A Dozen Stickers on a Mailbox: Physical Encounters and Digital Interactions in a Local Sharing Community

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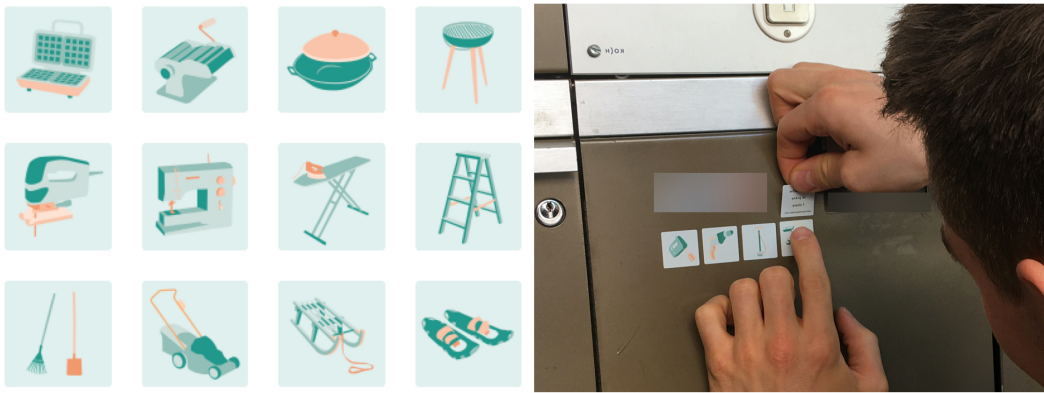ELAINE M. HUANG, University of Zurich, Switzerland

Fig. 1. Stickers emblematic of the Pumpipumpe resource sharing community on a member's mailbox.

Many non-profit peer-to-peer exchange arrangements and profit-driven, multi-sided online marketplaces leverage underutilized resources, such as tools, to optimize their use to capacity. They often rely on a digital platform in pursuit of their social aspirations and/or economic objectives. We report on a field study of a local sharing community that employs a set of stickers illustrating different household items, typically placed on community members' mailboxes, along with complementary digital tools. The stickers are used to communicate the availability of resources among neighbors to facilitate social encounters and to encourage sustainable use and re-use of shared resources. Through in-depth qualitative interviews with sixteen participants, we describe the opportunities and limitations of this approach to peer-to-peer exchange. We offer insights for designers of resource sharing communities into facilitating face-to-face encounters and the online interactions needed to support them.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**.

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1 INTRODUCTION

An increasing number of non-profit groups and organizations offer collections of shared things (e.g., books, toys, tools) and resources (e.g., woodworking spaces, fab labs, community gardens) with the explicit aim of benefiting local communities. These sharing initiatives commonly promote re-use of existing artifacts (e.g., tools) and joint development of resources (e.g., fertile land) in an effort to foster a stronger sense of community. Additionally, they often strive to advance ecological and social sustainability in their local settings.

Light and Miskelly [38, 39] emphasize the importance of grassroots sharing initiatives in helping to develop social cohesion, resilience, and resourcefulness in neighborhoods and promoting sharing cultures among people. Collectively, these initiatives have the potential to change not only the use of resources at individual and community levels, but also broader socio-economic structures [36]. Researchers have identified that maintaining a balance between digital and physical activities is imperative for local community endurance, sustainable development, and growth [31, 39]. Considering the rapid proliferation of such initiatives (e.g., [52]) and their social, economic, and ecological import, providing support for their members' practices is a growing area of interest for researchers, designers, and technologists (e.g., [12, 15]).

We address Dillahunt et. al's [10] call to study informal economies of underutilized personal artifacts (e.g., household goods, hardware tools) – one of the underexplored areas of the sharing economy in HCI literature. Our study explores resource sharing practices in neighborhoods and the associated challenges and opportunities for design. Specifically, we consider: (i) how resource sharing is performed in practice and/or reasons for lack of sharing; and (ii) how community innovations (in our case, locally present physical signifiers and supporting digital tools) shape those practices by facilitating or hindering sharing among neighbors.

We conducted a field study of a resource sharing community in the Zurich metropolitan area in Switzerland to elicit everyday sharing practices of its members. The sharing community Pumpipumpe[1] provides a pre-defined set of stickers that can be affixed to a mailbox (see Figure 1) to let neighbors know what household items one is willing to share. To start sharing items with the community, one is required to order a set of stickers and/or register them on the supporting website. Being a low-tech solution, the service does not specify how to arrange the sharing of items – it is up to individuals to agree on terms of use and arrangements for return. Yet, Pumpipumpe does provide an interactive map and a messaging service to facilitate searching for items and coordinating exchanges among members. We conducted a contextual inquiry with 16 households that participate in Pumpipumpe. We explored and uncovered: (a) the practical aspects of how borrowing and lending are orchestrated; (b) perceived barriers to participation; (c) functional aspects of the supporting digital tools; (d) symbolic meanings of the mailbox stickers; and (e) how trust is established within the community.

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[1]The name *Pumpipumpe* stems from a delicate interplay of two German words: *eine Pumpe* (or a Swiss German variant *e Pumpi*) – a pump (e.g., a bike pump) and *pumpen*, which has a twofold meaning: (1) to pump something into something (e.g., air to the tyres), and (2) to lend/borrow something to/from someone.

The Pumpipumpe community shares some principles and characteristics with well-researched resource sharing initiatives, including tool libraries [16], makerspaces [58], and local peer-to-peer exchange systems [32, 57]. All of these aim to maximize the use of existing artifacts over the acquisition of new things. Nonetheless, Pumpipumpe's approach differs from other initiatives in its self-organized sharing process that combines physical artifacts (stickers) with digital tools, the absence of detailed tool inventories, and the importance of face-to-face contact in establishing rapport and finalizing lending/borrowing decisions. (We describe Pumpipumpe in detail in Section 3).

Although over 24,000 people worldwide have ordered stickers and the concept has attracted regional, national, and international media coverage, the Pumpipumpe organization knows surprisingly little about the actual practices, needs, and concerns of the participating households. Even as the community appears relatively successful at a glance, it is not clear how this model for local peer-to-peer exchange plays out in practice.

This paper makes two contributions. First, we provide a detailed account of practices in a resource sharing community, outlining the role of physical encounters and digital interactions. A better understanding of the practices surrounding the Pumpipumpe model (that combines physical artifacts with digital tools) contributes to social exchange literature and adds to HCI research on local resource sharing communities that facilitate social encounters among members and encourage sustainable consumption practices at large. Second, we discuss opportunities and barriers for the design of resource sharing initiatives, with a focus on how to strike a balance between face-to-face encounters and digital interactions that support them. This addresses the need to support designers in the sharing economy (e.g., [13, 14]).

In this paper, we first position our study within the larger context of the sharing economy and describe the Pumpipumpe community in detail. We then present our research method and our empirical findings on the sharing practices within the community. To conclude, we discuss opportunities and barriers for design research and practice in the context of resource sharing initiatives.

2 RELATED WORK

Our review of related work is divided into two main areas. First, we describe the two main approaches (i.e., profit-driven and non-profit) to the sharing economy. Second, we review research on the challenges that non-profit sharing initiatives face.

