



# Exploring Digital Communication Needs of Local Communities and Self-organised Collectives

KATERINA EL-RAHEB, University of the Peloponnese, Greece

VASILIS VLACHOKYRIAKOS, Newcastle University, United Kingdom

MARIA ROUSSOU, National and Kapodistrian University of Athens, Greece

PATRICK OLIVIER, Monash University, Australia

TOM BARTINDALE, Monash University, Australia

ANDREW GARBETT, Samsung AI Center, Cambridge, United Kingdom

Recent work in HCI has explored the use of ICTs for the mobilisation and organisation of values-led communities and social movements. This paper extends this line of work by exploring the design of a communication system for informal, place-based citizen collectives—also referred to as Social Solidarity Movements. The distinctive characteristics of such collectives, namely their decentralised, bottom-up and self-organised organisation, and their lack of monetary resources, pose interesting challenges for communication technology design. The work reported in this paper sought to explore how the values and practices of such collectives can be embodied in mobile communication tools. A system was designed to mirror on-the-ground informal organisational structures, its primary goal being to serve as a probe for research and discussion. Our findings highlight the diversity of channels and organisational structures prevailing in these contexts, their participatory nature, and issues of temporality, anonymity, privacy, and trust, all of which must be considered when designing technologies to support cooperative work. We contribute methodological insights and design implications for mobile technologies underpinning the work of social collectives and their practices.

CCS Concepts: • **Human-centered computing** → **Collaborative and social computing systems and tools**; **Field studies**.

Additional Key Words and Phrases: solidarity HCI, latent assets, solidarity economy, SMS, design

## ACM Reference Format:

Katerina El-Raheb, Vasilis Vlachokyriakos, Maria Roussou, Patrick Olivier, Tom Bartindale, and Andrew Garbett. 2023. Exploring Digital Communication Needs of Local Communities and Self-organised Collectives. *Proc. ACM Hum.-Comput. Interact.* 7, MHCI, Article 208 (September 2023), 17 pages. <https://doi.org/10.1145/3604255>

## 1 INTRODUCTION

Over the past decade, HCI researchers have been active in exploring the role of technology in the mobilization, organization, and communication of social movements. Work such as [20, 25] has brought to light how social media has contributed to the mobilization of social movements, while other work [19] has explored how cooperative systems can be designed to facilitate collective action through democratic participation. Part of such inquiries on the role of HCI in supporting grassroots organizations and collective action is also work that aims to develop bottom-up and sustainable technological infrastructures for community self-organization and resilience [12].

Authors' addresses: [Katerina El-Raheb](mailto:k.elraheb@uop.gr), [k.elraheb@uop.gr](mailto:k.elraheb@uop.gr), University of the Peloponnese, Greece; [Vasilis Vlachokyriakos](mailto:Vasilis.Vlachokyriakos@ncl.ac.uk), Newcastle University, United Kingdom; [Maria Roussou](mailto:Maria.Roussou@upatras.ac.gr), National and Kapodistrian University of Athens, Greece; [Patrick Olivier](mailto:Patrick.Olivier@monash.edu), Monash University, Australia; [Tom Bartindale](mailto:Tom.Bartindale@monash.edu), Monash University, Australia; [Andrew Garbett](mailto:Andrew.Garbett@samsung.com), Samsung AI Center, Cambridge, United Kingdom.



This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike International 4.0 License.

© 2023 Copyright held by the owner/author(s).

2573-0142/2023/9-ART208

<https://doi.org/10.1145/3604255>

Building upon this line of work, in this paper, we explore the design of mobile technology for informal, place-based citizen collectives in Greece. Such collectives, also called Social Solidarity Movements (MVs) [42], have already been a research topic for civic-oriented HCI work. In [42], through a participatory ethnographic account of the organization of solidarity movements, the authors contributed implications for value-centered design, including implications for designing for societal transformation and "agonism." Meanwhile, later work with such collectives [43] contributed tactics for designing social innovation—a set of design methods for participating as technology designers in the socio-political innovation of such movements. These works, in addition to recent research exploring self-organised solidarity economies on social media [17], have uncovered the complexities of technology design in contexts and communities that lack a formal organizational structure and fixed roles for their members. More specifically, some of the more distinctive characteristics of Social Solidarity Movements in Greece, namely their decentralised and dynamic organization and their operation through non-monetary donations such as skill-sharing and time-banks, pose challenges to the use of digital technology and its administration.

This work aims to understand the particular practices and values that shape the asynchronous mobile communication of MVs and develop a technological probe that can provide insight into the implications of transferring such values and workflows into action in their everyday life. To do so, we designed and developed an SMS system (IrisSMS) informed by past empirical work with solidarity movements reported in the literature (i.e.[43])

More specifically, IrisSMS is an SMS distribution system for asynchronous communication between a network of subscribed phone numbers. Members of solidarity movements or other organizations can choose to "donate" SMS messages and thus contribute to the community through their phone network subscriptions (see below for more details). The mode of sharing available or already paid-for SMS messages and how SMS messages are distributed and managed through the network of donors mirror organizational and sharing practices within such collectives. We interviewed members of MVs and then undertook a workshop with one of these collectives, aiming at discussing the implications of using IrisSMS internally.

Our interviews and workshop data point to the complexities of technology use in these types of informal and dynamic settings. More specifically, the action-oriented, fluid, non-hierarchical nature of such structures presents several (in many cases contradicting) design objectives, namely: maintaining transparency and decentralization vs. ensuring authentication and trust; leveraging the instant and targeted nature of SMS vs. micromanaging communication needs; exploiting the cost distribution advantages of IrisSMS vs. managing time constraints, context sensitivity, and power dynamics. These complexities and contradictions reflect both practicalities in the field and other socio-political motivations and contradictions of solidarity movements.

Building on the contradictions our findings bring forth, in this paper, we contribute implications for the design of computer-supported cooperative systems for social movements. We also contribute to research through design approaches by discussing the methodological role that our digital artifact (IrisSMS) played in surfacing and making tangible such seemingly nonexistent contradictions. As our findings show, while the hypothesis of incorporating the values of MVs (donation, distribution, decentralization, etc.) into the IrisSMS system sounds promising, the transfer of those directly into one system in real life comes with several implications that could not be foreseen without exploring with the probe. While implementing these core values in a mobile communication system was our initial motivation behind the IrisSMS probe, our experiment has not only contributed to documenting these implications and complexities of designing for the MVs but also can help us discover the nuances of such human values of the MVs communities.

