framework during my PhD, I have approached design work in various ways, embracing a collaborative and inclusive design approach. Across the two central case studies, my activities ranged from structured co-design workshops and exploratory brainstorming sessions to more ad hoc sociotechnical interventions designed and implemented as a response to urgent or upcoming community needs. In the case of FS-CPH, design work was carried out across two workshops with board members, volunteers, and recipients from the community on different occasions. The first held in March 2019 had nine participants and lasted two hours. Aside from the initial planning of the study with FS-CPH members, this was the first concrete instance of community members participating in the research process. The goal of this workshop was to present and discuss the thematic analysis and early findings of the observations and interviews carried out two months prior. To help the flow of the workshop card prompts were created based on the earlier data using keywords such as technology, activism, and sharing to initiate an open discussion among the group. Building on this, the community members and I reflected on

PLATFORM	FUNCTION(S)	USERS	VOLUNTEER
Karrot	Organising Pickups, Internal Communication	Food-sharers	Food-saver 1?
Facebook group	Sharing info about pickup/distribution times	Food-sharers Potential New Volunteers FB Group want to join (link to Karrot), meetings etc	Food-saver 2
Facebook Page	Share info about distributions sharing pictures of available food, meetings, ways to get involved general news	Food-savers and Food-sharers, and general public	Katie
Instagram	Sharing images of food saved, meals cooked, sharing events	Food-savers, Food-sharers, sharing events, General internet public	All food sharers are encouraged to post, Food-saver 3 will respond to any messages
Website	General info for Sharers, Savers, and Public	Food-savers, Food.sharers, General internet public	Katie and Food-saver 4
Email	Registration for other platforms, external communication	Food-savers, Food-sharers, General	Food-saver 5
Google Drive	Meeting notes, organisational documents, and images etc	Food-sharers	All food sharers

Figure 3: An early specification of the digital tools used by FS-STHLM was created by my fellow volunteers and me at a volunteer meeting.

four central themes; sustainability of food systems, technology use, growth of the community, and what it meant to be a food activist. Based on the discussions at the meeting and a further round of analysis, it was decided that the study would focus on queuing practices at sharing events. A more detailed description of this workshop can be found in Paper I.

Building on this, the second workshop, conducted in February 2020, was a more hands-on design workshop and had five participants: *three* highly active volunteers, *one* former recipient/new volunteer, and *one* newcomer who had recently discovered the community online. The goals of the workshop were threefold. The first goal was to explore different queuing experiences and the activities, values, and other socio-cultural aspects associated with queuing. The second goal was to dig deeper into the experiences and values associated with queuing from the perspective of both event volunteers and event participants to understand the *pains* and *gains* of established queuing systems. The third goal was to understand how community members envision the role of technology in infrastructuring queuing mechanisms centred around key community values. A more detailed description of this workshop can be found in Paper II. The design work carried out for the FS-STHLM was less structured and focused on designing sociotechnical infrastructures on an iterative basis. The goal was for these infrastructures to support the on-the-ground work of the community and any new challenges or logistical concerns, adjust to changing organisational needs, and support emerging commu-

nity values. For example, an initial artefact ecology was designed and implemented within the infrastructure of our work. The first phase of this design process involved volunteers breaking into working groups to explore different needs, e.g. one group explored how internal and external communication might work in the community, while another group looked into possible technologies that could be used to address such needs. Over time, some of these practices would be refined and/or further developed, e.g. optimising the process of enrolling volunteers, while others were discontinued because they were creating unnecessary work, e.g. we decided that the work of managing both a Facebook group and a Facebook page was not worth the amount of time invested. Other key examples of how this process worked are illustrated in Figure 3.

4.3 Data Analysis

The data analysis process involved analysing the collected data sets from each case study in multiple stages. This analysis was conducted collectively with my co-authors using thematic analysis (Braun and Clarke, 2012) as the primary method; we also communicated outcomes and received input from community members in a less 'academic' fashion through collaborative brainstorming (Iversen and Smith, 2012) and collaborative mapping (Burgess-Allen and Owen-Smith, 2010) exercises. In what follows I will explain the data analysis process for each paper included in the thesis.

For Paper I, my co-authors and I collectively and recursively analysed the data sets using Braun and Clarke's thematic analysis (Braun and Clarke, 2012). We systematically read through and discussed all the collected material, including notes from participant observations, interview transcriptions, and workshop discussions. In the first round of analysis, we focused on themes related to the role of technology in advertising events, recruiting volunteers, and the activities involved in food collection and distribution. We also examined themes concerning the community's impact, scale, and expansion over the years. In the second phase of analysis, we delved deeper into the organisation and management of sharing events by volunteers. This involved exploring the challenges encountered in handling a growing number of attendees, distributing surplus food fairly, and experimenting with different queuing strategies. We also considered the community's core values and the motivations of the attendees.

For Paper II, the analysis included various materials such as workshop documents, transcriptions of conversations, diary entries, video clips, and photographs collected through participant observations. Thematic analysis (Braun and Clarke, 2012) was again employed, and my co-authors and I conducted the analysis collectively and iteratively. We initially focused on the documents created during the workshop tasks, which were then triangulated with the analysis of audio recordings. The first round of analysis concentrated on themes related to transparency, trust, fairness, expectations, and the delegation of queuing responsibilities. In the second phase, we examined supporting data from diary entries, video clips, and photographs to relate workshop themes to my direct experiences in the community. This

phase shed light on the challenges encountered in communicating activism and establishing relationships and the tension between efficiency and socialising in queuing at food-sharing events.

For Paper III, I was involved in the final stages of the thematic analysis (Braun and Clarke, 2012) and I also conducted analytical work on a more conceptual level during the writing process of the paper. This involved situating the data within related research and within my previous analytical work in Paper I and Paper II which drew attention to fairness as a central concern for surplus food distribution and the significance of the sociotechnical practice of queuing at sharing events.

For Paper IV, I took a bilateral approach to data analysis. Throughout the study, the initial rounds of analysis were carried out continuously; I reflected on meetings, and participatory experiences and created working themes using iterative brainstorming and visual mapping techniques (Burgess-Allen and Owen-Smith, 2010; Iversen and Smith, 2012). At the end of the data collection process, a thematic analysis was conducted on the data collected over three years, including notes and reflections from volunteer meetings and weekly field notes made during food collection and sharing events. Visual maps were created to capture the central focus points of the community, including people, tools, and surplus food. These maps served as boundary objects for exchanging expertise with community members and connecting codes and themes to a broader picture of the community. In the thematic analysis, words, phrases, and sentences were highlighted, and shorthand labels or codes were assigned to describe their content. This comprehensive analysis resulted in richer and more nuanced findings. The findings were then triangulated with the visual maps, my co-authors and I collaboratively unpacked connections and relationships between categories, resulting in themes such as setting up the community, setting up sharing, and governing the community.

4.4 Research Rigour and Ethics

Long-term ethnographic research and PAR such as the research I conducted with FS-CPH and FS-STHLM involve interactions with different community members and other actors (e.g. the organisers of event locations) over a long period of time using a range of data collection methods. Below, I will describe the academic rigour of my work, as well as ethical considerations concerning data collection, including the process I followed for obtaining participant consent, the choices I made with regard to participant anonymity and data storage, and how conceptual and practical value was co-created by the community members and I me.

Replicability and Trustworthiness

The goal of my PhD research was to explore contextualised and localised solutions to the real-time problems (Hayes, 2014) faced by the volunteers, donors, and recipients of grassroots food-sharing communities. My research approach aligns with a constructivist science paradigm through which people construct their own understanding and knowledge of the

world by experiencing things and reflecting on those experiences. In a study such as this, positivist expectations of replicability are not the goal; instead, resonating with work from the participatory design field (Frauenberger et al., 2018) my work takes a different approach to replicability, transferability, and trustworthiness that emphasise the re-contextualisation of situated knowledge across different food-sharing contexts. This is visible across the three case studies of my thesis; many of the same ideas and themes were considered to be relevant including the idea of fairness, valuing the work of volunteers, and organising around food rather than people. Perhaps the most salient example of the replicability and trustworthiness of my work is how the findings and themes of case studies I and II where I was the primary investigator were replicated in the findings of Case Study III, where a similar research strategy was applied by different investigators.