2.1 Two Approaches to the Sharing Economy

The "sharing economy" [7] has become an umbrella term for a variety of social, economic, and business models that rely on networked technologies to enable access to different types of (shared) resources. To help map the terrain, Schor [54] distinguishes between two main approaches to the sharing economy based on their market orientation: First, profit-driven digital platforms (e.g., Airbnb, Uber), services (e.g., car and bike sharing) and online marketplaces (e.g., TaskRabbit) generate economic activity by matching providers and consumers to optimize resource use to capacity or by brokering on-demand labor. Some of these services entail no face-to-face interaction and, therefore, do not considerably contribute to social cohesion [17] and some can even be associated with negative social impacts (see e.g., [11, 50, 62]). Second, in contrast, the non-profit approach to the sharing economy aims to prioritize social, cultural, and environmental values over economic gain. Examples of this approach include grassroots sharing initiatives [39], member-owned organizations [33], solidarity movements [61], and platform cooperatives [52] that focus on empowering local communities through social innovation, shared ownership, as well as the conscious use and re-use of available resources. Besides providing practical value to members, initiatives like community gardening [38, 46], tool libraries [16], makerspaces [58], food purchasing

communities [6], and food saving initiatives [4, 18] advocate for the fair distribution of goods and labor and aim to create a stronger sense of community in their local settings. Our study looks at one example of this type of local resource sharing.

Over the past decade, HCI and CSCW researchers have developed a strong interest in both approaches to the sharing economy. In an extensive literature review of the sharing economy in computing, Dillahunt et al. [10] identified several underexplored areas for future research. These include a lack of studies regarding informal economies of underutilized personal assets and aspects of sustainability and trust in relation to sharing economy platforms. The authors [10] also outline a significant imbalance towards the US context in prior research, especially within HCI. Our study responds to calls for further research on environmental, social, and economic sustainability [37, 38], along with trust and reciprocity [8, 32] in different sharing domains [10] and diverse geographic settings [59]. We specifically selected a local resource sharing community outside of the US and chose to focus on a case where interactions among peers do not necessarily depend on a supporting online platform and where exchange is not bound by specific rules (e.g., monetary compensation) but rather guided by social norms and conventions (e.g., reciprocity, neighborly values).

2.2 Challenges in Non-Profit Sharing Initiatives

Prior research has illustrated several interpersonal and organizational challenges that resource sharing initiatives face. These include (a) the management of common resources and the efforts involved in creating workable infrastructures to sustain a community [39] (b) the poor visibility of member activities and lack of accountability for shared resources [46, 57]; (c) issues of trust and reciprocity [8, 32]; (d) limited access to shared resources for underprivileged populations [9]; (e) challenges to clearly conveying social and personal benefits of participation [2]; (f) unsystematic use of ICT to support day-to-day operations [6, 33]; (g) creating [40] and supporting new instances of local communities [31]; and (h) competitiveness in comparison to multinational corporations, such as lack of a public profile and long-term funding [53].

Given the societal import of resource sharing initiatives and platform co-ops, there is a need for a comprehensive understanding of resource sharing practices in organizations that rely on both digital interactions and physical encounters. Thus far, prior work has considered sharing practices within local communities with low levels of digital presence [38] and neighbors' perceptions of sharing household items (e.g., [43]). Light and Miskelly [39] propose trust, sharing, localness, and connectedness as cornerstones of community cohesion, and emphasized the value of relational assets (e.g., the social benefits of mutual care and the ad-hoc exchange of infrastructural resources). McLachlan et al. [43] describe a mismatch between peoples' attitudes regarding what they want to borrow and what they are willing to lend in their local communities in both physical and digital contexts, concluding that fostering social ties with neighbors could help mitigate this gap. Law and colleagues [35] developed ShareBox, an interactive artifact in the form of a physical lockbox controlled by a chatbot. ShareBox enables asynchronous and anonymous exchanges of personal items among geographically co-located peers. The authors field-tested the system in a few locations (e.g., on a university campus, at a lobby of an apartment complex) and concluded that despite the ease of the coordination that ShareBox affords, the mediated communication through an interactive agent paired with peer-interactions that were deliberately designed to be impersonal and anonymous considerably stifled social opportunities among community members.

Maintaining a balance between digital and physical activities is imperative for local community sustainability and growth [31, 39]. Specifically, HCI and CSCW scholars have concluded that designers of supporting digital tools and platforms should ensure that the tools fit users' everyday lives [57], allow for diverse forms of participation [14], alleviate the discomfort of indebtedness in non-contingent exchange [32], and encourage direct engagement among those involved [57].

We extend this literature by exploring the role of locally present physical signifiers (i.e. mailbox stickers) in enhancing community members' sense of participation in peer-to-peer exchange. We build on prior research by exploring how local sharing communities can find a balance between facilitating face-to-face interactions among their members and their digital presence to support such interactions to engender trust among members and build communal resilience.

3 THE PUMPIPUMPE SHARING COMMUNITY

The Pumpipumpe sharing community was founded in Bern, Switzerland, in 2012. It offers a set of 50 stickers that can be put on a mailbox to let neighbors know what household items one is willing to share. The stickers depict various household and leisure items such as a bike pump, a power drill, a pasta maker, and a tent. Blank stickers are also provided so that members can create their own symbols. Currently, Pumpipumpe's website offers a simple search interface, including a map of participating households with an embedded messaging function for members. Inclusion on the map is voluntary. Approximately half of the households who have ordered stickers have opted to be shown on the map. Pumpipumpe does not specify any conditions for how items should be shared. Individuals must determine terms for loan, use, and return themselves. There is no monetary compensation explicitly designed into the service. Members' activities are largely invisible both to the organization and to other community members.

As a non-profit resource sharing community, Pumpipumpe aims to promote trust, sustainable consumption, and social encounters among neighbors. The organization is run by seven volunteers who support its day-to-day operations and it is coordinated by a board of three founding members. The organization relies on donations and revenue from sticker sales (7 Swiss francs for a set of 50) to support its operations. The community has grown substantially since its founding and it now comprises over 24,000 participating households worldwide, primarily in Europe. However, despite the initial popularity of the stickers, little is known about what role they play in constructing community identity or activating exchanges among members.

We expect sharing practices in Pumpipumpe to differ from those of established resource sharing initiatives (e.g., tool libraries, community makerspaces) and local online peer-to-peer exchange marketplaces, due to four distinctions. First, the informal nature of membership in Pumpipumpe and the absence of explicit sharing rules contrasts with the established practices in tool libraries (e.g., tools check-out at a counter with a volunteer) and the explicit terms and conditions of use (e.g., a period of rent, fees per transaction) that are common in online marketplaces. Second, exchanges among neighbors usually lack detailed online inventories, making it difficult to determine the availability and the characteristics of an item (e.g., whether a particular angle grinder disc is good for stone or metal) in advance. Third, the attitudes towards accountability may be different when borrowing from a neighbor rather than renting an item through an organization, since the latter often entails a liability insurance or a deposit. Finally, decisions to share items are solidified face-to-face, when both parties can ensure that they want to engage with one another and the borrowers can confirm that the item matches their needs. Thus, exchanges are not brokered by a supporting online platform (e.g., tool/item reservation system) or influenced by online reputation systems, reviews, or other trust mechanisms.