## 2 BACKGROUND: CIVIC PARTICIPATION AND COMMUNITY SHARING

### 2.1 HCI and Social Movements

HCI has been exploring ICT use for the organization and communication of social movements [14, 25, 46, 47] and community action [1, 10, 33, 34, 41]. Studies have focused on the way digital technologies have supported social movements' mobilization [9, 47], community organization [11], and crowdfunding [13, 41]. These studies have examined the role that social media and mobile technologies (e.g., smartphones) have played in large-scale social movements, for example, the Egyptian and Tunisian revolution [6, 46, 47], the EU social forum [36], the Occupy Movement [9] and the Umbrella Movement in China [25]. Such works have argued for paying more attention to the often "invisible" micro-dynamics, divergences, practices, tasks, and actions underpinning the movements' activities, often omitted from the literature [25]. Knowledge about the tasks and actions of such social movements is significant for designing supporting technologies that embody their values and practices. In this respect, authors have argued for the necessity of doing "on-the-ground studies" to gain a thorough understanding of the practices and potential role of technology in these political processes [25, 46].

### 2.2 HCI and Social Innovation

Building on such work, research in HCI has worked closely with local communities and social movements to surface the micro-dynamics, divergences, and practices of these movements. Grass-roots practices are understood as a form of social innovation [3]. As such, participatory design methods and participatory action research approaches are employed to design technology with, rather than for, these local communities. One prominent example of this type of research is the work of Bjorgvisson et al. [4, 5]: through three embedded living labs in Malmö, the researchers develop relationships with local communities in ongoing processes of alignment across a range of contexts and topics. This long-term work (also referred to as "infrastructuring" [16, 24]) is construed as a long-term platform for designing social innovation. In more recent work with social solidarity movements in Greece, the authors have conceptualised the activity of social movements as already designed social innovation, resulting in a set of methods (referred to as tactics) for researching and designing with such citizen collectives—i.e., designing with social innovation.

### 2.3 Technologies for grassroots civic participation and organization

Within this way of thinking about and designing technology, the agenda of ethical and responsible civic engagement in the digital realm, or digital civics, proposes to explore how civic platforms might enable the (re)configuration of service delivery in more relational ways through, for example, peer-to-peer models of service provision [2, 35, 38]. Critical premises of this agenda include how digital technology might help organizations deliver more resilient services in the context of decreasing resources, how they may support the engagement of citizens and communities to co-create services that better respond to their needs, and how local solutions might be scaled up and out. Similarly to the design for services agenda (Mol, 1999) and design for social innovation [30, 32], a digital civics agenda hopes to intervene in and challenge entrenched and unbalanced power relations and move towards more collaborative and relational approaches to service design and delivery through technology.

Of relevance for a digital civics approach to technology design is work that aims to develop bottom-up and sustainable technological systems and infrastructures for community self-organization and resilience [12]. Open-source and free/libre technologies have played a key role in such technical projects both due to the substantial work that open-source communities have done in supporting

such citizen collectives and as the democratic and participatory values and practices of such open-source communities align with these of local solidarity movements [29]. Of relevance to our work is HCI research that attempts to design and develop bespoke technologies for such social movements. As such, this work attempts to design technologies that embody the ways of being and doing of such collectives. For example, in [19], researchers have explored how cooperative systems can be designed to facilitate collective action through democratic participation. Similarly, the RootIO project [12] has developed peer-to-peer, hyperlocal, low-cost, and low-power radio stations in Africa. The researchers, through designing and building such a community-led infrastructure, made access to radio production more inclusive and thus systematically addressed the existing structure of radio ownership; while also, through an increased interplay of radio with other ICTs, they allowed greater community connectivity. Within the MobileHCI community, previous research on locative media [44], serendipity networks [23], and others [21, 31, 39] has investigated the way mobile media interaction can be aligned with the practices of social communities but also highlighted the difficulty of defining the borders of a community.

Similar to the above work, in this paper, we explore the design of a communication infrastructure for self-organised social movements. In the section below, we briefly introduce the context of this research before going deeper into our methodology and research findings.

### 3 CONTEXT: CIVIL SOCIETY AND PLACE-BASED SOCIAL MOVEMENTS IN ATHENS

The context of this research takes place in Greece, where neighborhood-based local social movements (more widely referred to as Solidarity Movements) have been active since widespread demonstrations and social mobilization took place in 2011 – that coincided with large-scale uprisings across the world (e.g. Indignados movement etc.). Such local social movements share similar characteristics to what in contexts such as Northern Europe would be considered civil society organizations. In Greece, partially due to a lack of strong civil society (e.g., charities and third sector organizations more generally), similarly to several other countries in Southern Europe, such informal local collectives have been providing social support to people most affected by the financial and refugee, and more recently the Covid-19 crises.

The role of these MVs is first to cover everyday basic needs for food, clothing, education, and health services, and secondly, to exemplify spaces where practical alternative ways of social organization and participatory service provision can emerge, be contested, and re-worked [? ? ]. For example, such collectives are non-hierarchical and operate through working groups and coordination teams, which are dynamic and constantly negotiated through dialogue in group assemblies. They resource their activities through voluntary work and time-based donations (e.g., managed through time banks), with their community centers being typically leased for free from local municipalities. Such fluid organizational structures (no clear stakeholders and set roles and responsibilities) and the donations-based, non-monetary resourcing of activities pose interesting design challenges for technology to support the groups' operation. Past work in HCI with social movements and with social solidarity economies has pointed to the difficulties of introducing bespoke digital technologies or conducting design-led research due to questions of sustainability, maintenance, and power. In this paper, we describe our attempt to conduct design-led research with such social solidarity movements. Building on past research within this context [? ? ], we report on our attempt to understand better the potential design of an instant messaging communication system for such solidarity movements.

### 4 APPROACH AND METHODS

Our research methods include semi-structured interviews and a workshop. We interviewed actors within Solidarity Movements in Athens to understand their communication practices better. We

then designed a workshop centered on IrisSMS, a probe we designed as a tool for Research Through Design [18]. We conducted this workshop with a time-bank network and solidarity school. Below we describe these methods in more detail, including our research probe IrisSMS. The two methods (semi-structured interviews and the workshop) are complementary. While the first provided more specific insight into the everyday communication practices and how their values are reflected in their organization exchanges (including the idea of latent assets for material and non-material things, the workshop aimed at working hands-on with the IrisSMS probe and revealing the design potential and implication of a hypothetical tool that would reflect these values. While the interviews target a wider range of solidarity movements also revealing a diverse map, we have chosen to work with the particular solidarity school/time bank mentioned below for two reasons: a) the idea of a non-material latent asset, in their case time, is already familiar in their everyday life and b) they showed during the interview the stage the biggest diversity in terms of using different communication media and channels, and the most complex organization (their communication needs varied from sending an SMS to 5-10 teachers to sending an announcement to more than 300 people).

