ECSCW CONTRIBUTION

Understanding Nomadic Practices of Social Activist Networks Through the Lens of Infrastructuring: the Case of the European Social Forum

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Abstract. Within CSCW and HCI, an increasing body of literature has been demonstrating the essential relevance of infrastructures and infrastructuring to the work of people engaging in technologically mediated nomadicity. Tech Nomads – or T-Nomads, as they are sometimes called – not only rely on *technological, human*, and *environmental* infrastructural components – such as Wi-Fi, technical support, space, and basic resources such as light and power outlets – but they also have to engage in infrastructuring to mobilise their workplaces and effectively accomplish work in and across different locations. In this article, we bring an infrastructuring perspective to understanding nomadic practices concerning the organisation of complex collaborative events. We introduce findings from a long-term investigation focusing on how infrastructures are re-instantiated with the help of digital technologies, according to emerging demands from T-Nomads. Our findings demonstrate the need for a 'non-essentialist' approach to nomadicity, one which recognises the character of nomadic work and its varied aspects in different contexts. We extend the infrastructuring literature by demonstrating how infrastructuring work is done in a complex collaborative initiative, as the organisation of the annual European Social Forum.

Keywords: Collaborative event organisation, ESF, European Social Forum, Infrastructuring, ICT, Network of social activists, T-nomads, Sociotechnical infrastructures, Technologically mediated nomadicity, Technology management

1 Introduction

Discussions on the relevance of infrastructure for people engaged in technologically mediated nomadicity, also known as Tech or T-Nomads (de Carvalho, 2014), have already been to a certain extent explored in the CSCW

(Computer-Supported Cooperative Work) and the HCI (Human-Computer Interaction) literature. Studies such as the ones presented by Humphry (2014), Liegl (2014), Rossitto et al. (2014) and de Carvalho et al. (2017a, b) touch on important issues regarding infrastructure, as demonstrated in the Related Work section. A deeper account of these issues is provided by Mark and Su (2010), who draw on Star and Ruhleder's (1996) notion of infrastructure to discuss how important it is to make infrastructure visible for nomadic workers, contrasting with Weiser's views on the relevance of invisible infrastructure for effective ubiquitous computing (Weiser, 1991). Erickson and colleagues also bring an infrastructural perspective to the analysis of T-Nomads' practices in terms of mobilising their workspaces and dealing with infrastructural seams as they move across space and time while accomplishing their productive activities, by drawing on what they call infrastructural competence (Erickson and Jarrahi, 2016; Sawyer et al., 2019).

Nevertheless, to the best of our knowledge, no careful analysis has been carried out on how infrastructuring, as a notion, can help us to understand the practices of people engaged in the organisation of highly collaborative events on a volunteer basis. In addition to that, the aforementioned contributions to the literature and other related work (see e.g., Hemsley et al., 2020; Erickson et al., 2019; Rossitto and Lampinen, 2018; Su and Mark, 2008; Rossitto and Eklundh, 2007; Bogdan et al., 2006) usually focus on a small number of individual workers. Our contribution responds to this gap in the literature, bringing an infrastructuring perspective to the understanding of practices involved in the organisation of and development of infrastructures for large and complex collaborative quasi-nomadic events, where people from different parts of the world congregate to work together on a cause. Our contribution, then, lies in an application of an infrastructuring perspective to a collaborating group of people who are not in any conventional sense, workers. Moreover, and as we discuss, the term 'nomadic' itself needs to be viewed as describing a continuum of activities. Our aim is twofold. Firstly, the principle analytic theme we draw out is that of 'infrastructuring' and the challenges posed for collaborative sociotechnical development work in circumstances we describe as 'punctuated' – i.e., in a changing sociotechnical landscape. Secondly, we seek to get a better understanding of the different ways in which 'nomadicity' can be conceived of in these circumstances.

Our contribution elaborates on findings concerning the role of sociotechnical infrastructures for nomadic practices within communities of social activists. It builds upon, deepens, and considerably extends an initial discussion begun in the ECSCW workshop on 'Nomadic Cultures Beyond Work Practices' (de Carvalho et al., 2017b; Rossitto et al., 2017). In this article, then, we ask ourselves: *How can the notion of infrastructuring shed light on the corollary work necessary for nomadic work practices of large groups of people collaborating sporadically to take place?*

To answer our research question, we have revisited the data collected in an extensive ethnographic study within the European Social Forum (ESF) community, which aimed at understanding the characteristics of the human and technological elements of its infrastructure and the challenges of maintaining and mobilising it, as the community engaged in practices which were heterogeneously nomadic and, to a degree, transitory. The practices of the community in question were made visible in the organisation of their main event, taking place across different countries. Hence, our focus is on the *corollary work* necessary to facilitate nomadic practices of networks of activists, i.e., all the elusive (and often invisible) work underpinning the configuration of workers, informational, technological, and relational infrastructural resources in (re)producing liveable worklives (Gray et al., 2020). These activists, we argue, can be seen as T-Nomads, albeit of an unusual kind, as they sporadically move from place to place, finding and using the resources necessary for their activist work. Behind this mobilisation work, there is a considerable amount of infrastructural work – the topic of our article – which is usually taken on by only a small number of them – i.e., those participating in the organisation of the events.