4 STUDY DESIGN

We conducted a qualitative inquiry comprising in-depth semi-structured interviews with 16 members of the Pumpipumpe community in order to gain a comprehensive understanding of their sharing practices with neighbors (or lack thereof), their emergent concerns vis-à-vis their membership, and their experiences with and interpretations of the supporting physical and digital tools. We believe that such understanding of member practices in a community that has a deliberately

low-tech orientation to peer-to-peer exchange can inform the design of other resource sharing initiatives with limited digital presence and support.

4.1 Participants

Our fieldwork team consisted of the first author and three researchers listed in the Acknowledgements section. We recruited participants with the help of advertisements on the Pumpipumpe website, the Pumpipumpe newsletter (that members receive every six months), and social media channels. We also distributed paper flyers to some participating households based on Pumpipumpe's online map. Finally, we acquired stickers and registered them online such that we could send invitations to participate through the Pumpipumpe messaging feature.

We received 40 expressions of interest from Pumpipumpe members. We used purposive sampling [56], a non-random selection of individuals and settings, to ensure a variety of experiences would be represented, ranging from frequent sharing to no sharing. In our sampling, we aimed to balance such aspects as gender and age of the participants, as well as the length of their participation in the community and their role in the exchanges as both a lender and a borrower. In the end, we selected sixteen participants (7 female, 9 male, 0 nonbinary) for in-depth, semi-structured interviews. Thirteen participants had experience of sharing that had been triggered by the stickers. On average, however, these interviewees participated in exchanges only once or twice per year. The remaining three participants had neither borrowing nor lending experience despite having been members of the community for a few years. One participant was an active volunteer for the Pumpipumpe community, and another was a co-founder. We decided to interview them not only to collect their personal sharing experiences, but also to gain insight into the community from the perspectives of key stakeholders in order to identify possible gaps and tensions between Pumpipumpe's vision and its members actual practices. The age of our participants varied from 24 to 58 years, with the average being 36 years. Participants occupations were diverse: we interviewed, among others, a software engineer, a marketing specialist, a delivery person, and an architect. One participant was temporarily unemployed. All lived in Switzerland, mostly in urban areas. Table 1 provides an overview of our interviewees and their involvement with the community. We use pseudonyms when referring to the participants.

4.2 Interview Procedure

We designed the interviews to capture both broad reflections on the community and detailed experiences of sharing. We also collected photos of shared items and participants' mailboxes with stickers to enrich our research materials. The interviews took place over two months in the winter of 2020. When possible, they were conducted in person in participants' homes or other places where they shared their items (e.g., a studio). If participants preferred to meet elsewhere, we arranged a comfortable alternate location, such as a café in their neighborhood. In these cases, we asked participants to provide photos of the items they shared.

We began each interview by inquiring about the participant's background and reasons for joining Pumpipumpe. We then probed for descriptions of memorable positive and negative experiences and asked the participant to walk us through a typical sharing experience, including initiation, exchange, and return. We subsequently discussed what types of items they were willing to share, as well as the privacy of the shared items and associated personal information. For participants who had neither borrowed nor lent any items during their membership in Pumpipumpe, we asked for reflections of why this might be the case. We also invited participants to discuss challenges and opportunities they saw in Pumpipumpe. In terms of technology use, we asked about tools used before, during, and after a sharing experience, focusing particularly on the Pumpipumpe tools (e.g.,

Table 1. Overview of interviewees.

Pseudonym	Gender/Age	Occupation	Member since	No. of Exchanges
Barry	M32	Software engineer	2013	3-4
Noah	M24	UX designer	2019	1-2
Robb	M58	Unemployed	2013	3-4
Jenny	F27	Doctoral student	2020	3-4
Laura	F43	Bed and breakfast owner	2018	1-2
Norman	M46	User researcher	2018	0
Fiona	F37	Hospitality specialist	2015	3-4
Jordan	M24	Youth empowerment activist	2015	10-20
Kyla	F27	Marketing specialist	2018	1-2
Hermann	M45	Language teacher	2018	0
Simon	M39	Communication specialist	2018	1-2
Lilian	F36	Architect	2018	1-2
Sandra	F34	Sustainability researcher	2016	0
Fred	M40	Delivery person	2020	1-2
Oliver	M32	Traffic planner	2015	3-4
Anna	F35	Product designer	2012	10-20

online map and messaging service). Finally, we inquired about anything that had led participants to stop sharing items or cease their participation in the community.

The interviews lasted approximately 60 minutes. Participants received a gift certificate for a local grocery store chain, ranging in value from 25 to 40 Swiss francs based on the length of the interview. All interviews were audio recorded and transcribed verbatim. We conducted interviews in pairs, with one researcher guiding the discussion while the other took notes. Fourteen interviews were conducted in English. The other two were conducted in the native language of the participants and subsequently translated into English for analysis. In addition to interviews and photos, we captured insights immediately after each interview by writing reflective field memos [21].

4.3 Analysis Process

Our research materials consist of interview transcripts, field memos, and photographs. We first used affinity diagramming [23] to identify themes. Drawing on theories of social practice [26, 55], we approached the collected data through the lens of three constitutive elements of practice: materials, meaning, and competencies. *Materials* include things, technologies (hardware and software), "tangible physical entities" and things they are made of; *competences* "encompass skill[s], know-how and technique[s]"; and *meanings* include symbolic values and motivations to engage in a practice [55]. This allowed us to identify common constellations of elements relevant to sharing practices [26].

We then used a qualitative content analysis approach [3], employing deductive and inductive coding techniques from grounded theory [22]. Four researchers from the fieldwork team initially coded 10% of the data together to identify selection criteria and reach an agreement on the granularity of codes to be applied. We then started to code the data individually, while collaborating to reach consensus on the final coding tree that was used to code the entire data set. Working our way up from low-level codes to high-level analytic categories, we went back and forth between the materials, our notes, and the emerging structure of empirical categories. We also held meetings with researchers outside of the project to challenge our assumptions and corroborate the themes.

Through the analysis, we generated two high-level themes that characterize participants' sharing practices in the Pumpipumpe community: (1) the organization of "things" and tools that constitute sharing; and (2) the sharing process itself, including associated concerns. The themes and subthemes that we conceptualized are not orthogonal; they describe intersecting characterizations of our participants' sharing experiences.

5 FINDINGS

We now present our empirical findings, detailing the artifacts and tools involved in sharing processes, participants' experiences of sharing within the Pumpipumpe community, as well as emergent challenges with peer-to-peer exchange via Pumpipumpe.

5.1 The Artifacts and Tools of Sharing

In considering how Pumpipumpe works, it is important to have a sense of what is being shared. Most commonly, participants turned to Pumpipumpe to share with their neighbors various household items that were used only occasionally. These included kitchen utensils like pasta makers, tools for home or garden maintenance such as ladders and drills, items for leisure activities like a pair of snowshoes or a board game, and access to electronic devices such as a printer or a wireless router. The stickers served initially as something of a checklist for what to share: *"Do I have that? Would I be willing to lend this out?'"* (Norman, 46). Typically, participants selected objects that could be replaced or repaired easily, or ones they were not particularly attached to, and refrained from listing possessions that were intimate or expensive. They were reluctant to lend out valuables to strangers, owing in part to the lack of specific rules or regulations from Pumpipumpe regarding the sharing process. Sandra, 34, elaborated: *"You have no guarantee that you'll get [an item] back. That's why I'm rather hesitant with any high-value items, to be honest. If a blender goes away, it's not such a big loss. But with the sewing machine – [it] is."* We now turn to the tools and artifacts in place to facilitate sharing via Pumpipumpe, considering, first, the stickers as a key resource, and second, the digital tools involved.