Regarding the authors of this paper and their background, the first three authors are specialised in Human-Computer Interaction methods and user-centered design, and the second has substantial expertise in MVs in particular. The fourth author was the Principle investigator of the initial project with a background in HCI and digital civics, while the fifth and sixth authors have developed the IrisSMS probe.

#### 4.1 Semi-structured interviews

Past research [42, 43] has pointed to the importance of phone calls and SMS messages for the instant communication needs of local collectives – especially in cases of emergencies and urgent announcements.

This background work provides insight into the alternative economy and organizational structures of these movements, highlighting their significant potential importance for HCI design that reflects these values. Our methodology aims to understand in depth the values and structural principles that can be incorporated into the design of these systems. With the hypothesis that a decentralised system like the one described here and used as a probe (IrisSMS), we aim to study how it would practically work in their everyday lives. To better understand the communication practices of solidarity movements, we first conducted semi-structured interviews with coordinators and members of different collectives in Athens.

We contacted solidarity communities undertaking various activities ranging from time banks, solidarity schools, solidarity clinics, and solidarity kitchens to social and cultural solidarity movement representatives. Participants were contacted via phone and/or email, wherein a brief introduction about our research goals was provided, and appointments for the interviews were scheduled with organization representatives. On-site participants were given an information sheet and a consent form and were asked whether they agreed to be voice-recorded during our discussion.

A questionnaire was prepared to guide a semi-structured interview inviting the interview to provide insight about the type of the organization, their general and everyday activities, the size of the organization, asked them to describe in briefly how they are organized, how do they keep up with the organizing latent assets and communication (e.g., do you keep phone lists), what are the means of distant communication that are using internally among members and volunteers, what are the advantages/disadvantages of using SMS, what is the kind of information they share through the different channels. (e.g., announcements, emergencies, updates, etc.) The full semi-structured guide questionnaire is available [here](#).

We conducted semi-structured one-to-one interviews with 10 organizations and 13 persons (6 women, 7 men). In some cases, more than one person from each organization participated, so we had smaller groups of two or three. All interviews took place in-place in Athens. The interviews produced 450 minutes (7 hours of recording) which were transcribed and analyzed using thematic analysis with the workshop data (see below).

## 4.2 Design-led research: IrisSMS – Enabling the federated donation of SMS

We developed a mobile application, IrisSMS, as a design probe [22] designed to enable the sharing of unused SMS messages from peoples' monthly subscription packages. IrisSMS was designed to mirror the dynamic organizational structures of these movements (e.g., lack of established hierarchies and agility of working groups) while also enabling the sharing of unused SMS in a way that mirrors the operating of these collectives through donations such as clothes, food, medicine and time. Even though IrisSMS is viable, as it is technically feasible to develop and scale, its role within our research was to act as a research tool and start conversations about how prefigurative social arrangements and power structures can inform and be embodied in the design of participatory technologies. As such, departing from an understanding of technology as embedding and embodying politics [45], IrisSMS acts as an artifact for research through design [18] or, more specifically, using design as civic experimentation [15]. IrisSMS was not designed as a "solution" to the asynchronous communication needs of these communities and it is not an outcome of Participatory Design – it is a tool used as a way of probing into the ways social movements communicate and how ICTs affect such communication.

IrisSMS is an Android application designed to enable the sending of multiple SMS text messages to a list of subscribers—similar to a mailing list but for SMS. In addition to typical features of such applications, for example, the ability to add and remove subscribers of an organization, the key feature of IrisSMS is that it allows the sending of SMS messages through a network of SMS donors (as opposed to paying for these centrally). This works as follows: when an SMS message is sent through the IrisSMS App, the content of the message and the recipients' numbers are sent via mobile data to the phones of a network of donors that have agreed to donate SMS messages. Then the donors' IrisSMS App sends the message to a subset of the message recipients by using the donors' SMS gateway (and charging his/her phone number). Each donor can approve or reject the request for sending a message, which means that the number of messages sent by each donor depends on the number of subscribers, the number of donors, the number of messages that each donor has agreed to donate, and who has approved the sending request (Figure 1). Information can be also found online [here](#).

*4.2.1 Donating latent digital resources.* One of our key motivations in designing IrisSMS is to expand the non-monetary donation potential of these communities. Most local collectives, place-based publics, and social movements we have worked with operate with tangible material donations (e.g., clothing, groceries, medicine) or time-based donations (e.g., time banks and voluntary work). The sharing of digital non-tangible assets is not as frequent, and it is more complex – we have seen people offering their subscriptions to online services to benefit the wider community (e.g., Google accounts for remote participation during the Covid-19 pandemic) or the sharing of Netflix accounts.

Our past engagement with such collectives and our semi-structured interviews pointed to the use of online SMS services and platforms that support the management of subscriber lists and the bulk sending of messages. In these cases, volunteers used their personal credit or debit cards to buy credit as a form of donation to the community. Knowing that many volunteers already purchase monthly subscriptions of SMS messages to network providers, IrisSMS was designed to

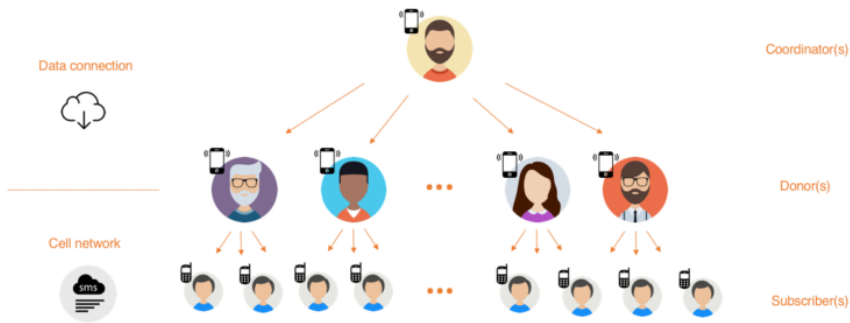


Fig. 1. The IrisSMS hierarchy of roles (Coordinators, Donors, Subscribers).

enable the sharing of such SMS subscriptions. As such, IrisSMS aims to expand the potential for donating digital resources by enabling people to share pre-paid SMS plans that, in many cases, are left unused.

The potential of donating SMS messages in the way described here raises a series of questions. For example: What are the privacy and legal (“terms-of-use”) implications for such sharing models? How do we enable the community’s participation in how the donation is performed, e.g., optimizing for efficiency, speed, values, personal relations, etc.? What is the potential of donating digital assets? What barriers does the digital introduce to existing sharing models? etc. We believe that these questions are important, and it is such questions that IrisSMS was designed to raise (see design workshop below).