Throughout my research process, I have embraced the messy nature of making changes in civic engagement and sustainability settings by embedding myself in the day-to-day work of organising activism. This highly engaged community participation over extended time periods has led to an increased number of informants and therefore richer data. Moreover, I found that collaborating with community members as co-researchers and interpreters resulted in my assumptions as a researcher being continuously challenged (Dick, 2004). For example, in terms of the richness of the qualitative data, I saw a significant change between the initial semi-structured interviews conducted during the early stages of my research and the numerous informal conversations that took place organically in the later stages of the project that took place during my participation in the organisational and on-the-ground work of food-sharing activities. This participation allowed me to take a more active empathetic and involved role with the 'other' in contrast to the positivist, clinical distancing that is often expected for research to be considered valid (Humphreys et al., 2003). The type of research conducted is reflected in the results and contributions of the studies; rather than considering concrete 'one-size-fits-all' solutions my co-authors and I present sensitivities for researchers designers, and activists to consider when tackling similar challenges across different contexts.

Informed Consent

Obtaining consent from community members for their collaboration in the FS-CPH study was quite straightforward. Consent was collected on an ongoing basis as different community members chose to take part in the research at various stages of data collection. I provided each individual with a detailed consent form (which we both kept a copy of) that outlined the goals of the study and the various methods that were to be used. I also made it clear to everyone that they could withdraw their consent at any time throughout the study and provided my contact details. However, in a longitudinal study such as the FS-STHLM case study, where community members were regularly coming and going, obtaining informed consent from all community members was much more challenging. Nonetheless, the voluntary collaboration of community members in this study was of paramount importance.

Therefore, to overcome the challenge of fluctuating participation, I took a two-pronged approach to consent. First, verbal consent to take part in the study was collected on an ongoing basis, as I regularly spoke openly about my research project and what it meant to collaborate. Inspired by past work (Mauthner et al., 2002 that makes the argument that ethically responsible research requires the researcher to negotiate participation at the outset of a research project as well as to be sensitive to how the dimensions of participation might change, I periodically reminded my fellow community members that this research was being conducted as part of my PhD studies and that they could withdraw their collaboration if they wished. If this situation were to arise, the individual would be assured that although I could not delete their data (as these data were combined with the data of many others), I would not use their data to directly inform the study. Second, during the time period between data collection and submitting Paper IV for publication, I circulated a digital consent form across all communication channels (Karrot, WhatsApp, Facebook, and Instagram) outlining the contents of the paper and stating that although all personal data would be anonymous, but the name of the organisation would be revealed. Although I cannot guarantee that all of the individuals who participated in the FS-STHM community over the past four years filled out the form, I obtained explicit consent from all community members whose direct quotes were used.

Anonymity and Data Storage

Across all publications on each of the three case studies, my co-authors and I made the choice not to anonymise the names of the food-sharing communities. This choice was also, of course, negotiated with the community members. This decision resonates with HCI and CSCW research that has called for a reconsideration of ethics in anonymisation practices (Brown et al., 2016) and for researchers to give credit to community-led initiatives striving for social change (Rossitto and Lampinen, 2018). This approach also reinvigorates the argument that HCI research should find sites of resistance, describe them, and help them proliferate through design research and practice (Heitlinger et al., 2019). The geographical location of each of the communities has also been disclosed, as it is important to recognise each of the specific socio-cultural contexts that shape how these communities operate and conceive of surplus food. However, the names of the individuals who participated in each of the studies have been made anonymous to both protect their identities and maintain objectivity in the work. Although I had originally planned on using pseudonyms, after reading about concerns related to maintaining a diverse image of the demographics of participants with regard to the diversity in terms of age, gender, and ethnicity (Oliver, 2010), I opted to use a numbered system instead. For accurate data management for both the FS-CPH and FS-STHLM case studies I created and continuously updated a detailed spreadsheet with real names, participant numbers, the length of participation, and the status of consent on an ongoing basis.

Some images of me volunteering at food-sharing events in Stockholm, Sweden

4.5 Reflections on Positionality

As expressed earlier in the chapter, I have been involved with the FS-CPH community and the FS-STHLM community as both a researcher and a participant to varying degrees over the past five years. Because of this, I have had to be conscious of both my reflexivity and my positionality as a researcher. To address this, and in line with the PAR approach (Hayes, 2011), I have made a conscious effort to keep detailed records of topics that I personally addressed/brought up and instances when I directly influenced decision-making. Additionally, in order to maintain the social ecology of the research setting and the equilibrium that evolves between the different social actors (Oliver, 2010), I did my best to share my findings and personal reflections on the research on an ongoing basis and validate the results with other community members. I consider myself to be an activist as well as a researcher so I naturally began my research with certain personal opinions about the topics of food waste, technology use, and sustainability, which inevitably came up during my participation in the community and research process. I made an effort to consciously recognise this behaviour when it arose and to account for it appropriately by engaging with my fellow community members and connected research to actively challenge these opinions.

I became aware of the FS-CPH community through having previously, and sporadically, participated in food-sharing events, as both an attendee and volunteer. This previous involvement was helpful for gaining access to the community. I could, for instance, contact an acquaintance, among the community volunteers, who suggested some community members for initial interviews. Nevertheless, as my previous involvement in the community had been limited, I lacked a nuanced understanding of how the community is organised and what role digital

artefacts play in this setting. Additionally, at the time of my participation in the community, food-sharing events were much smaller and the central issue of queuing, discussed in this paper, was not yet a concern for the volunteers. When I returned to the community in a research capacity, I tried to put aside my previous experiences, be open and model my methods based on the situation rather than what I thought it should be. When I started, I just began speaking to people without a very clear idea of what I was looking for which opened up the project to include the future collaboration of community members. Maybe this was a bad idea, but on the other hand, maybe this was what helped me to be more open to different ideas. Either way, it definitely made for a very challenging data analysis process! Nevertheless, I learned much from the process and feel that I gained insights from going in blind that I may have missed with a more structured approach.

When the opportunity arose to take part in and study the FS-STHLM community, work with FS-CPH was still ongoing as well as some other research projects that are not included in the thesis. I recognised that having this multi-stranded approach to research would be challenging and perhaps if I had been more focused on one project or another, things might have been easier; however, opportunities come up and I thought it was better to take them than to wait for something else to come along because this probably would not happen. I will likely do the same again if given the chance to do the kind of embedded research to which I am drawn. I have learned that I have to take the opportunities as they come because I do not necessarily know which one is going to be the most productive or the one that will help me turn a corner in my own thinking.

Juggling my dual roles as a researcher and a participant in FS-STHLM has been a conscious balancing act. On different occasions, I have had to make explicit choices as a researcher and other choices as a member. For example, as I was aware of some challenges that would likely arise while setting up such an initiative through my past work researching FS-CPH, I shared this knowledge with the rest of the community, thus shaping the way problems were framed and addressed. However, on other occasions, I decided to prioritise my role as a participant in an attempt to, as McCarthy and Wright put it, 'engage in participation with the other rather than for professional privilege over them' (McCarthy and Wright, 2015, .p15). In practical terms, this sometimes entailed forgoing more structured data collection, such as conducting planned on-site workshops, to support the running of food collection or sharing events because there was a last-minute shortage of volunteers. This choice to refrain from keeping 'a professional distance' from the subject of inquiry McCarthy and Wright, 2015, .p15), similar to taking on multiple strands of research, resulting in messiness. Although this was frustrating at times, it was positive overall as I was experiencing this messiness along with my fellow volunteers and thus I obtained deeper insight into their experiences. Moreover, as the work of these communities has clearly been instrumental to my PhD research it has been important to me from the outset to avoid participating in academic extractivisim (Cruz and Darcy, 2021) by considering how participating in this research can also create value for the communities themselves (Benbasat and Zmud, 1999).

How Did the Communities Perceive My Role?

Throughout the research process, it became evident that the communities I collaborated with perceived me as both an activist and a researcher. This was particularly true in relation to the FS-STHLM community with which I had a longer-term collaboration. I clearly communicated my intentions and activities to the community members, particularly highlighting my research focus on technology. Additionally, my involvement with the Karrot platform (a bespoke civic technology for food-sharing communities) and my role as a member of the development team further connected me to the work being done in the community. We engaged in discussions regarding governance models and how technology supported their initiatives.