Fig. 2. Pumpipumpe stickers on the back of Barry's van.

5.1.1 Stickers as a Trigger for Sharing. The stickers – the symbolic centerpiece of the Pumpipumpe community – were usually attached to participants' mailboxes, located inside or outside building entrances. As such, once attached, they were visible to the immediate neighbors. Barry, 32, had

put them on the back of his van (see Figure 2), hoping that someone would get curious about them during a road trip. The result exceeded his expectations: *"Last year we have been in Southern England with the van and we were on a camping ground near the ocean. We met a family [who] also [had a] van. They saw the stickers, and, funnily, they knew about them [through] a friend. They saw a [cable drum] sticker and I explained [to] them [that] you can charge stuff at my [van] using solar panels because at the camping there was no electricity. They replied 'Oh cool, can we use that?" They charged their cameras, and [a] laptop. We [even] had dinner with them, [and] played some games."*

Participants attributed both functional and symbolic values to the stickers. For them, the Pumpipumpe sticker system allowed signaling some initial form of trust: *"Every time you see them, they [broadcast] kind of trust in people, because if [people] have some stickers under a letterbox I assume they [are] nice people, they [care] about their behavior and [about] their neighbors"* (Anna, 35). The stickers were seen not only as instruments for displaying the availability of particular items but also – and arguably more importantly – as a communication tool that could serve as a ticket-to-talk with neighbors and strangers. As Jordan, 24, explained, the stickers could make it easier to approach neighbors: *"[The concept] facilitates the access for other people. It reduces the barriers for other people to come to ask to you [for an item] because they know you have the stickers and then it's also a reason to talk to you [...] it puts the barrier low[er] when you have stickers on your mailbox."* Oliver, 32, elaborated on the stickers as a friendly invitation for neighbors and community members to reach out and get to know each other better: *"to have the stickers [means to me] to be open-minded, not an anonymous neighbor. We wanted just to show: 'Hey, come and get this object here, you can borrow [it]!'"* Similarly, Noah, 24, explained how the stickers opened up opportunities: *"in the case of the lady getting the cake tin [from us], she would have never known that I would be willing to share this if I wouldn't have the sticker on my mailbox."* As these instances illustrate, the stickers conveyed openness to friendly interaction, acted as triggers for social engagement among unknown neighbors, and served as a starting point for fostering trust in neighborly relations.

Moreover, participants used the stickers to communicate personal values, in particular sustainable consumption, with the hopes of influencing others: *"It's also a statement that you have stuff, which others from your neighborhood can borrow [...] it's also a statement against this whole consumerism for me [...] maybe [if some]one ha[s] [seen] the sticker of the drill and next time they are in a [DIY] shop they think: 'Oh, I don't need to buy it. I saw the sticker there and we can just ring the bell and go there'"* (Barry, 32). Here, we interpret that beyond its pragmatic value, displaying stickers in one's personal space (e.g., mailbox) serves the purpose of identity building and advocating one's values within the community. The stickers also afforded self-reflection regarding practices of maintaining, handling, and discarding objects that could be shared. Anna, 35, described how the stickers allowed for a more reflective relationship with her possessions: *"[they enabled me to] look closely at your objects and the way you use them or you behave with them [thinking about] how they get used and what happens to them when they're broken [...] can you update or repair them or recycle more."*

Despite their practical and symbolic uses, the stickers had their limitations. Some participants were unsure whether putting stickers on their mailboxes was allowed by their house rules or might lead to complaints from landlords. Others found it impractical to add many stickers to the mailbox, for instance because they would then need to remove them when moving out. As stickers alone are not enough to keep Pumpipumpe running, we now turn to the role of digital tools in sharing processes.

5.1.2 Digital Tools for Facilitating Discovery and Coordination. The Pumpipumpe community offers a digital counterpart to the stickers in the form of geolocated pins placed on an interactive online map (Figure 3), along with a messaging system for members. These complementary tools are similar to those provided by peer-to-peer exchange systems featured in prior work, such as Kassi [32, 57] –

they serve as an online index of what is available and, as such, they can facilitate the coordination of sharing instances.
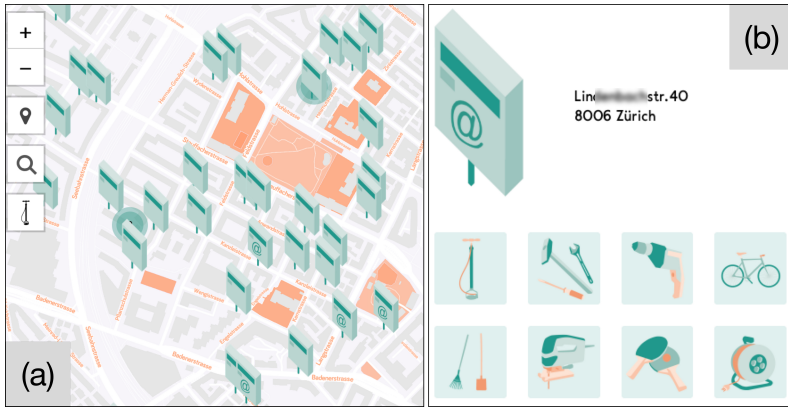

Fig. 3. (a) The online map of participating households in a neighborhood; (b) A detailed view of one household.

Participants perceived the map as the main tool to find objects in their vicinity. The map was also useful for discovering objects outside of one's immediate neighborhood – in places where one might be less likely to spot a sticker on a mailbox. Simon, 39, explained how the map helped him locate items close to where he wanted to use them: *"it's perfect to see what's around there. [When] I go to the lake and I would like to play table tennis. I can just look where [ping-pong paddles] are available around [that area]."* However, it is not mandatory to register one's stickers on the map. At the time of the study, only 48% of Pumpipumpe members had made their stickers visible on the online map. Although participants found the map to be the most useful tool for finding objects within and beyond their immediate neighborhood, it did not hold the same symbolic value for them as the stickers. It did not foster connections with neighbors in the same way, either. While anyone moving in a neighborhood might notice stickers by chance, the online map would only be useful for those who looked at it intentionally.

In 2019, Pumpipumpe introduced a messaging system to facilitate loan requests through the map interface. Due to privacy concerns, community members need to actively opt-in to be reachable via the messaging system. Thus far, possibly as a result of the opt-out default, only 10% of members have activated the feature. Those who have not activated it receive an email whenever there is a request for one of their listed items, specifying that someone is interested in borrowing it. This can serve as a starting point for coordinating the sharing.