**4.2.2 Donor network and federated sharing.** Another key characteristic of IrisSMS is its federated model for sharing SMS. The system assumes that a sender sends the message to several donors who act as distribution centers. As IrisSMS uses donors’ phones to send SMS messages, the messages are received from different phone numbers depending on the donor of the SMS you received.

A model like this attempts to expand how unused digital resources could be used and shared in participatory ways, similar to how volunteers distribute tasks between them in various activities. For example, we expect that donors might be configured to have special roles depending on their community access – e.g., a donor that typically contacts medical doctors of a social clinic, so doctors expect messages to arrive from her/his number; or a donor that has good access to local councilors of a municipality. The federated sharing model also contributes to the transparency of communication and delegation of work across volunteers – more people are involved in approving the content of a message to be distributed. At the same time, the relatively easy way of taking part adds to the action repertoire of the community.

Similarly to the above, federated sharing raises a number of questions: What are the privacy implications for such sharing models when there is an assumption of sharing phone numbers and messages broadly? What barriers does digital technology put on existing and more fluid ways of federated or decentralised sharing? What are the implications of the potential delays depending on donors’ activity? How do we ensure the messages are successfully and timely sent while also

considering the community's values and personal relations? etc. The design workshop described below was designed to introduce IrisSMS to one such community and raise questions concerning sharing and the digital.

*4.2.3 Design workshop.* We chose to explore the design of IrisSMS with one of the organizations we initially interviewed, a solidarity school and time-bank network. We decided to focus on this particular solidarity structure for many reasons, including the variety of its heterogeneous activities, its asynchronous communication needs on different levels (e.g., a need to exchange messages between a group of 10 to 50 teachers, the need to send an SMS to more than 300 people, etc.), and the sheer size of its community (more than 850 subscribers, 200 students, and more than 500 people overall, comprising teachers, parents, and other volunteers who are responsible for desk and administrative work, cleaning and security of the building and the children).

After preliminary face-to-face and online contact with members of the solidarity school, a workshop was planned to take place at the school and include members of the school that assumed one of three roles: Coordinators, i.e., people responsible for coordinating an event (or a message to be sent to many people), Donors, i.e., people who could donate mobile messages and accept to send messages to the members of their community, and Subscribers, i.e., people that belong to the solidarity community network and would receive messages that are sent and forwarded through the IrisSMS application. Six people, five men and one woman, aged 23 to 65, participated in the workshop. All participants are volunteers of the solidarity school, each one in a different role: a communications person responsible for desk services, social media presence, and face-to-face communication; an email and IT administrator who manages phone, mail, and email lists; a coordinator, founding member, and teacher, who described himself as rather technophobic; a teacher who is a computer professional; and two students of the solidarity school. The different roles these participants play within the solidarity school are not fixed or follow a particular official structure but have emerged according to their different skill sets.

The workshop started with a presentation of IrisSMS, encouraging a round table open discussion of the concept and sharing model. Participants were encouraged to ask questions, express their concerns and contribute with suggestions. This lasted approximately one hour. Then, for the next hour, participants were divided into two groups of three people each: one group acted as a team representing the Coordinators, and the second group acted as a team representing the SMS Donors. Each team was given scenarios and paper prototypes of IrisSMS and was asked to discuss them. Finally, the three-hour workshop concluded with a round table debrief, where all participants were prompted to discuss their roles, given tasks, and the potential of the application.

We conducted Thematic Analysis [7] on the interview transcripts and workshop data. Our coding approach aimed to conduct an inductive analysis and generate both descriptive/summative themes and more reflective themes, as illustrated below. In the following section on our findings, we present quotes from both the interviewees and participants of the workshop. We have coded the participants as follows:  $[MV_i, IP_j]$ , where  $MV_i$  represents the different solidarity movement communities, and  $IP_j$  refers to the interview participant, and  $[MV_i, WP_j]$ , where  $MV_i$  represents the MV where the workshop took place and  $WP_j$  indicates the workshop participant. Details about the types of activities can be found in Table 1.

## 5 FINDINGS

Drawing from the interviews and workshop, in this section, we describe how introducing IrisSMS as a design concept for the distributed donation and dissemination of SMS messages has contributed to informing our understanding of the complexities of communication within such community collectives.



Table 1. Participants and Social Solidarity Movement Activity types.

Participant(s) code	MVs Activity
MV1, IP1	Stray animals protection movement
MV2, IP2, IP3	Solidarity school and time bank network
MV3, IP4	Cultural solidarity and time bank
MV4, IP5	Social Clinic
MV5,IP6	Social Kitchen
MV6, IP7	Food Bank
MV7, IP8	Time Bank and development support
MV8, IP9, IP10, IP11	Housing Solidarity
MV9, IP12	Environment/Fire victims observatory
MV10, IP13	Refugee and Immigrant Women Support

### 5.1 Diversity of communication channels

Despite the many differences across communities, a characteristic that they share is that they have three types of communication needs: i) the regular everyday exchange among the different subgroups or working groups that serve daily, weekly, or periodic activities, such as lesson planning, open assemblies, etc.; ii) emergency communication that usually requires instant and quick communication among volunteers; and iii) communication on a larger scale, to engage the whole community into dissemination activities such as bazaars, events, and festivals. These different contexts may require a combination of communication channels that fit both scale (number of recipients), urgency, and the targeted subgroups. As one of the interviewees explains: "In case of emergency, I have to think who would be available and able to help and then send the same message on Viber, Whatsapp and through SMS since each one might use different means" [MV1,IP1].

The diversity of solidarity movements is reflected in the way asynchronous communication is held: "We cannot apply a specific means of communication; usually it is a trial-and-error process, or we just go with the flow and use whatever is available" [MV4,IP5]. For a variety of reasons, such as context, time, geographical location, type of messages, number and commitment of actors involved, people in SMs use a variety of communication channels that range from blogs and public web pages, email lists, Facebook groups, and instant messengers, such as Viber, WhatsApp, etc. to the more traditional phone calls and SMS. "There are qualitative aspects that we need to take into account as coordinators, there are people that need to be informed, and we take into account that some people read their mail, others check Facebook, and some none of that, so somehow we try to communicate through various channels," a key-person of a solidarity school clarifies. These decisions are also related to the credibility of the structure: "I would never send a message (e.g., SMS) to announce a cancellation of a children's class to their parents. It feels impersonal and unreliable, but I would send an SMS to invite them to the public assembly" [MV2,IP2].