Through these interactions, it became apparent that the communities understood and acknowledged my research endeavours. I aimed to cultivate a nuanced perspective on technology, emphasising the importance of avoiding oversimplification. The communities recognised this approach and perceived me as someone with a background in technology who also actively participated in their activities. In terms of positionality, there were instances when I prioritised participation over data collection or analysis, actively engaging in the practical work of sharing food. This further solidified their perception of me as a participant who was also conducting research. It is worth noting that the perception of my role varied among different community members. Some individuals took an active interest in reviewing and providing feedback on my papers, finding them interesting and valuable. Others focused more on discussing pragmatic and practical issues related to their work. The collaborative mapping and analysis described in Paper IV played a crucial role in fostering understanding, and communication, informing both the community members and the research process. Reflecting on how the communities positioned me in different ways helped me to further understand the multifaceted nature of my role as an activist and researcher. The diverse perspectives of and engagements with the communities provided valuable insights and shaped the collaborative nature of the research.

A volunteer setting up for a food-sharing event in Stockholm, Sweden.

An image captured at a food-sharing event in Copenhagen, Denmark.

“The radical act of paying attention to things that we do not wish to see and that make us uncomfortable can be aided by design if it takes up the challenge of resisting smoothness and self-centredness.”

(Light et al., 2017, p. 7)

Findings

5.1 Paper I: Queuing for Waste: Sociotechnical Interactions Within a Food-Sharing Community

Paper I draws attention to the core values and sociotechnical practices underlying the organisation of the activist food-sharing community, FS-CPH. The findings show that FS-CPH is a volunteer-led initiative that was established around a shared concern for reducing food waste. At the three community-run food-sharing events each week, through the collaborative efforts of community volunteers, food- donors, and recipients, surplus food that would have otherwise gone to waste is distributed for free within the community. The volunteers are responsible for organising and running events, and their central practices are identified as *collecting*– organising and conducting collections of donated food, *selecting*– sorting through donated food to perform quality control and categorisation, and *gifting*– determining how food is shared among recipients at events. The findings illustrate how, through the labour-intensive work of running large-scale food-sharing events, surplus food transforms from a commodity into a gift. Volunteers do not expect anything material in return for the food that they share, yet they do have an expectation of reciprocity from recipients in that they view events as spaces for collaborative care and community building rather than simply a way to get free food.

Volunteers employ an ecology of digital tools to support and infrastructure the face-to-face, practical work at events. For instance, the volunteer management platform Volunteer Local is used internally to coordinate tasks between volunteers and mainstream social media platforms such as Facebook and Instagram to advertise events to increase the impact of their activist work by reaching a broader audience. However, no digital technology is used during the sharing event itself; instead, volunteers give an opening speech before each event to communicate their efforts to prevent food waste and to share guidelines on how the events work. This is corroborated by data that illustrate that volunteers feel that organising large-scale events where many people come together helps to make the scale of the food waste problem in Copenhagen more visible than if recipients were to come one by one. Reflecting on these

practices, the paper unpacks opportunities for these collaborative practices to transform how community members perceive and value surplus food while also highlighting the complexities associated with sharing food in local community settings.

Specifically, the paper highlights how the central practice of queuing at food-sharing events is entangled with the often conflicting concerns and values of volunteers and participants. The analysis unpacks how, after rejecting a first-come-first-served approach early on, volunteers experimented with two different randomised queuing models to shape how food is redistributed. With these randomised models recipients receive a ticket (first using numbers and later pictures) that randomly determines their place in line. Volunteers hope that these randomised queuing models will reduce the desire for recipients to come to events early to be the first in line, help to create a more fun and social atmosphere as people can wait in groups, and most importantly help to distribute food in a more equal or 'fair' way among event attendees. This illustrates how although the central focus of the community is to reduce waste, the social dynamics at events also influence the organisational decisions of volunteers. However, even though the design of these new queuing models is centred around values of care, fairness, and community building, tensions still arise between recipients who stick to the rules and embrace the community spirit of events and those who try to cheat the system by collecting a set of tickets to increase their chances of receiving food first. The volunteers consider these instances of cheating to be disrespectful and in conflict with the values of the community and the volunteers' expectations of reciprocity.

Paper I contributes to digital civics research by identifying queuing as a central aspect of community-led activism in the FS-CPH community, and it highlights the need for the careful design of queuing practices in food-sharing settings. The paper outlines how a community economies perspective informs the design of sociotechnical queuing practices, exploring how values beyond waiting experiences, such as collectively being together, shape the organisation of queuing in sharing contexts. To consolidate the findings, the paper outlines three design sensitivities to consider when organising queuing at food-sharing events:

1. The first sensitivity, **mediating queuing through digital artefacts**, highlights how changes in seemingly mundane practices like queuing can result in significant changes in the sharing dynamics within the community by addressing the situated interactions centred around queuing at events and the potential role of digital technology within that space, e.g. exploring what a digital queuing ticket might look like and how that intervention would affect community dynamics.

2. The second sensitivity, **moving away from individualism towards supporting mutual relationships**, draws attention to how a practice like queuing might be re-imagined in collaborative settings to support mutual relationships rather than individual efficiency. This sensitivity encourages designers and activists to explore how digital technologies could bring people together through queuing rather than simply focusing on how the waiting time can be optimised.

3. The third sensitivity, **facilitating commoning rather than othering**, questions the dominant narratives of individualism and othering that can easily stem from digitally mediating sharing interactions. This sensitivity encourages designers and activists to instead consider how sociotechnical design might create opportunities to share responsibilities between volunteers and recipients, e.g. a system that empowers recipients to negotiate fairness together, relieving some of the social and emotional strain felt by volunteers when they are gifting food.

These sensitivities contribute to digital civics by providing valuable insights for designers and activists creating alternative queuing mechanisms for community-centred food distribution. They encourage the use of digital technology to support but not overtake social interactions, mutual relationships, and shared responsibilities among community members.

5.2 Paper II: "This is Not a Free Supermarket": Reconsidering Queuing at Food-Sharing Events

Expanding ON the work of Paper I, Paper II unpacks how FS-CPH members can communicate the community's activist values through the configuration of sociotechnical queuing practices. The data collected during a co-design workshop with volunteers and recipients emphasises a variety of concerns about how sociotechnical queuing mechanisms might reflect the activist visions and values of the community. The data unpack how volunteers and recipients envision potential queuing mechanisms that break away from the values of market models such as efficiency and individualism in favour of more diverse economic values such as collective care and commoning.

The paper addresses the challenges that were identified while rethinking digitally mediated queuing mechanisms with volunteers and recipients. The first challenge is focused on 'communicating activism through queuing'. In line with Paper I, the importance of bringing people together at events to encourage discussions and behavioural changes regarding food waste is emphasised. The second challenge, 'encountering others through queuing', explores the significance of social interactions in promoting fairness during events, illustrating how alternative queuing mechanisms might facilitate relationship building and foster empathy among community members during sharing events. The third challenge, 'transparency in queuing mechanisms', highlights how utilising technology to enhance transparency in the queuing process can create a relaxed and inclusive environment. FS-CPH members discussed how transparency can alleviate concerns about missing out and help manage expectations regarding the available food, enabling individuals to choose to leave before their turn if they so desire.

The findings of Paper II contribute to the field of digital civics by emphasising the role of values in reframing queuing practices beyond traditional experiences. The work highlights the need to consider the interplay of values, technology, and community concerns in shaping

the organisation of queuing. Additionally, the paper stresses the importance of re-configuring sociotechnical queuing practices to suit different contexts rather than applying them universally. As a practical contribution, the paper provides design sensitivities that can guide designers and communities approaching queuing from a community economies perspective, encouraging the exploration of new ways that technology can support diverse community values. These sensitivities prompt reflection on the who, where, when, and why aspects of queuing within volunteer-driven initiatives:

1. **Consider who is queuing.** The first sensitivity considers how often people attend food-sharing events in diverse constellations of families, friends, and acquaintances raising issues of whether queuing practices should be designed to facilitate the flow of groups of people, or single individuals, how their particular needs should be accounted for, and what constitutes fair sharing (Berns et al., 2021b).

2. **Consider where queuing takes place.** The second sensitivity concerns the characteristics of the places where queuing occurs. 'Hanging out', socialising, and having the opportunity to engage with other attendees are more easily achieved in large, non-transitory places such as community centres. Digital technology can play a role in managing the flow of attendees in various ways (Berns et al., 2021b).