Currently, the map/messaging system does not support detailed user profiles. The only information that is disclosed to the public is the type of item and its location. Some participants wished for a more elaborate profile mechanism with a picture, ratings, and a reputation system, as they felt that this would allow them to expand their sharing circle beyond the local community: *"maybe creat[ing] a proper profile on the website [displaying] similar [interests or affiliations]. If I see, for example, she [was] studying here [at the same] school, or she lives in my area. I would be more [willing] to share my things with them than with random [people]"* (Jenny, 27). With the present system, members are left to their own devices when it comes to sharing necessary details and establishing rapport – a design decision we revisit in more detail in 5.2.1.

While the stickers and map provided a general idea of what items are available, more descriptive information or pictures were suggested to help people determine whether the objects on offer

match the requesters' needs: *"oftentimes [pictograms] are not really representative of what you're getting. Like I'm allowing people to borrow my drill, but there's like a bunch of different types of drills. […] if I'm going through a drywall [that] it's fine if I have a little crappy drill, but when I'm going through like a massive piece of concrete, we need the heavy machinery"* (Noah, 24). Sandra, 34, talked about being hesitant to borrow via Pumpipumpe since the stickers describe items so vaguely that it was uncertain whether a particular item would meet her expectations: *"What bothers me is the process, borrowing it and then realiz[ing] a tool doesn't work."* To overcome such issues, some, like Norman, 46, wished it were possible to send voice messages and pictures through the messaging system to facilitate the sharing of details and facilitate the sharing process: *"I find it more efficient and personal to hear the voice of someone and not to write back and forth in chat. Also, if somebody would ask: 'Oh, what kind of suitcase do you have?' I could just send the picture and don't have to explain it."*

5.2 Experiences of Sharing Processes

We now turn to participants' experiences of sharing processes. Signing up for Pumpipumpe was seen as fairly straightforward: *"it was a very low key [process]. I mean, you just order the stickers and put [them] on the box and that's basically it"* (Norman, 46). The open-ended nature of the sharing process that Pumpipumpe supports leaves room for participants to go about exchanges as they see fit: *"[Pumpipumpe is] not a finished product but a tool to activate the [network] in the neighborhood"* (Anna, 35). Our research materials illustrate that this has led to diversity in how sharing takes place, along with different thoughts and tactics regarding who to engage with, what to share, and how to navigate the practical coordination of exchanges or concerns regarding trust and reciprocity. We have synthesized common phases of sharing processes in Figure 4.
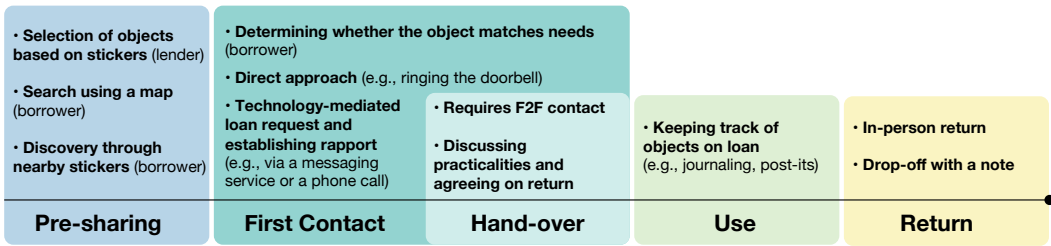

Fig. 4. Common phases of sharing processes and their typical characteristics.

5.2.1 Coordinating Sharing and Establishing Trust. The sharing process in the Pumpipumpe community usually begins with *pre-sharing* – a preparatory step in which a lender decides which objects they would be willing to share, while a borrower identifies where they might find the item they would like to borrow. Rather than start with Pumpipumpe, participants said they often checked first in their existing networks of friends and family and that they would only turn to the sharing community if the search among acquaintances was unsuccessful.

The subsequent step in the process is making *first contact*. On the whole, some of our participants preferred to be contacted in advance to determine the time of the exchange, while others welcomed spontaneous and casual drop-ins. Participants who used the digital tools (e.g., map messaging) deemed them important at this stage as they provided a way to get the contact information necessary for in-situ coordination (e.g., a phone number). In addition to the limited digital tools that Pumpipumpe provides, participants relied on common means of communication on their smartphones, such as instant messaging and voice calls to inquire about the item's details, establish

a shared understanding about the exchange, and, ultimately, arrange a pick-up. While separating first contact from *the hand-over* was the norm in exchanges that originated from online interactions, for some participants, a casual ring on the doorbell was more typical, especially when it came to repeated exchanges with (increasingly familiar) neighbors. Noah, 24, described how getting in touch with a potential (unknown) counterpart ahead of time could occasionally be foregone for the sake of convenience: *"Actually, he found the location through the website and he just came by. I was not aware that he was going to come by, but, apparently, he was on that side of town anyway. He was like: 'Otherwise, I'll contact you over the website, but if I'm already here, I might just go ring the doorbell.' By chance, I was home."*

Participants reflected on how much effort it was to get an item from a neighbor and weighed that against buying an item of their own at a store. While fostering social connection and aspiring for more effective use of resources motivated some to avoid buying things, it was not enough for everyone to justify the hassles of peer-to-peer exchange: *"it [requires] less time to buy a new [pasta maker]. It's [also] not that much money. [When] you go and borrow it, you need [first] to contact [a] person, to [set] a time slot to [retrieve] the material and bring it back. That's the problem of the society because we should take [our] time to talk to people, to have a meeting, [even when it comes] to [borrowing] something [of] a small value and not to take out the resources of the world"* (Simon, 39).

Proximity came up as a key issue both for making the practical arrangements easy enough to not hinder participation and for fostering trust in exchange partners through a sense of familiarity. While participants were willing to get an item within their immediate vicinity, going further away could feel like too much of a hassle. Robb, 58 explained: *"Sometimes the distance is also important if you can walk 5 minutes and get it: no problem, but if you live in [another region] and you have to drive 1 hour, it's another thing."* When prompted whether sharing with a stranger who lives nearby or further away plays a role, Norman, 46, discussed being more confident about engaging with people living in the same neighborhood: *"If I knew that he is really living here then, of course, that is different. I mean he is anonymous but I know where he lives then we would probably have higher confidence [to share]".* Similarly, Fred, 40, had developed a sort of policy to share items only with community members who live nearby: *"people living in my area [say] 5-10 kilometers are fine [...] when [one lives] 50 or 100 kilometers [away it becomes] too [unpredictable]."*

Participants emphasized the importance of physical encounters to solidify a lending decision, especially when they were contacted via Pumpipumpe by a stranger. Barry, 32, explained *"So I think the personal contact gives you the criteria to evaluate if [a person] is trustworthy or not. So even if I'd get contacted by chat by someone from [another city], but he is in [my area] for some time. I would still make an [effort to] meet him. I think meeting face-to-face is enough to judge if I should give [an item] to him or not."* Fiona, 37, shared a similar story of how she made a sharing decision in-situ when a stranger asked for her bicycle pump extemporaneously: *"It's always [about] a gut feeling [...] Once, a guy just rang the bell and he asked if he can borrow [a bike pump]. I was in my pajama and [asked] 'What for?' He had no more pressure in [the tyres], so it was only for few minutes. [Nonetheless,] I asked him for the phone number, like a guarantee if he brings it back or not. [I know] that it's only a pump, but still it's my thing and I take care of it."* Ultimately, the very first sharing experience with a neighbor could influence subsequent interactions, and even aid developing bonding ties. Barry added: *"when you have the first contact over Pumpipumpe, you share one thing and then there is like a connection starting and, maybe, the next time you want to borrow something you just ask them [casually] on the street: 'Do you have this [object]?' This first time borrowing [experience] gives you kind of trust to this person."*