While many different asynchronous communication channels may be used simultaneously and interchangeably, SMS seems to play a key role. As an animal activist explains: "Our work is mainly on the street, so there is no WiFi. In such cases, the option of having SMS donated by volunteers within the community and sharing the cost would be vital". Our data also point to how SMS messages carry a different significance or weight: "If I receive an SMS I know that it might be something important, whereas the messenger rings all day long," says a young teacher in cultural solidarity structure. Another volunteer reiterates a similar point while pointing to the use of SMS for time-sensitive reminders: "An SMS is always seen. Even if we send an email, we may still follow

up with an SMS as a reminder" [MV3,IP4]]. "SMS is clear, direct, and personal; it is an instant personal request which is very much appreciated."

## 5.2 Dynamic organizational structures

The fluidity and horizontal organizational structure lies at the core of solidarity movements. Nevertheless, the absence of strict hierarchical roles does not imply a total lack of structure: roles and groups are constantly changing according to needs that may be antithetical (e.g., participation in a public assembly and other open events vs. handling an emergency), skills and assets that are not always documented (e.g., who can cook or who owns a car), or geographical limitations (e.g., "we start looking for volunteers that are nearby" [MV1,IP1]). Hence, such structures can be hierarchical, yet not firmly so, while the arrangement of responsibilities may continuously change according to needs for action. The fact that SM structures live through emerging hierarchies that are defined by action, human dynamics, and availability of resources reflects on the way that the asynchronous communication of announcements and other messages are sent. These emerging and relaxed hierarchies create "micro-management" tasks for the Coordinators, the people who send a message to a community. Coordinators think about the priority of urgency and importance of the message in relation to who should see the message and what exactly should be written or announced. This reflection on "how important" this message is and "who should receive it" might also determine the means of communication used.

The flexible, emerging structures of MVs share some common characteristics. In the core, there is a team of people who lead and act as coordinators and communication nodes to the network of the community. Outside this core, there is another group of people that usually action certain activities according to their skills and what they can offer to the community—a communication infrastructure that resembles concentric circles. The wider community consists of people who are also beneficiaries or volunteers but who are less engaged and committed. Finally, some people share the same vision, are present and active in public assemblies, are engaged through open activities and events such as bazaars and festivals, and are followers of social media pages and blogs. So while there are no strict hierarchies, these four levels of engagement and commitment to the SM are visible in every such collective.

Even though there are many cases where a large number of people should receive a message (e.g., an announcement of a public event or a call to action), according to the people we talked with, this should come as an extension of in-person communication and not in a way that resembles automated messaging. In a professional context, it would be normal to send a message to all members of a list or to some sub-groups according to strict policies, hierarchies, and role assignments. But the same does not hold with SM communities. "We are against automation", a solidarity school key person stresses. Also, more than one of the volunteers commented on the risk that mass text messaging might convey to receivers the impression of a politician's campaign, a fact that is perceived as negative. "We would never send an SMS to someone who has not been active for the last two years; this would be intrusive and conceived as pressure" [MV6,IP7], a food bank volunteer adds.

## 5.3 Donating SMS as participation

While there was obvious hesitation in adopting a new tool, the idea of donating SMS was welcome. It was seen as a way of engaging marginal members of the SM community. The feeling of contribution and belonging to the community can also be manifested through donating SMS as a latent asset. At the same time, its intangible nature can erase some of the limitations that exclude some people from contributing. As a key person in the animal rights movement explains, donating a number of SMS might be an opportunity to cultivate the sense of giving and belonging to less active volunteers: "There are some people who lack time, resources or have other limitations, but they share the same

vision. They can feel happy to donate SMS in the same way they can donate only occasionally. I would see, in this case, the role of becoming a donor as a way of engaging and connecting with these people (e.g., ex-volunteers, less active volunteers, busier people) and creating for them the positive feeling of contribution. "[MV1,IP1]

While some other volunteers do not see the act of donating SMS as something very important, they realise its potential in engaging some people: "I don't think that the role of the donor can be something very creative. However, having "a role" can always be a way to empower someone or a group" [MV2,IP2], a solidarity school volunteer comments. While a housing solidarity person admits, "Sending the message through its donors requires a higher level of involvement and a higher level of participation"[MV8,IP11]. As a solidarity hub key person explains, this might be very important for some community groups: "The role of the donor can also be held by more senior people [i.e., older adults] from the network. [...] Elder people can sometimes feel excluded or neglected, so giving them a role, a simple responsibility, can be important. I find a great idea the fact that you engage some people; they are becoming ambassadors. [...] I would say that choosing the Donors might be something very important; they can be key personalities, and they could be the voice of inviting the communities". [MV7,IP8]

#### 5.4 Temporality, anonymity, and privacy

Donating SMS messages through our design probe emphasised the importance of time when distributing such messages. Our participants raised concerns about how the algorithm decides which donors to prioritise and why. Different approaches to the algorithm's design, such as a "greedy logic" that prioritises using the most donated SMS before they expire, a "distributed logic" that prioritises using as many donors as possible, or a "temporal logic" that uses the donors most likely to respond quickly, were considered. The participants posed questions such as: "Should the algorithm prioritise donors with SMS that will expire? Would this be fair and well-distributed? What if one donor has 100 expiring SMS and there are 100 other donors? Should we prioritise a distributed logic or take advantage of all the available resources (SMS) that would otherwise be lost? How can we ensure that the same people are not always donating? Who makes these decisions? How does this align with shared economy and distribution logic?" [MV1, WP15]. These questions illustrate the complexity and challenges of designing a communication system for self-organised local communities and social movements, where multiple considerations must be balanced to ensure fairness, efficiency, and alignment with shared values.

Another perspective discussed was the effect that interpersonal relations and lack of anonymity might have. Collecting material goods such as food supplies and clothes can easily become impersonal and anonymous. But the forwarding of SMS messages through donors' phones means that messages are received from donors' phone numbers, which can potentially lead to confusion, raising questions of credibility and trust: "Let's say I accept to donate the message and the list of subscribers includes people I have a negative personal relationship or experience. This would be weird!" [MV1, W17]. In addition, privacy considerations, especially when secure communication is required (e.g., in social clinics when medical data should not be disclosed), highlighted the importance of controlling which nodes (i.e., volunteer donors) in the donors' network are used to disseminate the message.

For us, methodologically, it is interesting how the presentation of a possible tool for the distributed resourcing of communication raised important aspects of the social practices and work of SMS that, in many cases, remains invisible and hard to understand and design for. In terms of design, our findings point to how a communication system could have negative implications for collaborative work when it is not designed to take into account such nuances especially in

contexts that these are hard to be distinguished, e.g., temporal conditions, interpersonal relations and privacy considerations.