3. **Consider when queuing starts.** The third sensitivity considers consolidated experiences of queuing, such as reducing the waiting time, which is also important in food-sharing communities (Berns et al., 2021b).

4. **Consider why people queue.** The final sensitivity reflects on the meanings different people attribute to queuing: from opportunities to encounter others and learn about food sustainability to a set of practices to be delegated to digital artefacts. Failing to recognise the variety of reasons people might have to participate in sharing events might reduce some of the attendees' interest in taking part in sharing events (Berns et al., 2021b).

5.3 Paper III: (Re)-Distributional Justice: Negotiating Conflicting Views of Fairness Within a Local Grassroots Community

Paper III highlights the expansion of surplus food-sharing communities to encompass diverse forms of food sharing, such as seed sharing and community kitchens, which foster the development of new food literacies among members. However, the integration of pre-existing alternative food initiatives presents challenges. The data highlight that conflicting visions, values, and sociotechnical practices within food-sharing communities have implications for community building around sustainable food practices. For instance, despite the activist framings of surplus food-sharing, some participants still associate free food with charitable organisations like food banks, which can create feelings of stigma and hinder inclusivity. This

raises concerns among community members who aim to foster a more inclusive environment where everyone is welcome, regardless of economic need. Additionally, debates arise regarding what constitutes a 'fair' way to distribute surplus food at sharing events. Conflicting conceptualisations of fairness within the community lead to tensions, resulting in volunteers implementing rules to regulate food distribution, such as limiting the amount each recipient can take or implementing a randomised queuing system similar to that in the FS-CPH case. However, a consensus on what constitutes 'fair' sharing remains elusive for community members.

The paper draws attention to how different conceptualisations of fairness reflect diverse approaches to care within the community such as showing appreciation for the contribution of volunteers, supporting financially disadvantaged people, making an ethical decision to avoid waste, or caring for the broader political landscape of food sustainability. The findings connect with community economies thinking by illustrating how food-sharing communities can recognise and try to make space for diverse ideas of fairness. With this in mind, the analysis of Paper III contributes five different notions of fairness that emerged among members of the food-sharing community and act as sensitivities for designing for fairness in sharing contexts:

1. **Charitable fairness.** The first notion is based on the view that the people who need the food most i.e. those who are financially disadvantaged should be favoured and have the opportunity to collect food first.
2. **Contribution-related fairness.** The second notion is built around the idea that as volunteers are the main contributors to the community e.g. organising donations and events, they should be given first preference on what food they can take.
3. **Equality-based fairness.** The third notion suggests that no preference should be given to anyone in the community and that the order in which both volunteers and recipients collect food should be randomised to give everyone an equal chance to select food first.
4. **No-waste fairness.** The fourth notion is based on the idea that reducing waste is the central goal of food-sharing communities therefore once the food is kept from being wasted, it does not matter who consumes it.
5. **Systemic fairness.** The fifth notion is concerned with the bigger picture of unfair global food systems, combining both local activist and 'glocal' points of view. The idea is to move beyond the scarcity mentality of surplus food and aim for abundance by developing more diverse and robust sustainable food practices.

The data in Paper III highlight the challenges faced by the community regarding conflicting visions, values, and sociotechnical practices. As the community expands to include various forms of food sharing, new members encounter difficulties in adopting existing sociotechnical practices. The food-sharing platform, foodsharing.de, designed for specific surplus food-sharing activities, proves less intuitive and accessible for new forms of sharing like community

gardening. Consequently, some members opt for alternative communication methods like Telegram, leading to confusion and information loss.

The paper also explores the potential role of action-oriented researchers in helping communities to overcome infrastructure challenges and merge diverse sociotechnical practices. It advocates for responsible and respectful long-term sociotechnical change in grassroots communities, rather than reliance on quick digital fixes. To facilitate this, the paper provides six design sensitivities for researchers and community initiatives to consider to develop more meaningful relationships:

1. **Support community engagement through contribution** by taking on tasks and striving to develop meaningful relationships.
2. **Facilitate engagement with the day-to-day problems and embody 'care' for the community** this will enable the researcher to share in both good and bad experiences rather than keeping an emotional distance.
3. **Maximise opportunities for participation** by attending meetings or adopting the digital tools and platforms used in the community:
4. **Support initiatives from anyone** who wants to discuss issues rather than simply focusing on the views of core participants;
5. **Participate in decision-making processes** rather than acting as mere observers.
6. **Use cooperative rather than rival engagement** to cultivate an enjoyable community culture by using entertainment and games to support difficult decision-making processes.

In sum, Paper III contributes to the field of digital civics by highlighting tensions within grassroots food-sharing communities and exploring ways to address them. The study focuses on key concerns such as stigma, fairness, and lack of food literacy, and emphasises the challenges they pose to community building. The paper shows how these challenges cannot be resolved through technological quick fixes alone. Instead, it proposes that empathy, community building, and open discussions about diverse notions of fairness are essential for reducing tensions and fostering understanding among volunteers and recipient groups. By unpacking conflicting conceptualisations of fairness, the paper creates a space for community members to recognise and discuss different perspectives on fairness.

5.4 Paper IV: Learning from Other Communities: Organising Collective Action in a Grassroots Food-Sharing Initiative

Paper IV provides a comprehensive first-hand account of the work involved in building a food-sharing initiative from the ground up. The findings unpack how the central activities of the community are conceived of and organised, the concrete challenges of sharing surplus food, and how governance and decision-making models are adopted and (re)negotiated over time. This research uncovers how the work of creating, infrastructuring, and organising a new food-sharing community is supported by learning from the concerns, values, and sociotechnical practices of more established communities. Learning is presented as a sense-making process in which volunteers share knowledge from other initiatives and evaluate its applicability to the new context. This is the result of volunteers' direct or indirect experiences with similar initiatives informed discussions and careful considerations regarding the organisation of food distribution within the FS-STHLM community. As a result, this knowledge encompasses narratives about the impact of similar initiatives, key values and sociotechnical practices, and various methods of organising food distribution.

The findings unpack how the central activities of the initiative are conceived of and organised, the concrete challenges of sharing surplus food, and how governance and decision-making models are adopted and (re)negotiated over time by learning from similar communities with the same goals. For instance, during the early stages of setting up the FS-STHLM community, the volunteers' previous experience with similar initiatives in other cities and countries was integral to developing ways of working by providing volunteers with different examples of what a food-sharing initiative might look like. The analysis highlights the challenges faced by the community in setting up and negotiating the values and practices of sharing surplus food. The volunteers decided early on that the primary focus of the community would be to prevent food waste, meaning that food distribution would be organised around the surplus food that is donated rather than the people who will eventually eat it. Because of this, volunteers decided that food should be shared with anyone for free, revealing solidarity and environmental sustainability as central values, rather than market values such as profit or individual efficiencies. Early volunteers drew considerable inspiration from other food-sharing communities to work out the logistics of sharing surplus food. FS-STHLM adopted sociotechnical practices similar to those of FS-CPH such as using open-source civically engaged digital tools (e.g. the Karrot platform) to manage their work internally, while also using mainstream social media platforms to advertise sharing activities, recruit new volunteers, and generally draw more attention to the community.

Connected to this were the volunteers' considerations about how food could be shared. In search of alternatives to market models of food distribution volunteers looked to other food-sharing communities to work out the logistics of sharing surplus food. From learning about some of these similar communities, volunteers discovered three distinct sociotechnical models for distributing food. One involved running sharing events that would be advertised on social media, another involved setting up a sharing fridge where recipients would be alerted when

food was available, and the third was a more decentralised process where sharing was co-coordinated in small groups using the foodsharing.de platform. FS-STHLM ultimately decided to adopt a combination of the event and fridge-based models so that community building and activism around food waste could take place at events, while the fridge allows more flexible asynchronous distribution, making sharing more accessible to recipients who cannot attend events. At sharing events, the community also adopt a randomised queuing system as a way to facilitate distribution in an equal manner and to make sure all recipients will leave with something.