The novelty of this contribution is twofold: first, the focus on nomadic practices of highly complex collaborative initiatives, as in the organisation of ESF, brings a new perspective to issues concerning the accomplishment of work by means of distributed nomadic practices. Second, our focus is on new configurations of previously established infrastructures and the extent to which previous experiences, transferred media and heterogeneous practices can support or hinder the process of bringing it to life again. These phenomena are particularly visible in the example of the practice of organising the ESF forum, and we use it to suggest possible improvements to existing software infrastructures that may help mitigate the problems that we saw.

ESF was a central event for European activists and organisations participating in anti-globalisation social movements, held in different locations between 2002 and 2010. This means that every time an event happened, the community had to mobilise the event infrastructure to a new location (Saeed et al., 2011). Our findings suggest that this mobilisation is, to some extent, similar to the mobilisation of the workplace which is a defining criterion of technologically mediated nomadicity (de Carvalho, 2014) but which nevertheless has elements which are distinctive, as will become noticeable across the article.

In particular, we discuss the infrastructural challenges entailed in making an ESF conference happen, and which possibly contributed to its end. This is a context where enhanced technology integration is quite evident in modern work environments. In order to set up and maintain sociotechnical infrastructures, considerable financial and human resources are required. Traditional organisations have well-established information technology (IT) departments to take care of their organisational infrastructure. Activist networks often

cannot finance this kind of continuous maintenance – not even of important IT infrastructures. In addition, demand for infrastructural services is fluid, with high and low points of participation interest and involvement. Work infrastructure becomes extremely important at these high interest points and may be of less importance at other times.

Drawing on the findings from a *thematic analysis* (Braun and Clarke, 2012) carried out on ethnographic data collected over a period of 3 years, we elaborate on the practices involved in mobilising the ESF infrastructure from country to country, where activists from different parts of Europe come together to work on their political agenda, coordinate their efforts and articulate future activities. We discuss how the human and technological infrastructures relating to the development activities of an activist network display characteristics of the nine *technological and social* properties of infrastructure (Karasti and Blomberg, 2018; Bowker and Star, 1999). These characteristics describes a *relation* between technologies and their users/usages, which results ultimately in an 'infrastructure'. Hence, we adhere to the understanding that infrastructures are established by activities (infrastructuring) and there are different ways to perform these activities. Our findings, which come mostly from interviews and observations carried out during the organisation of the two last ESF events – see Saeed et al. (2019) for details on the study – highlight the problems that communities of activists may face in mobilising the infrastructure for the organisation of their events as they move across different (international) locations. This thus serves as a cautionary tale about the design, development, and integration of infrastructural components, so that these can be properly instantiated in a temporary infrastructure as they become necessary.

In articulating the aforementioned contributions, we highlight how infrastructuring is a key aspect in fostering nomadic cultures. In particular, we draw attention to the fact that infrastructure (re-)design methods can be a relevant resource for T-Nomads engaging in activities such as those reported in this article.

This article is organised as follows: Section 2 deals with the theoretical background underpinning this contribution, pointing to relevant related work that speaks directly to our findings and discussions. Section 3 introduces the research design that produced our findings, providing details on the research context, the data collection instruments used and the data analysis procedures. Our reflections on the strengths and limitations of our methodological approach are also presented in this section. Section 4 lays out the results of our analysis by means of the four themes that we elaborated as answer to our research question: *infrastructuring challenges with the ESF information infrastructure; politics of technology; impacts of discontinuity*, and *volunteer nature of work*. Section 5 elaborates on the presented results and discusses how the presented case advances the state of the art on understanding nomadic work practices of contemporary societies. Last but not least, Section 6 presents our concluding remarks.