### 5.5 Trust, decentralization, and control

The idea of donating SMS is welcomed but comes with several questions related to commitment and motivation for the donors, especially if they do not belong to the core group of people within a community. An SM-key person adds: "Trust is something that builds over time. We are open, and help is welcome from anyone but it is not as simple as accepting help from anyone who walks in. Could we imagine the scenario of someone who walks in and offers to babysit? Of course not!" [MV2,IP15]. When it comes to donating SMS, the case does not seem to make things different, if not more sophisticated. "On top of this, there is the matter of trust: The donors would be persons of the network, e.g., 10 persons maximum [MV2,WP16].

In the case of our prototype, the idea is that the donors donate SMS messages upon request, i.e., the need to confirm the sending of messages through their phones. The fact that the donations need to be approved by donors raised questions about how donors will decide on accepting or rejecting a donation request: "What about the motivation of the donor? Maybe some donors are motivated in sending some messages vs. others, e.g., donate messages to help refugees, but not for other social activities or film nights" [MV6, IP7]. As such, IrisSMS would give donors partial control over some of the group's communication, typically done by more established members at the group's core. Our participants were generally positive about donors deciding if they want to distribute a message or not. However, the delegation of decision-making about whether a message should be sent or not might override collective decisions (e.g., an assembly decision for an event to be held), or it might be exploited by members of the community with different opinions, values, and political viewpoints: "What makes this interesting is the fact that there will be not only one who decides what to write and how to express it but somehow the Donors consent and agree on sending this message. Commonly, we might have differences on some decisions [based on political or other disagreements]" [MV2, WP14]. Or as a member of a housing initiative puts it, "there is always a risk that some donors will not necessarily like to promote this message from their own number because they disagree. But this [disagreements] happens anyway. With such an app, distributing the communication can contribute to a more democratic and open communication and guarantee a higher level of consent within the organization" [MV8,IP10].

As such, the design of IrisSMS, and more specifically, the potential of delegating some of the decision-making concerning groups' communication, has brought to the surface tension and contradiction within such groups. A contradiction between the need to expose a common identity (through groups' communications), which is typically achieved through controlling who sends messages, what is being sent, and to whom, and expanding participation and delegating responsibility to community members more broadly.

## 6 DISCUSSION

Our findings build on similar work in HCI and CSCW, and more specifically on work that explores the nuances of designing for trust with civic organizations and local communities [8, 17], the interplay between transparency, privacy, and anonymity in social movements and community organizations [37], and the significance of designing for the temporal dimensions of place and community [28].

### 6.1 Design Implications

Our findings contribute implications for communication technologies for community self-organization and civic participation. In particular, such technologies should:

**Provide multiple and diverse channels of communication.** In our case, we saw how community groups use a variety of communication networks, channels, and applications to accommodate a diverse group of participants (i.e., beneficiaries, key members, etc.) and different communication needs (i.e., for mundane, emergency, or more widespread communication). This is particularly the case in such organizations where the beneficiaries of community action (e.g., food distribution, etc.) are also key members of the organization (which is indeed common in solidarity-based organizations [42]).

**Scaffold participation, from spontaneous and lightweight to engaged.** In our case, we saw how community groups create the conditions for people to participate at different levels of engagement in community work. For IrisSMS, sharing the communication cost can empower people, particularly those at the margins, to participate. As such, communication technologies can be designed to engage members on the periphery by ensuring a sense of purpose, commitment, and responsibility. This is aligned with past work in MobileHCI, which indicates that despite privacy concerns, positive interactions among unacquainted individuals in serendipity networks can create bonding and engagement [23]. In our case, the donation of messages could strengthen the connections among members, not only through the sense of offering something back (like the cost of an SMS) but through interacting through such participation. SMS here has a double role: as an interaction and as a donation. We argue that digital technologies are not configured to support such plurality and diversity in ways of participating. Similarly to work within this space that aims to expand the action repertoire of local communities [41], we argue that future technologies for community participation should scaffold various levels of community participation, from lightweight involvement to engaged community practice.

**Consider the socio-temporal dimensions of community engagement work.** Community participation is generally voluntary and, in many cases, spontaneous; as such, the technologies we design shouldn't assume fixed social and temporal arrangements (as opposed to, for example, technologies for work environments). As previous work highlights, "Eagerness to share comes from a desire to help others, feel needed, and create a sense of belonging. But sharing is not a panacea that operates without conflict or discrimination. Individual sharing can exclude those with the fewest means" [27]. In our case, we saw a diversity of organizational and social structures in addition to their dynamic and agile character. These structures acted as snapshots and changed continuously depending on the context, time, activity type, and people involved. This points to technologies that allow configuring embodied assumptions of social structure and time – for example, the how and who for roles related to technologies' administration (i.e., system administrators, content creators, etc.) while also configuring temporal dimensions of people's involvement (e.g., who/what is available when).

**Allow configuring for varying levels of control and privacy.** In our case, and due to how our probe was designed, this was an interplay between centralization vs. decentralization and anonymity and transparency. Our participants pointed to the need for a federated decentralization that allows for control while also opening up spaces for participation. This was also the case for privacy, anonymity, and transparency: community members wanted to be open and transparent as a community while also being able to ensure their personal anonymity and privacy. As such, we argue for a federated model for privacy and control in such civic community contexts that allow the delegation of control and visibility to key nodes/members of such organizations.

## 6.2 Methodological reflection

At this point, we believe it is important to reflect on our methodology, and more specifically, the use of IrisSMS as a design probe [22] within a Research through Design (RtD) approach [18] (as discussed in detail in our Approach and Methods section). Such RtD methodologies are not frequently used

in HCI work that focuses on civic participation, civic technologies, local communities, and the public. Even though we can not assume why this might be the case, based on our experience, work within such contexts typically require long-term engagement processes and the development of sustainable, easily maintainable “in-the-wild” technologies that can outlive the short timescales of academic and HCI projects [40]. Even though we acknowledge that research artefacts and designs (like IrisSMS) produced as probes cannot directly benefit the communities with which we worked, we believe that some of the insights produced wouldn’t have been possible through, for example, other (e.g., Participatory Action Research) approaches that we could have followed.

IrisSMS made tangible and visible a potential reconfiguration of communication in ways that provoked reflection and raised questions about the way that this is currently achieved. This was particularly important as their existing practices were developed in response to needs and with the means available to them at the time (i.e., bulk SMS message platforms, free chat applications, etc.), without having the space and time to think about what they might need. As such, we call for more RtD work within civic technologies and digital civics research to make visible what remains hidden within such community organizations, while also giving members of these communities time and space to imagine potential bespoke technologically supported futures (in communication or elsewhere).