One significant example of community members deciding not to adopt the practices of similar communities was when they were exploring governance models. The volunteers' decision to adopt a non-hierarchical decision-making model over time led to a lack of organisational structure, community guidelines and decision-making models. While this was intended to foster an open leaderless community, it led to significant barriers for newcomers who wanted to join and contribute. Fluctuations in participant numbers also contributed to the disorganisation, for example during periods of high participation volunteers would employ formal decision-making processes while during periods of low participation, a more pragmatic approach was adopted. As a result of the lack of explicit rules, norms, tasks, and governance mechanisms informal leadership structures emerged, creating stress and feelings of obligation for the core group of volunteers as well as undemocratic decision-making. Connecting with community economies scholarship that outlines how diverse forms of exchange, participation, and labour are key to sustaining communities (McKinnon and Kennedy, 2021), the paper highlights that structure and transparency can help to shape the motivations of different actors and make expectations about participation clear from the beginning to avoid conflicts down the line.

To capture the influence of previous experiences on community efforts, the concept of 'collective histories of organising' is introduced. The paper also offers practical insights for designers and activists on how to establish, sustain, and develop surplus food-sharing initiatives. It outlines three dimensions of the concept of 'collective histories of organising' and provides practical sensitivities for building and sustaining such initiatives.

- **Configuring capacities.** Here the process of resource mobilisation involved in building food-sharing communities is discussed. Resource mobilisation includes enrolling volunteers, gathering material resources, putting together a technological infrastructure, and developing different capacities needed to operate the community. Equally important are discussions on how capacities such as volunteer labour and food donations are related to how the community might develop and grow. As a practical sensitivity for configuring capacities, the paper outlines how forming partnerships could first be developed around already established local ties and personal relationships and outlines how developing the collaborations needed to operate the community is interwoven with the articulation of core food-sharing visions and models.

- ***Configuring sociotechnical practices.*** Here the details of how community-led initiatives use digital technologies to organise their work, document meetings, and gain visibility are discussed. While mainstream social media platforms are useful for generating interest on a larger scale, more civically focused tools are used where possible e.g. for internal organisation. As a practical sensitivity for configuring sociotechnical practices, the paper outlines that communities should strategically map the variety of digital technologies used to understand the values and tensions that stem from their use and how they relate to the core goals, visions, and work of the community.
- ***Configuring participation.*** Here, the governance structure of the community is identified as having a lack of clear community guidelines and decision-making models, which poses a significant challenge for newcomers who want to join and contribute. While the community values non-hierarchical decision-making and encourages independent initiatives, in practice, informal leadership structures have emerged, creating stress and feelings of obligation for the core group of volunteers. As a practical sensitivity for configuring participation, the paper outlines that communities should make key rules, norms, and tasks explicit and develop visible and adaptable governance mechanisms e.g. a voting mechanism. This transparency can help to shape the motivations of different actors and make expectations about participation clear from the beginning to avoid conflicts down the line.

In summary, Paper IV contributes to digital civics research by building on past work concerned with how grassroots and activist community initiatives adopt different sociotechnical practices to infrastructure their work, to learn from others, and to scale their impact through proliferation (Bødker et al., 2016; Frauenberger et al., 2018; Korsgaard et al., 2022; Lampinen et al., 2022). The paper contributes the concept *'collective histories of organising'* to capture the processes whereby a community initiative gets started in the first place by drawing attention to the impact of previous experiences on communities' efforts to get up and running. The paper outlines three central dimensions of the concept, namely configuring capacities, configuring sociotechnical practices, and configuring participation. Moreover, to continue the cycle of learning among grassroots communities, Paper IV presents a set of practical design sensitivities that can help other food-sharing initiatives to build, sustain, and infrastructure collective action.

A selection of surplus fruit (above) and surplus vegetables (below) ready to be shared at a food-sharing event in Copenhagen, Denmark

“Activating notions of ‘community’ in economic exchange has been integral for framing the design of sociotechnical collective decision-making and mutual understandings which contribute to building relationships of trust and support within communities”

(Berns, 2023, p.59)

Discussion

In this chapter, I begin by discussing the overarching themes and ideas that became visible across the four papers included in my thesis. The chapter is structured around three salient points of discussion that address the following research questions:

RQ1: *What are the key concerns, values, and sociotechnical practices involved in establishing, sustaining, and running activist food-sharing communities?*

RQ2: *How can sociotechnical practices be designed to support food-sharing as an alternative to mainstream models of food distribution?*

RQ3: *How can a community economies perspective help to frame and determine the scope of the design of such sociotechnical practices?*

The first discussion point, *food-sharing as activism*, addresses RQ1 by describing the key concerns, values and sociotechnical practices around which food-sharing communities are established. The second, *designing sociotechnical sharing and governance practices* addresses RQ2 by discussing the current (and potential future) sociotechnical practices that are key to supporting and infrastructuring alternative models of food distribution within food-sharing communities. Finally. the third, *designing community economies*, addresses RQ3 by discussing the co-existence and entanglements of diverse models of food distribution, the central practice of queuing at sharing events and the cultivation of mutual relationships and the impact that they have on food waste activism

6.1 Food-Sharing as Activism: Key Concerns, Values, and Sociotechnical Practices

Addressing RQ1, I have identified that reducing food waste and cultivating more sustainable food practices are the key concerns around which activist food-sharing communities have been established. Community volunteers frame their efforts both as a form of on-the-ground local activism where surplus food is (re)distributed rather than wasted, and as a way to facilitate broader discussions around the causes and effects of food waste. These activist concerns have become apparent across the four papers, for instance, in how FS-STHLM shaped the community around waste reduction as the primary goal or how many FS-CPH and FS-SGE members are drawn towards *no-waste* notions of fairness that prioritise waste reduction as the most important aspect of events. Connected to past digital civics work (Crivellaro et al., 2014; Fuad-Luke, 2009; Giles, 2021; Le Dantec, 2012), unpacking food-sharing as an activist initiative draws attention to the processes whereby individuals come together to identify and engage with shared issues or concerns. By *addressing RQ1*, my research expands this work by offering a detailed account of how specific configurations of activists and researchers who are concerned by food waste form food-sharing initiatives. For instance, Paper I illustrated how the FS-CPH community was established after a few individuals were inspired by similar efforts in Germany. Furthermore, Paper IV built on this by presenting a comprehensive analysis of how food-sharing initiatives are established and sustained through distributed online and offline connections with similar initiatives.

Relatedly, *in addressing RQ1*, my work has illustrated how the values of different community members (volunteers, donors, and recipients) lead them to act in various ways. Echoing related work that illustrates how values are a key component and driving force behind activism (for example, S. Bardzell et al., 2020; K. Hansson, Pargman, et al., 2021; Vlachokyriakos et al., 2014), Paper IV highlighted how volunteers communicate their values to potential food donors to convince them to collaborate, suggesting that the donors who have agreed to participate may also hold the belief that surplus food should not be wasted. At the same time, my work has also unpacked how values within food-sharing communities can vary. For example, Paper III illustrated that bringing different food-sharing practices together requires negotiation concerning how to combine diverse values (e.g. social support, education, waste reduction). Similarly, Paper I described how the values motivating the participation of recipients in the community are more diverse. While some share the values of volunteers, others claimed to attend events as a social activity, as an opportunity to try new food, or simply to get free food. Connected to this, Paper I and Paper IV have shown that during sharing events, volunteers guide recipients on how much food to take, often using the refrain *only take what you can eat*. This reflects concerns about how recipients might subconsciously devalue the food by taking more than they can eat, resulting in the food simply being moved from one rubbish bin to another. Relatedly, Paper III has unpacked how in FS-SGE surplus food is given the same status as locally produced food, which is typically viewed as highly valuable (Normark et al., 2021).

My work has also drawn attention to how (re)negotiating the value of surplus food is not only about the food itself but also about bringing diverse groups of people together (e.g. age, values, socioeconomic status, and cultures). Connected to RQ3, from thinking about food-sharing practices through the perspective of community economies, it became apparent across all communities that for many volunteers and recipients, food-sharing events are not just about the distribution of food; they are also spaces for community building and exploring ways of collectively navigating more sustainable food practices, beyond reducing waste. For example, Paper III described how in FS-SGE, surplus food is (re)negotiated as valuable through the on-the-ground work of the community by unpacking their efforts toward effecting deep, rather than surface-level change both locally and as part of a broader social movement towards more sustainable food practices across both local and glocal food systems.