Most of the participants' exchanges had happened face to face with minimal instructions given about the appropriate use of the shared objects. The exchanges often concerned ordinary objects, like an ironing board. Participants expressed different opinions about tracking objects during the

use phase. Some developed personal strategies such as journaling (Figure 5a), placing sticky notes in visible locations (Figure 5b), or taking a picture of a person with the borrowed objects, like Kyla, 27, did: *"I have a trick. When somebody comes to me and wants to borrow something I usually take a photo of the person and the stuff I lend to them because sometimes I [simply] forget."* Jordan, 24, did not see much value in keeping track: *"No, we never kept track. For me personally keeping track would be counterproductive because it feeds the wolf inside you that makes you [seek] having your stuff back and all those bad feelings with it."*

Fig. 5. (a) A journal with loaned items; (b) A note on a fridge door lists name, item, and date of loan; (c) Pick-up/return via a mailbox; (d) A drop-off note from a borrower: "Thank you very much. BR, Tamara".

5.2.2 Returning Items and Negotiating Reciprocity. When it comes to *returning* an item, for non-valuable objects (e.g., ping-pong paddles) and when the lender was not at home, a simple drop-off to the mailbox (Figure 5c) with a 'thank you' note was a rather common experience among the participants (Figure 5d). We did not encounter any instances of exchanges involving any monetary compensation. For a few, it was customary to reciprocate in some small way, like when Anna, 35, had returned a mixer: *"in return, we give them a little cake or a piece of cake, something we have produced with the mixer."* Participants had rarely encountered situations in which objects went missing or got broken. Rather, items often came back in the same or even better shape as before: *"Sometimes when you give [a raclette grill] to someone, you get it even cleaner back than it was before"* (Barry, 32). We interpret these instances to illustrate intrinsic care for the community and the importance of reciprocation.

While the stickers lowered social barriers to engage with neighbors, they did not completely eliminate hesitation to ask for something. Norman, 46, explained: *"the real problem [for me] is also a little bit the inner threshold to approach someone and ask for something, even though [I] know that this person should be open to that because he is a member [too]."* The expectations of reciprocity and the discomfort related to feelings of indebtedness could inhibit some of our participants from borrowing an item in the first place and direct them, instead, to seek alternative ways of getting it: *"I prefer to have a binding contract and if I just contact somebody unknown and ask him to lend me something, I feel a lot more like a beggar than when I have to pay for [an item]. I think that person expects some gratitude and if we have a contract then no gratitude is involved."* (Hermann, 45)

In talking about Pumpipumpe, participants drew parallels with other sharing models. For example, sharing practices in tool libraries contrasted with the ones in the Pumpipumpe community based on different considerations of ownership, established processes, and supporting tools (e.g., an up-to-date online inventory). For example, for Jordan, 24, getting a tool from a neighbor was considered much more of a social imposition than acquiring it from a tool library: *"[at times it] is easier [to use tool library] because you go [there] and you certainly check before what is available. It's their purpose [to provide this service], you won't disturb them [with a visit] so I think for a lot of people it's easier and it works [well]."*

5.2.3 Low Frequency of Activity. Some of our interviewees participated in the community only symbolically – they found the idea of sustainable consumption appealing and wanted to contribute but had yet to participate in sharing processes. Norman, 46, shared an account that resonates with those of a few participants: *"I have to say that I'm a member of Pumpipumpe [but] actually I never lent anything and [no]one ever came to borrow something, so it is more [of] supporting the idea. People like the idea and are sympathetic but [when it comes to] turnover of items it is not there. It is not really preventing [me from] purchasing these items."* Additionally, the community's lack of critical mass had made it hard for some to find desired items or people to engage with nearby: *"I'm almost the only one in my little area of [Sommerberg (name anonymized)]. I guess it's a hassle for everyone else to drive out to wherever I am and back. But if you could kind of just walk right over there 100 meters ask your neighbor if he has a certain item, then it will really make sense"* (Noah, 24).

Participants also shared some unsuccessful experiences of borrowing items within the community. While the lack of a critical mass is one of the obvious reasons for the infrequent exchanges among neighbors, other reasons included people not being at home at an opportune moment or items not being available anymore, even if the stickers were still up and the pins remained on the digital map. Similarly, when distributing flyers to recruit participants for our study we discovered the issue of outdated information in the form of "ghost households", i.e. non-reachable members who had registered stickers and their address on the map but had neither activated the messaging function nor attached the physical stickers on a mailbox. One possible explanation is that these members may have ordered the stickers without getting around to affixing them. Also, stickers might be placed in an area that is not accessible to the public (e.g., gated courtyards). Kyla, 27, suggested that people may also have moved out and forgotten to update their address on the map: *"some people don't live at the same place anymore. [The map] is not updated and it was very frustrating [. . .] I checked maybe 10 places and maybe 3 of them had stickers on it or something but I couldn't enter the buildings and [get in touch]."*

Disengagement from the community was another reason for members' low levels of activity. Infrequent communication among community members and the organization (e.g., a newsletter was sent to the members only twice a year) meant that some participants, like Laura, 43, had largely forgotten about their participation: *"Suddenly the doorbell rang and there was someone standing there. Then [I] said [to myself]: I almost forgot that I am a [Pumpipumpe member] because nobody*

ever used it." Additionally, when exchanges happen, the platform does not provide mechanisms to collect members' stories about their sharing experiences. Several participants felt that this would be an essential feature for community-building: *"it's really interesting to have more sharing experiences and more thoughts [. . .] it would be nice to know statistics and have more insight into [individual] sharing experiences"* (Anna, 35). While participants would like to read related stories, it might be difficult to capture them in a community in which successful involvement (e.g., supporting the idea of co-use, offering to share some of one's possessions, and being able to borrow items one uses only infrequently) does not necessarily mean frequent participation and members are not committed to maintaining an online profile.

Finally, our participants expressed worries about every household having the same items: *"I think the reason that it's not so frequent that someone comes to my door to ask for something is that we just live in a situation where everybody has almost everything. [Especially if you] live with some friends and you end up having like four mixers and three pasta machines. [But I hope] that this project or a lot of other sharing projects, will [gradually] influence the future consumer behavior."* (Anna, 35)

6 DISCUSSION

Our findings reveal both valuable aspects of the Pumpipumpe sharing community that could be amplified to the benefit of its members and points of weakness that hinder interaction and growth. We now delve into how these opportunities and issues can be addressed in the design of the model and its supporting technologies, and also consider the implications of these findings for supporting resource sharing communities more generally.