### 6.3 Limitations

In this work, we tried to capture the perspectives of different community groups and local social movements. The first phase of our research (semi-structured interviews) involved diverse participants and communities, while the second phase (design-led workshop) involved the members of a solidarity school and a time-bank network. Even though we recruited a diverse set of participants for our workshop, we cannot assume that other communities and organizations interviewed in the first stage will have the same views on the applicability of a potential tool such as IrisSMS to their community or organization. Nonetheless, our findings are relevant for researchers researching, designing, and developing technologies for informal, local, and community groups organised around a common cause (widely talked about as local publics [26]).

## 7 CONCLUSION

This work builds on previous research and engagement with self-organised communities and local social movements to better understand their digital communication needs. We went a step further to investigate the specific requirements for asynchronous communication and the use of mobile technology to identify concrete scenarios and workflows of interactions. To achieve this, we introduced IrisSMS as a technology probe to facilitate discussion with these communities and to understand their communication needs, requirements, and challenges. The findings suggest that designing tools for administration and communication for local communities requires consideration of the unique characteristics of these communities, which differ from those following a typical hierarchical administration structure. The fluid and horizontal philosophy of solidarity structures requires participatory, design-based research methodologies to unravel the emergent dynamics and workflows. This study highlights the need for a deeper investigation and reflection of the complex relationships that emerge through these structures’ fluid roles, philosophy, values, and constantly changing needs.

## ACKNOWLEDGMENTS

This work has been funded by the EPSRC Digital Economy Research Centre (DERC) Research Project (EP/M023001/1), a collaboration between Newcastle University, the National and Kapodistrian University of Athens and Open Lab: Athens. The main development of IrisSMS app has been done

by Rob Anderson, a Senior Research Software Engineer at Newcastle University, Open Lab. Finally, the authors would like to thank the members of the solidarity communities that participated in the numerous interviews, evaluation sessions, and focus groups and especially the organisation of The Citizens of Moschato Movement 'Mesopotamia' for hosting our workshop.

## REFERENCES

- [1] Paul M Aoki, RJ Honicky, Alan Mainwaring, Chris Myers, Eric Paulos, Sushmita Subramanian, and Allison Woodruff. 2009. A vehicle for research: using street sweepers to explore the landscape of environmental community action. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 375–384.
- [2] Mariam Asad, Christopher A Le Dantec, Becky Nielsen, and Kate Diedrick. 2017. Creating a sociotechnical API: Designing city-scale community engagement. In *Proceedings of the 2017 CHI conference on human factors in computing systems*. 2295–2306.
- [3] Thomas Binder and Eva Brandt. 2008. The Design: Lab as platform in participatory design research. *Co-Design* 4, 2 (2008), 115–129.
- [4] Erling Björgvinsson, Pelle Ehn, and Per-Anders Hillgren. 2010. Participatory design and" democratizing innovation". In *Proceedings of the 11th Biennial participatory design conference*. 41–50.
- [5] Erling Björgvinsson, Pelle Ehn, and Per-Anders Hillgren. 2012. Agonistic participatory design: working with marginalised social movements. *CoDesign* 8, 2-3 (2012), 127–144.
- [6] Manuel Castells. 2015. *Networks of outrage and hope: Social movements in the Internet age*. John Wiley & Sons.
- [7] Victoria Clarke, Virginia Braun, and Nikki Hayfield. 2015. Thematic analysis. *Qualitative psychology: A practical guide to research methods* (2015), 222–248.
- [8] Eric Corbett and Christopher A Le Dantec. 2018. Exploring trust in digital civics. In *Proceedings of the 2018 Designing Interactive Systems Conference*. 9–20.
- [9] Sasha Costanza-Chock. 2012. Mic check! Media cultures and the Occupy movement. *Social movement studies* 11, 3-4 (2012), 375–385.
- [10] Clara Crivellaro, Rob Comber, John Bowers, Peter C Wright, and Patrick Olivier. 2014. A pool of dreams: facebook, politics and the emergence of a social movement. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 3573–3582.
- [11] Clara Crivellaro, Rob Comber, Martyn Dade-Robertson, Simon J Bowen, Peter C Wright, and Patrick Olivier. 2015. Contesting the city: Enacting the political through digitally supported urban walks. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. 2853–2862.
- [12] Chris Csikszentmihályi and Jude Mukundane. 2016. RootIO: ICT+ telephony for grassroots radio. In *2016 IST-Africa Week Conference*. IEEE, 1–13.
- [13] Javier Ramos Diaz and Bruno González CACHEDA. 2016. Financing social activism: Crowdfunding and advocacy social movement in Spain in times of crisis. In *Proceedings of the 9th international conference on theory and practice of electronic governance*. 139–148.
- [14] Jill P Dimond, Michaelanne Dye, Daphne LaRose, and Amy S Bruckman. 2013. Hollaback! The role of storytelling online in a social movement organization. In *Proceedings of the 2013 conference on Computer supported cooperative work*. 477–490.
- [15] Carl DiSalvo. 2022. *Design as Democratic Inquiry*. The MIT Press. <https://doi.org/10.7551/mitpress/13372.001.0001>
- [16] Carl DiSalvo, Andrew Clement, and Volkmar Pipek. 2012. Participatory design for, with, and by communities. *International Handbook of Participatory design*. J. Simonsen and T. Robertson.
- [17] Hayley I Evans, Marisol Wong-Villacres, Daniel Castro, Eric Gilbert, Rosa I Arriaga, Michaelanne Dye, and Amy Bruckman. 2018. Facebook in Venezuela: Understanding Solidarity Economies in Low-Trust Environments. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–12.
- [18] William Gaver. 2012. What should we expect from research through design?. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, New York, NY, USA, 937–946. <https://doi.org/10.1145/2207676.2208538>
- [19] Sucheta Ghoshal, Rishma Mendhekar, and Amy Bruckman. 2020. Toward a grassroots culture of technology practice. *Proceedings of the ACM on Human-Computer Interaction* 4, CSCW1 (2020), 1–28.
- [20] Philip N Howard, Aiden Duffy, Deen Freelon, Muzammil M Hussain, Will Mari, and Marwa Maziad. 2011. Opening closed regimes: what was the role of social media during the Arab Spring? *Available at SSRN 2595096* (2011).
- [21] Yun Huang, John Zimmerman, Anthony Tomasic, and Aaron Steinfeld. 2016. Combining Contribution Interactions to Increase Coverage in Mobile Participatory Sensing Systems. In *Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services* (Florence, Italy) (*MobileHCI '16*). Association for Computing Machinery, New York, NY, USA, 365–376. <https://doi.org/10.1145/2935334.2935387>