Furthermore, *addressing RQ1*, all four papers have highlighted how community members collaborate through a range of sociotechnical practices that are essential for (re)negotiating the value of surplus food. Specifically, donors communicate with volunteers and set aside surplus food items each week. Recipients discover events online (e.g. Facebook) and through offline social networks (e.g. friends and family) and show up to events and wait patiently (for the most part) to keep items from going to waste. Most prominently, Paper I and Paper IV unpacked the labour invested by volunteers to organise weekly food-sharing events, which include tasks such as establishing partnerships with donors and event spaces, creating and managing profiles on social media platforms, collecting and sorting donated food (i.e. removing inedible items), and managing the flow of recipients at events. My research illustrates how through the labour of volunteers surplus food that would otherwise go to waste is given new value. Papers I, II, and IV, unpacked how the volunteers' belief that surplus food should not be wasted is reflected by social practices at events. Similarly, Paper IV unpacked how the (re)negotiation of the value of surplus food manifests through the strategies used to recruit donors; volunteers spent a considerable amount of time developing their vision of an anti-food-waste community and preparing materials to convince potential food donors that their surplus food could be shared as a valuable resource, rather than going to waste.

Looking at the bigger picture, my work unpacks how activist food-sharing strives to achieve change by creating a space where people can share and develop new *food literacies* (e.g. communicating the scale of the food waste problem or helping people to make informed judgements about whether food is still safe to eat or not) both at a local level and as part of a broader social and political movement towards food waste reduction.

6.2 Designing Sociotechnical Sharing and Governance Practices

Addressing RQ2, my work has raised questions concerning the relevance of technology in community-led food-sharing contexts. A common theme throughout the co-design work in my thesis has been that community members feel that the use and/or design of technology is not always suitable or appropriate for supporting the on-the-ground work of sharing surplus

food. For example, Paper II and Paper III unpacked instances when community members tended to have a binary view of technology. Some members associate technology use with efficiency feeling that it could do more harm than good by hindering social interactions, reducing engagement in activism, and generally making events less enjoyable. Meanwhile, others leaned toward technological quick fixes as a way to optimise the process of sharing by reducing the often large crowds of recipients at events.

Nonetheless, resonating with related research that encourages designers to recognise when *the implication is not to design* (Baumer and Silberman, 2011), Paper III in particular draws attention to situations in which technology is not suitable such as negotiating different conceptualisations of fairness among FS-SGE members. However, *in addressing RQ2,* my work has drawn attention to a number of situations in which interactions with digital technology are/can be appropriate and helpful for running (the on-the-ground work of sharing food), sustaining (keeping communities alive), and proliferating (growing beyond numbers (Lampinen et al., 2022)) activist food-sharing practices. Specifically, my work has offered first-hand examples of fruitful collaborations between professional designers and the natural affinity community members have for design based on their context-specific knowledge (what Manzini refers to as *diffuse design* (Manzini and Coad, 2015)). These collaborations are valuable for experimenting with how community activities, values, and social structures can be successfully intertwined with the design and use of technology (as unpacked in Section 2.2).

Paper I, Paper III, and Paper IV describe how food-sharing communities use purpose-built platforms (Volunteer Local, Foodsharing.de, and Karrot) and messaging services (WhatsApp and Telegram) to organise the volunteer work required to run sharing events. These papers also draw attention to the interactions that take place between volunteers and recipients through mainstream social media platforms (Facebook and Instagram), namely advertising events and raising awareness about food waste reduction beyond face-to-face interactions. The work presented in Paper I and Paper II explores how digital interactions might be extended to other elements and moments of food-sharing events investigating the potential ways in which technology can be used to complement face-to-face sharing rather than completely delegating it to technology. Specifically, this research illustrates the design of digital mechanisms to enhance seemingly insignificant practices such as queuing at events (i.e. the flow of recipients) in a way that aligns with the diverse values of community members such as safety, transparency, and education.

Another noteworthy example of this delegation can be seen in the ways in which communities are governed. Linking to the related literature (Section 2.3), my work reveals how food-sharing communities can struggle to sustain their efforts over time. For instance, *Addressing RQ2*, Paper III highlights the challenge of coordinating work and aligning different goals, values, and sharing strategies while respecting the autonomy and diversity of different community members. Moreover, Paper IV draw attention to feelings of frustration among volunteers when trying to find a balance between formal and informal governance structures. FS-STHLM volunteers adopted a number of digital tools as a way to delegate some of the necessary organ-

isational and governance work to technology. One example of this is using the community website to provide potential new volunteers with basic information on how the community works. Another example is the use of the Karrot platform to facilitate decentralised and flat governance models by, for instance, providing tools for online decision-making through voting and polls and the ability to make public posts that make offline decision-making visible and transparent to less active members.

Connected to what is described in Section 2.3 as 'the tyranny of structurelessness.' (Freeman, 1972), Paper IV also discusses how digital platforms might be used to configure participation in communities by making activities and tasks explicit to help new members get involved while also reducing the organisational responsibilities of more experienced volunteers. In addition to these examples, Paper III also outlines the ways in which FS-SGE volunteers try to delegate the task of organising sharing events to the foodsharing.de platform. However, although this is successful for organising surplus-food-sharing events, attempts to integrate this practice into their extended sharing community resulted in some members actively rejecting the platform as they found it difficult to use or deemed it unnecessary, as well as, more subtle instances of non-use (Baumer et al., 2015), where community members just passively ignored the platform. Shifting from a view of technology that is intended to support day-to-day sharing practices and carry out governance tasks such as facilitating decision-making and scheduling volunteer shifts; Paper IV is primarily focused on the wider relations that exist between activist food-sharing initiatives in different locations.

Recent discourse on scale in computing has drawn attention to how normative framings of scale are often unsuitable for more local grassroots sites of technological development (Larsen-Ledet et al., 2022). For instance, research has unpacked how rather than scaling up by increasing participant numbers, community-led initiatives can expand out to other settings through processes of proliferation (Lampinen et al., 2022). Through extensive research into surplus food-sharing initiatives, my work furthers this knowledge by introducing the concept of *collective histories of organising*. This concept accounts for instances when new sharing initiatives proliferate from similar more established communities as part of a broader social movement towards food waste reduction.

The term collective here accounts for the learning processes that take place through both direct (e.g. the mobility of volunteers) and indirect interactions (e.g. knowledge-sharing forums) between communities. I describe this as a sense-making process whereby volunteers share their knowledge of other initiatives and consider its adaptability to the new context. While history in this context unpacks how the organisation of collective action around food waste begins by identifying the key concerns, values, and/or sociotechnical practices of initiatives that have already been established. This knowlege can then be used as a resource to simplify the work of starting anew. Specifically, my work has illustrated how the communities get up and running; FS-STHLM drew on the previous knowledge and experiences of more established food-sharing initiatives (e.g. FS-CPH). This experience led to the adoption and re-contextualization of some of their key values (e.g. activism) and sociotechnical practices

(e.g. randomised queuing) to fit the local specificities of the community (e.g. having fewer members), while also rejecting other organisational aspects (e.g. hierarchical governance models).

This concept resonates with the digital civics literature which describes how civic technologies are typically designed locally first before they are carefully scaled out or scaled out to different contexts (Frauenberger et al., 2018; Schrock, 2018). To expand this work, an upcoming paper I have written in collaboration with the development team of the Karrot platform considers the design space for facilitating ongoing knowledge sharing between food-sharing communities. Specifically, through a library where community members can share different operational rules/guidelines that have been implemented in their communities and why to trigger discussion and/or ease the governance work of other groups.

6.2.1 Sensitivities for design

As presented in 5, my work contributes five sets of design sensitivities that are directed towards other activists, designers, and researchers who are engaging in collective action around food waste reduction and other related social movements (e.g. food democracy (Prost et al., 2019), food sovereignty (Shattuck et al., 2018) or the slow food movement (S. Schneider, 2008)).

The first set of sensitivities encourages the recognition of seemingly mundane practices such as queuing at sharing events and how they can be designed and leveraged to cultivate collectives by aggregating diverse individual goals and efforts. For example, how digitally mediated queuing mechanisms might facilitate processes of commoning by creating space for encountering others and developing mutual relationships. Connected to this, the second set of sensitivities has been developed to trigger discussions around the situational aspects of organising surplus food-sharing focusing on the who, where, when, and why of queuing at sharing events. For example, queuing configurations that facilitate diverse constellations of attendees at events (e.g. families, groups of friends), rather than just individuals.