6.1 Fostering Willingness for Interpersonal Encounters

Due to the relatively straightforward procedure of ordering stickers and signing up on the website, Pumpipumpe has been able to expand its community quickly and widely. For many participants, (e.g., Noah in Section 5.1.1), the stickers provided a lightweight way to establish contact with unknown people. The use of simple and inexpensive resources, like stickers and other physical artifacts, can lead to productive social experiences and can be scaffolded to promote longer-term participation in resource sharing communities. The placement of stickers on visible physical spaces, vehicles, or objects (e.g., mailboxes) can create possibilities for service designers to broadly communicate shared community values. For example, Barry used his camping van to display his support for sustainable consumption by attaching stickers on the rear door (see Figure 2) to trigger social interactions. Supporting and extending these practices may contribute to building community identity, even when it comes to initiatives that rely primarily on digital tools. We highlight three design strategies to foster willingness for interpersonal encounters among members: (1) attending to social barriers; (2) encouraging incremental involvement; and (3) building on shared interests.

6.1.1 Attend to Social Barriers. Resonating with Lampinen et al.'s [34] findings, our research indicates that sharing processes need to **align with the slow and gradual nature of neighbor relationships** in order to be appealing, especially for those who may initially participate mostly for symbolic reasons. If people fear that social interactions will require substantial effort and commitment, this may be a hindrance. There is a need for future research to investigate how to better mitigate such concerns. For example, community members (like Hermann in 5.2.2) may opt to obtain a desired item by purchasing it instead of borrowing it so as to avoid awkward interactions or the discomfort of indebtedness [32]. Designers of novel resource sharing services may specifically **factor the casual nature and low-key commitments** of peer-to-peer exchange in their designs to anticipate potential social barriers that may hinder onboarding and participation.

Similar to the benefits of unfinished aesthetics [48], which afford self-reflection, experimentation, and self-expression when it comes to organizing personal physical and virtual possessions in a domestic context, we found that the lack of instructions on how to complete the exchange left room for people to speculate on how they wish to imbue their social environment. For example, consider Anna's (see Section 5.2) acknowledgement of the unfinished nature of the project and how she endorsed the supporting value of the physical stickers to activate her neighborhood network. Yet, despite the perception of the stickers as a ticket-to-talk with neighbors, our findings show that they alone are often not enough to remove social barriers to approaching strangers, especially those outside of one's immediate neighborhood. There is an opportunity, then, to explore how signifiers beyond stickers might **mitigate worries about being a burden to others**. To activate exchanges within larger areas, designers could also explore how simple illustrative examples, such as "how-to" guides or pre-defined templates in the messaging service, might bolster confidence to make contact.

6.1.2 Encourage Incremental Involvement. Pumpipumpe's digital tools, the map and its messaging function, were built with a focus on privacy. As a result, by default, the map displays only the address where an object is located and, optionally, a name of a member. None of our participants decided to disclose their names publicly. Nonetheless, our findings indicate that in some circumstances members are willing to provide further details to people who live nearby and those who share similar experiences (e.g., a university affiliation) or aspirations (e.g., DIY enthusiasts, outdoor sports fans). This resonates with Law et al.'s [35] observations that shared affiliation may positively impact assessments of peers' trustworthiness in indirect resource exchange. Similarly, in a study of peer disclosures on Airbnb, Ma et al. [42] confirmed that more detailed host profiles increase perceived trustworthiness and influence decisions. Expanding on these findings, we believe that displaying more information about the members within a defined area may create confidence and motivation to approach others. This suggests an opportunity for researchers to **explore** how **progressive self-disclosure** – the gradual revealing of one's identity or individual information in relation to a shared resource – could be leveraged in design to build trust among community members [16, 31].

It is important to mention that progressive disclosure practices in the sharing economy context starkly contrast with disclosure behaviors typical of social media, which are generally neither gradual nor incremental [1]. On social media platforms, personal details (e.g., phone number, relational updates) and peripheral information (e.g., restaurant likes, movies preferences) are often shared alongside each other and accessible to heterogeneous audiences (e.g., family members, acquaintances, colleagues) [60]. When it comes to gradual disclosure in resource sharing communities, it is important to investigate **how it can facilitate the trust dynamics required for sharing** physical spaces and possessions. In addition to incrementally disclosing more details during an exchange process, it is worth considering concealment strategies after the fact to mitigate possible negative consequences (e.g., unsubstantiated post-transaction allegations, dubious pursuits) [13].

6.1.3 Build on Shared Interests. The majority of exchanges in our study happened in participants' immediate neighborhoods. This is unsurprising given the local orientation of Pumpipumpe. Despite digital tools that facilitate search (e.g., the interactive map) and communication among peers (e.g., the messaging system), participants were more eager to engage with those living in their immediate vicinity than members farther away. In addition to the value of geographic proximity for convenience, this relates to interpersonal trust (e.g., [8]), that is, the confidence between two individuals and their willingness to be accountable to each other.

Social networking researchers (e.g., [41]) have found that geographic proximity and presumed social ties influence self-disclosure. When it comes to indirect resource exchange among strangers, the physical proximity of shared resources and the need for information about a borrower and the

intended use of the shared resource regarded important in decision-making and may contribute to assessments of trustworthiness [35]. To **foster interpersonal trust based on more than mere proximity**, we see an opportunity to explore how resource sharing communities might **accentuate common interests** (e.g., DIY, outdoor sports, or baking) that relate to the items requested.

For sharing economy services, this offers a new direction that contrasts with currently popular approaches, such as profiles and reputation systems, which can lead to impersonal exchanges and trust being placed in a platform rather than in other members [29]. Stemming from Moser et al.'s recent study [44] on e-commerce on Facebook, perceived similarity is a critical component of trust when it comes to transactions among strangers. Consequently, a common interests-oriented strategy raises questions of what **effects** increased knowledge **of similarities** (e.g., hobbies, social and professional affiliation, socio-economic status) among community members might have **on members' willingness to share personal items** (with the caveat that it might inadvertently promote homophily and, subsequently, discrimination [25]).

Ultimately, our findings speak to the importance of face-to-face contact in determining the trustworthiness of exchange partners. This marks a stark difference between the Pumpipumpe low-tech model and platform-centered models, even those in the community-oriented sharing economy. When it comes to Pumpipumpe, lenders retain agency to make sharing decisions in-situ (as in the case of Fiona in 5.2.1). In other settings, decision-making processes are often facilitated or hindered by the supporting platform's mechanisms [42]. A consequence of the in-person approach is that members need to come up with tactics and techniques for dealing with unwanted interactions. Drawing on prior research on conflict management in network hospitality [30], future work could investigate approaches for **mitigating undesirable social situations** (e.g., refusal to lend) while promoting inclusive, safe, and enjoyable sharing experiences.

6.2 Leveraging Online Information to Promote Continued Participation

Our findings show that the decision to make joining Pumpipumpe straightforward and to rely on self-regulation in sharing processes catalyzed initial interest in the community. Yet, this approach also created numerous challenges. The slow pace of exchange paired with a lack of instructions on how to arrange sharing contributed to community disengagement and a vague collective identity. For example, Laura (see Section 5.2.3), had nearly forgotten about her membership and was only reminded of it a few years later when someone rang her door bell. Despite the low-intensity of exchanges, merely displaying the availability of resources has merit in that it projects shared values of social support, care, and participation. This can spark a sense of community among neighbors and support the cultivation of relational assets [39]. To further promote continued participation in resource sharing communities, we encourage designers to (1) signal community activity and anticipate potential inactivity; (2) allow for rich resource descriptions and storytelling; and (3) create opportunities for members' self-reflection on their relationship with physical possessions and on their contributions to the resource sharing community.