2 Theoretical background and related work

In CSCW, HCI and IS (Information Systems) a large body of literature has been dedicated to understanding the evolutionary nature of large application environments and infrastructures (Karasti et al., 2018; Karasti, 2014; Bietz et al., 2010; Bowker et al., 2010; Edwards et al., 2009; Pipek and Wulf, 2009; Ribes and Finholt, 2009; Karasti and Baker, 2004; Star and Bowker, 2002; Star and Ruhleder, 1996). More recently, a growing body of literature has been investigating and discussing the relevance of infrastructures for people engaging in nomadic work practices (Jarrahi et al., 2021; Erickson and Jarrahi, 2016; Erickson et al., 2014; Rossitto et al., 2014; de Carvalho, 2013; Mark and Su, 2010). In this section, we provide an overview of these bodies of literature, pointing towards their contribution and further elaborating on some of the still existing gaps. Space precludes providing a comprehensive review of this literature, as it is vast. Nevertheless, we do address the main aspects related to our own research, so as to situate our contribution and highlight how it advances the state of the art.

2.1 The notions of infrastructure and infrastructuring

In CSCW, HCI and IS the terms *information infrastructure* and *IT infrastructure* have been consistently used to refer to the series of fundamental resources necessary to enable and sustain people's work and non-work activities and to support access to, and the provision of, services. Often the *material resources* of these infrastructures – consisting of buildings, hardware equipment and associated components – are at the core of the notion. These material resources are complemented by *personal resources*, which contain knowledgeable personnel of IT in diverse categories, and *institutional resources*, which refer to laws and norms concerning privacy, security, and data protection as well as international procedures of standardisation (Sawyer et al., 2019; Bowker et al., 2010). Of course, and as we argue below, these resources are variously stable and/or fluid depending on organisational circumstance. The coalescing of an organisational form with particular temporal and spatial elements is our theme, following up many and various previous works on or related to the subject (Karasti and Blomberg, 2018; Jarrahi et al., 2017; Bødker et al., 2016b; Pipek and Wulf, 2009; Star, 1999; Star and Ruhleder, 1996).

Overall, infrastructure is typified as an inherently relational notion, characterised for its (1) *embeddedness*, (2) *transparency*, (3) *reach or scope*, (4) *links with conventions of practice* and (5) *embodiment of standards.* They are mainly (6) *learned as part of membership*, (7) *built on an installed base*, and only (8) *becomes visible upon breakdowns* (Star and Ruhleder, 1996). Following breakdowns, they are (9) *fixed in modular increments* (Bowker and Star, 1999). Building upon these fundamental characteristics and taking into consideration findings

from their own empirical research, Karasti and Blomberg (2018) outline five dimensions of infrastructure, which help to further illuminate the work necessary to bring them into existence, namely (1) *relational*, i.e., infrastructures refer to massive sociotechnical imbrications that shape and are shaped within communities of practices; (2) *intrinsically (at least partially) invisible*, i.e., they fade away as people engage in accomplishing their work and only becomes noticeable if something stops working or does not go as expected; (3) *connected*, i.e., they bring together things of different scales and goes beyond single events or one-site practices; (4) *emerging and accreting*, i.e. they are constantly 'in-the-making'; and (5) *intentional and intervention prone*, i.e., they serve a purpose but its dynamism and heterogeneity constantly invites or require people to intervene so they can grow and serve new purposes. These characteristics and dimensions, as we shall see, are very apparent in the ESF case addressed in this contribution. It was the developing nature of the literature that this work has inspired that prompted us to revisit data we had collected.

Information systems can be considered a special type of infrastructure due to their reflexive quality, as designers and users are part of the same infrastructure. IT infrastructure therefore can be processed within the infrastructure allowing design-before-use and design-in-use allowing its emergence. Ciborra and Hanseth (2000) even postulate, that 'infrastructures tend to *drift*, i.e., they deviate from their planned purpose for a variety of reasons often outside anyone's influence' which leads towards an 'understanding of infrastructure as an embedded and drifting institution'. Hanseth and Lundberg (2001) recommend such systems to be designed and implemented primarily by their users based on their actual use of the technology and therefore collapsing the distinction between users and 'designers'. The distribution of the roles of designer and user in the infrastructuring approach of community-based participatory design is weak and dynamic, however, with considerable variation to be found across different circumstances. Thus, and for instance, Krüger et al., (2021) show how participatory design activities become problematic in distributed and heterogeneous organisational contexts. DiSalvo et al. (2013) point to the way in which design activities have to be brought into a community environment to use the knowledge and expertise of the crowd, but how exactly this is to be done is not always clear. Ribes and Finholt (2009) describe 'the long now of infrastructure' as a conceptualisation of time that demands that sustainability become a major consideration and point to various tensions in managing immediate concerns as against long term planning. As we argue below, this perspective was useful in enabling, in particular, our understanding of how varied motivations impacted work in the context we describe.