- [22] Hilary Hutchinson, Heiko Hansen, Nicolas Roussel, Björn Eiderbäck, Wendy Mackay, Bo Westerlund, Benjamin B. Bederson, Allison Druin, Catherine Plaisant, Michel Beaudouin-Lafon, Stéphane Conversy, and Helen Evans. 2003. Technology probes: inspiring design for and with families. In *Proceedings of the conference on Human factors in computing systems - CHI '03*. ACM Press, New York, New York, USA, 17. <https://doi.org/10.1145/642611.642616>
- [23] Hyukjae Jang, Sungwon Peter Choe, and Junehwa Song. 2011. Exploring Serendipitous Social Networks: Sharing Immediate Situations among Unacquainted Individuals. In *Proceedings of the 13th International Conference on Human Computer Interaction with Mobile Devices and Services* (Stockholm, Sweden) (*MobileHCI '11*). Association for Computing Machinery, New York, NY, USA, 513–516. <https://doi.org/10.1145/2037373.2037449>
- [24] Helena Karasti. 2014. Infrastructuring in participatory design. In *Proceedings of the 13th Participatory Design Conference: Research Papers-Volume 1*. 141–150.
- [25] Yong Ming Kow, Yubo Kou, Bryan Semaan, and Waikuen Cheng. 2016. Mediating the undercurrents: Using social media to sustain a social movement. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. 3883–3894.
- [26] Christopher A Le Dantec. 2016. *Designing publics*. MIT Press.
- [27] Ann Light and Clodagh Miskelly. 2019. Platforms, scales and networks: meshing a local sustainable sharing economy. *Computer Supported Cooperative Work (CSCW)* 28, 3-4 (2019), 591–626.
- [28] Siân E Lindley, Anja Thieme, Alex S Taylor, Vasilis Vlachokyriakos, Tim Regan, and David Sweeney. 2017. Surfacing small worlds through data-in-place. *Computer Supported Cooperative Work (CSCW)* 26 (2017), 135–163.
- [29] Jan Ljungberg. 2000. Open source movements as a model for organising. *European Journal of Information Systems* 9, 4 (2000), 208–216.
- [30] John McCarthy and Peter Wright. 2015. *Taking [a] part: the politics and aesthetics of participation in experience-centered design*. MIT Press.
- [31] Tamir Mendel, Debin Gao, David Lo, and Eran Toch. 2021. An Exploratory Study of Social Support Systems to Help Older Adults in Managing Mobile Safety. In *Proceedings of the 23rd International Conference on Mobile Human-Computer Interaction* (Toulouse Virtual, France) (*MobileHCI '21*). Association for Computing Machinery, New York, NY, USA, Article 30, 13 pages. <https://doi.org/10.1145/3447526.3472047>
- [32] Anna Meroni and Daniela Sangiorgi. 2016. *Design for services*. Routledge.
- [33] Andrés Monroy-Hernández, Shelly Farnham, Emre Kiciman, Scott Counts, and Munmun De Choudhury. 2013. Smart societies: from citizens as sensors to collective action. *interactions* 20, 4 (2013), 16–19.
- [34] Andrea Parker, Vasudhara Kantroo, Hee Rin Lee, Miguel Osornio, Mansi Sharma, and Rebecca Grinter. 2012. Health promotion as activism: building community capacity to effect social change. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 99–108.
- [35] Matt Ratto, Megan Boler, and Ronald Deibert. 2014. *DIY citizenship: Critical making and social media*. MIT press.
- [36] Saqib Saeed, Markus Rohde, and Volker Wulf. 2011. Analyzing political activists' organization practices: findings from a long term case study of the european social forum. *Computer Supported Cooperative Work (CSCW)* 20, 4-5 (2011), 265–304.
- [37] Shruti Sannon and Andrea Forte. 2022. Privacy Research with Marginalized Groups: What We Know, What's Needed, and What's Next. *Proceedings of the ACM on Human-Computer Interaction* 6, CSCW2 (2022), 1–33.
- [38] Anna Seravalli, Mette Agger Eriksen, and Per-Anders Hillgren. 2017. Co-Design in co-production processes: jointly articulating and appropriating infrastructuring and commoning with civil servants. *CoDesign* 13, 3 (2017), 187–201.
- [39] Youngsoo Shin and Jungkyoon Yoon. 2021. Towards Designing Human-Centered Time Management Interfaces: The Development of 14 UX Design Guidelines for Time-Related Experiences in Mobile HCI. In *Adjunct Publication of the 23rd International Conference on Mobile Human-Computer Interaction* (Toulouse Virtual, France) (*MobileHCI '21*). Association for Computing Machinery, New York, NY, USA, Article 15, 7 pages. <https://doi.org/10.1145/3447527.3474861>
- [40] Nick Taylor, Keith Cheverst, Peter Wright, and Patrick Olivier. 2013. Leaving the wild: lessons from community technology handovers. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1549–1558.
- [41] Vasilis Vlachokyriakos, Rob Comber, Karim Ladha, Nick Taylor, Paul Dunphy, Patrick McCorry, and Patrick Olivier. 2014. PosterVote: expanding the action repertoire for local political activism. In *Proceedings of the 2014 conference on Designing interactive systems*. 795–804.
- [42] Vasilis Vlachokyriakos, Clara Crivellaro, Pete Wright, Evika Karamagioli, Eleni-Revekkha Staiou, Dimitris Gouscos, Rowan Thorpe, Antonio Krüger, Johannes Schöning, Matt Jones, et al. 2017. HCI, solidarity movements and the solidarity economy. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. 3126–3137.
- [43] Vasilis Vlachokyriakos, Clara Crivellaro, Pete Wright, and Patrick Olivier. 2018. Infrastructuring the solidarity economy: Unpacking strategies and tactics in designing social innovation. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 1–12.
- [44] Katharine S. Willis, Keith Cheverst, Claudia Mueller, Pablo Abend, and Cornelius Neufeldt. 2009. Community Practices and Locative Media. In *Proceedings of the 11th International Conference on Human-Computer Interaction with Mobile*



*Devices and Services* (Bonn, Germany) (*MobileHCI '09*). Association for Computing Machinery, New York, NY, USA, Article 105, 4 pages. <https://doi.org/10.1145/1613858.1613979>

- [45] Langdon Winner. 1980. Do Artifacts Have Politics? *Daedalus* 109, 1 (1980).
- [46] Volker Wulf, Konstantin Aal, Ibrahim Abu Kteish, Meryem Atam, Kai Schubert, Markus Rohde, George P Yerosus, and David Randall. 2013. Fighting against the wall: social media use by political activists in a Palestinian village. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1979–1988.
- [47] Volker Wulf, Kaoru Misaki, Meryem Atam, David Randall, and Markus Rohde. 2013. 'On the ground' in Sidi Bouzid: investigating social media use during the tunisian revolution. In *Proceedings of the 2013 conference on Computer supported cooperative work*. 1409–1418.

Received January 2023; revised May 2023; accepted June 2023