6.2.1 Signal Community Activity and Attend to Inactivity. Our findings reveal that disengaged participants (like Norman in 5.2.3) may opt for less sustainable consumption choices, i.e., buying an item that might be common in their neighborhood. This suggests an opportunity to explore how increasing frequency and quality of communication between the organization and its members might encourage sustainable consumption practices. For example, designing and implementing a neighborhood notification mechanism could partially **mitigate disengagement**. Members could, for example, opt-in to receive messages when a new member joins in their vicinity. The benefit could be two-fold: (1) members would see new objects available nearby; and (2) notifications would

indicate activity in the neighborhood – a signal that is important for building and sustaining a sense of social presence in exchange communities [57].

Due to the challenges in updating and maintaining physical stickers, we observed a significant number of "ghost households", that is, unreachable members who do not have stickers on their mailboxes (possibly due to moving) and who did not opt into online messaging. There is an opportunity, here, to devise continuous review routines to detect inactive members, offer re-activation of membership, and provide options to archive or revoke participation to help **keep information about people and available resources up-to-date**.

6.2.2 Allow for Rich Descriptions and Storytelling. Our findings indicate that stickers, although important especially for immediate neighbors, are often insufficient in the details they convey. Many participants suggested that inquiring into these details should be done prior to pick-up, as it is disappointing if the object does not meet a borrower's needs once acquired. For example, expectations could be better managed by providing an optional space to **annotate the tools** online and by linking this space to the stickers (via e.g., QR codes) or offering the option to attach images to the item request-response dialog. The messaging system could also indicate when the member was last logged in to the system. This could significantly improve the experience of a borrower looking for an item in the spur of the moment – quick responses to requests can be seen as an important requirement for local resource sharing platforms [35].

Our findings also illustrate that the stickers effectively supported qualities of attachment [20, 47] of the shared resources. Specifically, we drew on the attachments to the objects based on their perceived worth [20]. The estimated financial worth of the objects was critical to determining a member's willingness to share the object and guided the selection of item to lend, as in the case of Sandra's sewing machine (see Section 5.1). An interesting tension arose for many participants: listing valuable items involves a risk of losing them, but lending inexpensive objects may not be perceived to be worth the effort. Sharing communities could include a built-in feature to **indicate the object's perceived worth**, be it based on financial value or personal attachment. This could be useful for decision-making when selecting shareable items from large personal inventories (e.g., books, LP record collections). Nonetheless, designers should grapple with balancing the effectiveness of this technique and its unintended consequences (e.g., property loss) when choosing to implement it. Also, there is an opportunity to explore the necessary conditions for sharing objects of **sentimental or personal worth**. For example, the use of "shared object narratives" [16] – stories collected when borrowing, using, and returning an object – not only affords storytelling (e.g., a history of an old backpack's itineraries) but also changes the way a borrower views and treats an item. This in turn could support accountability for the resource – a major challenge for sharing initiatives [46, 57] – and foster valuable social interactions that stem from the sharing of valued resources.

Prior work has shown that collecting and capturing members' experiences with shared objects can be effective in fostering social cohesion and feelings of belonging in the community [16]. Providing experience-oriented metadata [48] for objects, such as digital histories of shared use [16] and personalized digital annotations, could help to decrease the anonymity of membership and foster a sense of community among members. Pumpipumpe volunteers have already developed an online community wall on the website, where they manually post selected information from social media, featuring members' sharing experiences and promoting the available tools. Encouraging members to annotate and **follow-up on their sharing experiences** presents a further opportunity for **capturing stories** without placing the responsibility wholly on the volunteers.

6.2.3 Trigger Reflective Practices. Our findings point to untapped potential in the symbolic value of the stickers. They can be leveraged to **establish reflective relationships with personal possessions** (as in the case of Anna in 5.1.1). Prior research on physical and virtual possessions [48]

in domestic environments (e.g., [45, 49]) suggests that easy access to personal digital collections (e.g., by linking them to material objects like mementos) could facilitate serendipitous social engagement, and trigger reminiscence and reflection about objects. For example, using stickers as augmented reality markers could serve as a catalyst for onboarding members into a digital system to support deeper reflective experiences. This suggests an opportunity for designers to explore how we might create interactive systems that positively shape people's relations to their material possessions through illustrating provenance [51], longevity of use [5], and opportunities for repurposing the objects [24, 27].

6.3 Contributions and Limitations

To sum up, (1) we provide an understanding of the possible configurations of the online-offline boundary in the context of resource sharing communities; (2) we expose practical and symbolic values of physical and digital innovations within a large-scale, non-profit, resource sharing community; and (3) our findings inform gaps in the organization's understanding of their platform and community. Moreover, we offer an initial set of design recommendations to bridge that gap and inform the design of systems to support resource sharing communities more broadly.

We would like to acknowledge a few limitations of our study. First, the qualitative research approach employed in this work means that the findings may not (are not intended to) generalize to different communities and settings. Instead, our approach allowed us to develop a rich and descriptive account regarding one particular resource sharing community. A longer-term study employing longitudinal fieldwork and participant observation approaches could capture lending and borrowing experiences in even greater detail than what has been possible with our "snapshot" approach, especially when it comes to insights on how sharing practices and attitudes change over time. Furthermore, to establish a holistic understanding of community membership, we see value in combining our results with a large-scale survey of members' practices. Another path to further developing and exploring the sharing economy design space would be employing generative design methods, like cultural probes [19], to gain different orientations and perspectives on members' experiences, desires, and dreams regarding their resource sharing community.

The second limitation concerns the diversity of our participant population in two ways: First, despite purposive sampling, we were only able to recruit people with either largely positive experiences of Pumpipumpe or no sharing experiences. Interviewing (prior) members who have had negative exchange experiences could yield new insights about the tensions and challenges in the community. Second, given the site of our study (urban areas of the Zurich metropolitan area), our sample was culturally fairly homogeneous. Yet, sharing practices and routines are likely to be different in various cultural, geographic (e.g., suburban, rural) and demographic contexts. Furthermore, scholars identified that community-based social networking platforms may intensify existing tensions in racially diverse neighborhoods (e.g., the case of NextDoor in the US [28]). This highlights that while our findings paint a fairly harmonious picture of local resource sharing, this may be due either to who felt compelled to participate in our study or the characteristics of the particular community we studied. Tensions among members may be more intense in more heterogeneous neighborhoods and even well-intended platforms may end up amplifying them.

7 CONCLUSION

Our paper offers two main contributions. First, it systematically describes the practices of one resource sharing community. We detailed members' tactics for handling peer-to-peer exchange among neighbors, outlined interactional difficulties within the community, and examined how members use and make sense of the physical and digital tools that facilitate the sharing of household

items. We also identified and discussed the challenges and opportunities of the Pumpipumpe low-tech model in sustaining a sharing community over time. Second, we elicited a set of design recommendations for resource sharing communities. These aim to maintain the delicate interplay among face-to-face encounters and digital interactions. We hope that this study inspires HCI and CSCW researchers to further engage in studying non-profit sharing economy communities and in designing systems that can better support their efforts to promote sharing cultures and to advance social, economic, and environmental sustainability within their environments.

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