Opposed to more traditional considerations – such as the techno-centric understanding of IT infrastructure, which neglects to a large extent infrastructural activities (Dourish, 1999) – and building on Star and Ruhleder (1996) and Star and Bowker (2002), Pipek and Wulf (2009) established a perspective on

organisational IT as work infrastructure that focuses on the infrastructural nature of organisational information systems. This understanding of infrastructures sees them as the results of the relations between technological networks and the social processes they interact with. As Mark and Su (2010) put it, infrastructures are relational, situated and socio-technically imbricated constructs. Infrastructure is not to be conceived as a 'technology artefact' – as typically found (at that time) in IS and Design fields – but as a 'sustained relation' (Pipek and Wulf, 2009; Star and Ruhleder, 1996). Instead of focusing on isolated technical artefacts designed before use, the authors go on to discuss *infrastructuring* as all efforts 'that contribute to the successful establishment of an information system usage' and the progress of collaboration practices and is therefore defined as 're-conceptualising one's own work in the context of existing, potential, or envisioned IT tools'. Drawing on the notion of *points of infrastructuring* – i.e., events in which opportunities for (re-)design of infrastructure become evident due to infrastructure breakdowns or due to a *reverse salient*[1] – the authors demonstrate how resonance activities are an important part of the whole infrastructuring process by highlighting the connections between different points of infrastructuring.

In what follow, we concentrate on how infrastructure and infrastructuring have been addressed in the CSCW literature on nomadic practices, further elaborating on how our study advances the state of the art.

2.2 Infrastructuring as a practical concern for T-Nomads

The making of nomadicity is directly related to the notion of place making, which is in turn intrinsically connected to issues of infrastructure and infrastructuring (Erickson and Jarrahi, 2016; Ciolfi and de Carvalho, 2014; de Carvalho et al., 2011; Mark and Su, 2010; Rossitto, 2009). Indeed, information technologies, artefacts and tools have become an important repertoire of modern work infrastructures. These infrastructures are present globally and yet localised according to the needs of the work environments and work practices. Nevertheless, different from conventional organisational and governmental settings, where infrastructures are usually fairly stable and maintained by dedicated teams, settings concerning non-standard forms of employment – which spans, among others, temporary agency work, self-employment, and teleworking – are characterised by a relatively dynamic infrastructural arrangement (Gray et al., 2020).

The relevance of infrastructure to nomadicity has been widely acknowledged in the literature. Humphry (2014), for instance, discusses the notion of *officing* and its articulation with the concepts of connecting, configuring, and synchronising as a *set of infrastructure demands* which can contribute

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[1] The term reverse salient was first used by Thomas Hughes in 'Networks of Power' (1983) and refers specifically to components of a system which prevent the system from achieving its goals because they are inadequately developed. They thus become 'points of infrastructure', a sort of innovation force.

significantly to further understand contemporary nomadic practices and the rise of new cultures of nomadicity. Liegl (2014) draws attention to the relevance of transportation infrastructure for nomadic practices, going beyond the widely explored issue of the role of technological infrastructure in such practices. Rossitto et al. (2014) elaborate on the notion of constellations of technology, discussing how different technological infrastructures can impact upon collaboration among people working from and across different locations. De Carvalho et al. (2017a) discuss how technological infrastructure can influence people's motivations to engage in work, in and across several locations. Jarrahi and Nelson (2018) highlight how IT enables as well as constrains mobile knowledge workers in getting their work done, conforming with previous findings in the literature (de Carvalho et al., 2017a; de Carvalho, 2013). Their findings suggest that the way that workers assemble different technologies into a functioning unit is key for completing work effectively in and across different locations. Sutherland and Jarrahi (2017) highlight how mobile workers in the gig economy need to rely on multiple platforms and thus of necessity are engaged in building new information infrastructures across platforms to conduct their work. Lee et al. (2019) demonstrate that, although the main motivation of T-Nomads in using co-spaces is to meet people for social interaction, co-spaces also support them in their professional work and thus can be termed as co-living and co-working spaces. While these studies raise questions of infrastructural demands and contribute to our understanding of how they play a role in nomadic practices, they do not, in our view, interrogate the notion of nomadicity and its permeable forms in sufficient detail, as we argue below.