The third set of design sensitivities builds on the notion of queuing highlighted in Paper I and Paper II but with a more explicit and deep focus on fairness and encourages communities to reflect on how they might create space for different conceptualisations of fairness to coexist (e.g. prioritising economic support, or prioritising waste reduction). Bringing the design of mutual relationships to the forefront, the fourth set of design sensitivities is aimed towards action researchers and encourages them to reflect on the role they play as participants in grassroots communities (e.g. making tangible contributions to the community). Finally, the fifth set of sensitivities developed in my research takes a step back by focusing on the challenges of setting up and running new activist initiatives. Specifically, these sensitivities encourage aspiring activists to learn from the efforts of more established initiatives (e.g. adopting similar sociotechnical practices).

The choice to develop sensitivities for design rather than more prescriptive guidelines or even concrete digital 'solutions' speaks to the variance and local specificities of food-sharing initiatives in different contexts. Throughout my PhD, the diversity between different food-sharing contexts has been exhibited across initiatives in three Europen counties/cities that arguably share many social, economic, and geographical similarities, therefore one could speculate that such diversities would be amplified across more dispersed contexts. Sensitivities address that design in food-sharing contexts is not universal and therefore I encourage activists and researchers to find their own answers when thinking with them.

6.3 Designing Community Economies

Addressing RQ3, my research has explored how community economies thinking can help to frame and determine the scope of the design of sociotechnical practices in surplus-food-sharing communities. Across all four papers, this perspective has been helpful for discerning the social dynamics and interdependence of different models of food distribution within diverse economies. For example, there are crossovers between non-monetary and charitable distribution and food-sharing communities are often dependent on supermarkets for donations of surplus food. In addition to this, activating notions of 'community' in economic exchange has been integral for framing the design of sociotechnical collective decision-making and mutual understandings which contribute to building relationships of trust and support within communities. For instance, one could consider how digital technology might facilitate the sharing of responsibilities between volunteers, recipients, and participatory action researchers or develop sociotechnical mechanisms that can help activist communities to connect, learn from one another, and scale their impact as part of a broader social movement. This work is discussed in three intersecting subsections: the first unpacks strategies for *infrastructuring non-monetary exchange*, the second unpacks *queuing as a central practice* at food-sharing events, and the third *cultivating mutual relationships* discusses the value of establishing and nurturing relationships within and between activist food-sharing communities.

6.3.1 Infrastructuring Non-Monetary Exchange

Sociotechnical practices can shape infrastructure, but at the same time, infrastructure can also shape sociotechnical practices (Le Dantec and DiSalvo, 2013; Prost, 2019). Across all four papers, my work unpacks how the sociotechnical practice of sharing food at social events shapes the event infrastructure, as events are hosted in large public spaces that are open to the public i.e. local community centres. Conversely, below I unpack how the infrastructure of familiar models of food distribution, namely the market and charitable models has unintentionally shaped sociotechnical sharing practices at food-sharing events.

As discussed in Section 2.1, existing work by Michelini et al. identifies three distinct models of surplus food sharing, *sharing for profit*, *sharing for charity*, and *sharing for community* (Michelini et al., 2018) and the sociotechnical practices that support these models. Building

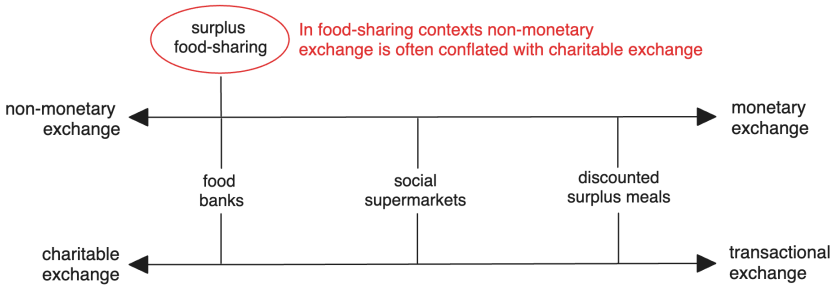

Figure 4: The spectrum of surplus food exchange

on this, my research has unpacked the ways in which these models become entangled with one another as part of diverse community 'economies' (Gibson-Graham et al., 2017). Figure 4 illustrates how different types of surplus food distribution/exchange exist on a spectrum. Non-monetary and charitable exchange (e.g. food banks) can be found on the far left, while monetary and transactional exchange (e.g. businesses selling surplus food at a discounted price can be found on the far right. The spectrum also includes a third type of exchange that can be found on the continuum (e.g. social supermarkets that sell food for symbolic prices). *Addressing RQ3,* my work has unpacked how non-monetary models of food distribution such as surplus-food-sharing lack the structure required to make the social dynamics of exchange clear. As a result of this, the values and mechanisms of the more dominant/familiar models of distribution (i.e. charitable and transactional) begin to sneak into those of surplus food-sharing communities. Thus, exploring how food-sharing communities might break away from these dominant framings of food distribution was a central focus of Paper I, Paper II, and Paper III.

Connected to the previous literature (Ikkala and Lampinen, 2015; Lampinen, 2021), my work has drawn attention to the challenges and opportunities that can arise when people share food for free and explored the design of values, relationships, and sociotechnical practices to support and infrastructure non-monetary food distribution. Paper I and Paper II have drawn attention to the tensions between transactional and relational exchange that arise in FS-CPH with volunteers feeling the need to constantly reiterate that sharing events are about reducing waste rather than feeding people and that events are places to engage in activism, not simply a 'free supermarket'. Similarly, instances, when non-monetary exchange is mistaken for charitable exchange, have occurred across all three communities. Paper III and Paper IV illustrated how free food is often associated with indigence and as support for people who are in 'need' – an association that related work has recognised as stigmatising (Dombrowski et al., 2013; Garthwaite, 2016; Purdam et al., 2016; Vyas et al., 2015) and leading to feelings of shame (Beagan et al., 2018). Such tensions were also visible in Paper I; volunteers described

Numbered tickets that were handed out to recipients at FS-STHLM events (left) and to recipients at FS-CPH events (right) to facilitate a randomised queuing model.

the need to reiterate to recipients that sharing events are focused on reducing waste rather than feeding people. Although from a distance this may sound harsh, it can also be interpreted as frustration about the expectations and responsibilities that are thrust upon volunteers to offer a service that they simply do not have the capacity to provide.

6.3.2 Queuing as a Central Practice

My work has paid particular attention to queuing at sharing events as a central practice around which the diverse values, ideas, and underlying challenges of food-sharing communities converge. This work contributes knowledge on how to design practices that may seem insignificant but do in fact capture the sociotechnical dynamics of the community. Past work (Norman, 2008) has illustrated how the design of queuing experiences is typically focused on cost and efficiency, while fairness, equity, and the experiences of people have been largely ignored. As a response, *addressing RQ3*, my research contributes a comprehensive analysis of how these values are central concerns around which queuing practices are designed and enacted at surplus food-sharing events. In Paper I and Paper II in particular, my work has drawn attention to how queuing not only captures the practical act of waiting in line but also represents a broader tapestry of interconnections within the community. It embodies the intricate relationships, complexities, and fusion of ideas that surround the food-sharing initiative and helps to re-frame sharing events as spaces of social connection and ethical negotiation, not just a way to get free food. For example, my work considers how queuing might be designed to facilitate negotiations around fair sharing or to foster reciprocity for the care work of community volunteers that is often rendered invisible.

Connected to this, my investigations have revealed how the most common concern related to queuing at sharing events is fairness. Paper I and Paper II unpack fairness concerns among volunteers and recipients through the analysis and design of alternative queuing experiences. Building on this, Paper III offers a comprehensive analysis of various conceptualisations of fairness that can emerge in food-sharing contexts and how they might be negotiated between different community members. For instance, on the one hand, many volunteers (across the three communities) subscribe to a *no-waste* approach to fairness meaning that as long as food is not wasted, it does not matter who consumes it. On the other hand, recipients find this unfair and typically prefer an *equality-based* approach to fairness through randomised queuing models. By identifying these different and sometimes conflicting conceptualisations of fairness, my work unpacks food-sharing communities as situated and diverse spaces of negotiated interdependence (Gibson-Graham et al., 2013; Ostrom, 1990) where shared ownership and the collective care and consumption of goods are paramount.

This suggests that rather than falling back on digital systems that will likely replicate the efficiency and individualism of market models (Ciaghi and Villafiorita, 2016), or the problematic distinctions of 'us' and 'them' associated with charity-based models (Dombrowski et al., 2013; Ganglbauer et al., 2014), community members will need to accept that complex challenges such as fairness cannot be solved. Rather, they involve a never-ending process of being together, struggling over the boundaries and substance of togetherness, and co-producing this togetherness in complex relationships (Gibson-Graham, 2006). For instance, my research has offered insights into how activist communities can design for diversity in various ways and recognise the diverse ways members participate in the community. Diverse participation could be cultivated through the design of queuing configurations that can facilitate diverse constellations of attendees at events (e.g. families, groups of friends) rather than just individuals. Moreover, these design sensitivities encourage how communities to reflect on how they might create space to allow for different conceptualisations of fairness to coexist.

6.3.3 Cultivating Mutual Relationships

Addressing RQ3, my work has unpacked how shared value systems are formed as a result of the relationships that develop between individuals who start food-sharing initiatives but evolve over time as communities grow. For instance, Paper IV detailed how the overarching value system of the FS-STHLM community was formed through a number of formal discussions, rather than through happenstance. During these discussions, volunteers considered concerns regarding the importance of certain values (e.g. environmentalism, solidarity) and the capacities of the community to act on these values (e.g. supporting people in need). Meanwhile, Paper I, Paper III, and Paper IV have shown that in each of the three communities investigated, what starts out as care for the environment (through waste reduction) becomes intertwined with care for the community itself as additional connected values emerge, namely, the responsibility to support those in need, negotiating fair sharing, and the desire to enact *deep change* that can transform food systems rather than just treating the symptoms (Weber et al.,

2020). The evolution of values is perhaps most prominent in Paper III, which illustrates how FS-SGE began as a surplus food-sharing community with values and goals similar to those of other German initiatives (Ganglbauer et al., 2014) but over time evolved by joining forces with other local sharing and sustainability initiatives (e.g. seed-sharing, community kitchens). These connected initiatives each brought with them diverse values and goals meaning that the community would need to find a way to negotiate their coexistence. The paper highlights how bringing together diverse food practices can shift the thinking of community members from a competitive scarcity mentality (arising from the sometimes limited supply of surplus food) to a more cooperative mentality associated with abundance, resonating with scholarship on how we can move toward deep rather than a surface level changes in mainstream food systems.

My research has also engaged with the design of digital infrastructures that align with the practices and values of activist food waste reduction efforts. An important aspect of this is recognising the interdependent relationships (Gibson-Graham et al., 2017; Gordon, 2016) that exist between the different community members, i.e. volunteers, donors, and recipients. This thesis has unpacked how these relationships also develop within initiatives through interactions with the various digital (e.g. Facebook) and non-digital (e.g. queuing tickets) artefacts used to support sharing and governance processes. Resonating with work on collective artefact ecologies that identifies the formation of artefact ecologies in collectives as a design process (Bødker et al., 2017; Korsgaard et al., 2022), my work has unpacked how food-sharing initiatives also cultivate interpersonal relationships through the artefacts they choose. For instance, Paper IV illustrated how community volunteers act as an intermediary between food donors and recipients. This takes place both through direct conversations between volunteers and donors and through volunteers sharing donor information on the Karrot platform to coordinate pickups, but as outlined in the paper this information is considered sensitive and therefore is not shared with recipients. However, as mentioned in Section 6.1, food-sharing events are also used as a means of building social capital and fostering trust within a community. For example, Paper II and Paper III discussed how gatherings and events surrounding food-sharing activities are organised to be social events where snacks and drinks are served and community members are invited to get involved in activities ranging from taking part in educational quizzes to digging up vegetables from the community garden to take home.

Addressing RQ3, my work has drawn on a community economies perspective to understand how activist food-sharing communities can develop community relationships locally while also strengthening social connections by identifying and amplifying ethical economic practices that already exist (Gibson-Graham, 2006). For example (as addressed in Section 6.2, the findings of Paper III and Paper IV have shown how constellations of interpersonal connections and digital artefacts inspire and help grassroots food-sharing communities to get up and running through processes of proliferation and evolve as part of a broader collective action towards more sustainable food practices. Furthermore, Paper III details how FS-SGE began as a surplus food-sharing community with similar goals and practices to other similar initiatives across Germany and Europe but over time evolved by joining forces with other local post-capitalist initiatives working towards more just and sustainable food practices such as seed

sharing and free shop to form a practice referred to as food resource sharing.

Developing this idea, as previously discussed in section 6.2, Paper IV highlights how digital technology and interpersonal relations help new collective actions to build direct and indirect relationships by learning from each other (Frauenberger et al., 2018), enabling communities to proliferate (as previously discussed in Section 6.2). Additionally, the relationships that form between food-sharing communities and researchers are an important point of my research. My work has exemplified how active participation from the food-sharing communities in the research process can empower community members and promote social change through the involvement of those most affected by the research topic (Hayes, 2014). Moreover, resonating with past work (Mason, 2015), Paper III has unpacked how supporting community engagement through contribution and embodying care for the community is important for researchers to understand grassroots food-sharing communities on a deep level. Moreover, this work emphasises the need for maximising opportunities for participation (e.g. volunteering at events), supporting initiatives from anyone who wants to discuss issues (e.g. managing meetings), participating in decision-making processes, and engaging cooperatively rather than as rivals (i.e. not pushing your academic agenda), and *continuing the conversation* when the research process comes to an end (Fox and Rosner, 2016). Overall, throughout my thesis, I have illustrated how this kind of participatory approach, and its ability to bring together diverse value systems and sociotechnical practices, is essential to understanding the complexities of designing digital infrastructures that support the emergence of community economies.

Conclusion

In conclusion, this PhD thesis has explored the dynamics and sociotechnical practices of community-led food-sharing initiatives that aim to reduce food waste and develop alternative food systems. The research has addressed the motivations, concerns, and practical work involved in establishing and maintaining food-sharing communities, as well as the design of sociotechnical practices to support alternative forms of food distribution. The concept of 'community economies' has been introduced as a framework for understanding and shaping the sociotechnical dynamics of food-sharing, emphasising the creation of ethical economies within local communities.

Through a participatory action research (PAR) approach, the thesis has engaged with two central case studies, FoodSharing Copenhagen (FS-CPH) and FoodSharing Stockholm (FS-STHLM), while also contributing analytically to a related project in Siegen. The research employed ethnographic methods and collaboration with community members to investigate the sociotechnical practices, values, and technologies that underpin food-sharing initiatives. This research approach led to a deep understanding of the sociotechnical dynamics and practices of grassroots food-sharing initiatives. My work also highlights the importance of ongoing engagement and mutual learning between researchers and communities in shaping sociotechnical interventions. As a whole, the thesis contributes to the emerging field of digital civics and civic technology, focusing on the design and use of technologies that foster long-term mutually beneficial relationships within food-sharing communities.

The first research question investigated the key concerns, values, and sociotechnical practices involved in establishing, maintaining, and running food-sharing communities. The thesis provides insights into the motivations and practical work of food-sharing initiatives, highlighting the importance of reducing food waste, increasing access to food, and building social connections. The second research question focused on designing sociotechnical practices to support food-sharing as an alternative to mainstream market models of food distribution. The research explores the role of digital technologies in organising and facilitating food-sharing activities, emphasising the need for technologies that align with the values and goals of food-sharing communities. The third research question examined how the concept of community

economies can frame and guide the design of sociotechnical practices in food-sharing communities. By adopting an alternative to the sharing economy perspective, the thesis contributes to understanding the dynamics of informal economic activities and how they can shape social connections and collaborations.

Overall, this PhD thesis contributes to knowledge about alternative food systems, civic technology, and sustainable human-computer interaction. It provides insights into the practical work, values, and sociotechnical practices of food-sharing communities and offers a framework for designing sociotechnical interventions that support ethical economies and collaborative efforts towards food waste reduction. The findings of this research have implications for policymakers, designers, and activists working in the fields of sustainable food systems and community-led initiatives.

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