Mark and Su (2010) draw attention to the fact that nomads are constantly in unknown environments, meaning that they do not actually know what such environments have to offer them in terms of infrastructure. The authors discuss how important is to make infrastructure visible to nomadic workers, so that they can actually find the relevant resources to accomplish their productive activities. The authors suggest developing local knowledge and sharing it within communities of practices for nomadic workers as a way to respond to infrastructure demands emerging from the engagement with nomadicity. In a previous work, the authors had already introduced a discussion on how T-Nomads are constantly assembling actants in preparation for moving to new locations for accomplishing work, seeking for material infrastructural resources as they arrive in such locations and integrating with the social infrastructure in place as they go on to accomplish their productive activities (Su and Mark, 2008). Despite the use of Star and Ruhleder (1996) to frame their discussion on the challenges faced by T-Nomads, the authors do not engage on discussions regarding infrastructuring and how it is an intrinsic part of the corollary work inherent to nomadic practices.

Erickson and Jarrahi (2016) partially respond to this in their work on the challenges of dynamic seams in nomadic practices. The authors specifically draw on

infrastructuring as a lens to understand how knowledge workers deal with the challenges stemming from a constant change in their relationship to infrastructure, as they traverse within and among difference infrastructural configurations by moving through space and time. They acknowledge that infrastructural contingencies are commonly part and parcel of nomadic practices and go on to elaborate on how *bridging* (i.e., introducing aligning interventions to connect incompatible digital infrastructures), *assembling* (i.e., customising infrastructural solutions by brining disparate parts together) and *circumventing* (i.e., improvising to avoid known infrastructural constraints that may hinder work) are three infrastructuring practices commonly used by knowledge workers in order to overcome infrastructural seams and keep working effectively. In particular, the authors draw attention to the fact that in order to engage in these infrastructuring practices, people need to develop some sort of *infrastructural competence*, which would allow them to identify where infrastructural seams exists and how they can overcome them to achieve desired goals by means of infrastructural strategies devised from sociotechnical insights. The issue of infrastructural competence has been further elaborated by Erickson and Sawyer (2019), who looked at the work of knowledge workers in the context of infrastructural bricolage and Sawyer et al. (2019), who went on to discuss a set of skills and ICT usage to appropriately engage in technologically mediated nomadicity.

Although Erickson and colleagues draw on infrastructuring to further understand the nomadic practices of knowledge workers, their focus also lies in individual practices applied on an almost everyday basis in the making of nomadicity. They do not look at a particular nomadic group or context, nor do they concentrate on a set of infrastructural tools. Erickson and Jarrahi describe their work as *'a prelude to more targeted investigations in the future'* (2016, p. 1325). This is exactly, we feel, what our contribution, which focuses on the 'work to make work possible' in a community of social activists and the technologies that they use in different locations, offers. The temporal aspect of our study – i.e., sporadic practices instead of commonly found practices – and the fact that these practices go beyond of individual practices also set our contribution apart from the phenomenon observed by Erickson and Jarrahi (ibid.).

2.3 Infrastructuring and artefact ecologies in volunteer-based communities

Information infrastructures, including ICT, have enormously benefited business and governmental organisations in improving work processes. However, volunteer-based/non-profit settings differ from traditional business and governmental organisations, making coordination and information management more challenging (Bødker et al., 2016a; Voida et al., 2011; Stoll et al., 2010a, b). Keeping this in mind, the research community has shown interest in how to support non-profit settings with modern technology. Some work has been done in which researchers have analysed the benefits of adopting modern technologies by non-profit organisations

in different geographical regions, e.g., a group of Australian farm women using a discussion group (Pini et al., 2004); two Canadian community organisations using video-based communication to connect their citizens; and ESF London making use of mailing lists in organising processes in 2004 (Kavada, 2009).

Similarly, some researchers have focused on designing appropriate technologies to support work in non-profit settings (McIver, 2004; Rohde, 2004), whilst others have involved actors of non-profit organisations in the search for a design process supporting sustainability (Farooq et al., 2005; Pilemalm, 2002; Mcphail et al., 1998). Social media have enabled new approaches for social activists to launch fundraising campaigns (cf. Goecks et al., 2008), organise online communities (Fuster Morell, 2010) and engage in political activism (Wulf et al., 2013). Similarly, open-source systems (Juris et al., 2008), mobile technologies (Kim et al., 2014) and ubiquitous technologies (Fischer et al., 2014) have also been explored to improve the work practices of non-profit organisations. However, when it comes to the articulation work necessary to coordinate large initiatives as the ESF, more traditional or private media are preferred (Saeed et al., 2019).

More recently, Bødker and colleagues turned their attention to the role of artefact ecologies within volunteer-based communities (Bødker et al., 2016a, b). Based on in-depth ethnographic work, the authors provide a nuanced account of the constitution of artefact ecologies in these communities, how such ecologies are shaped by the community members and how they in turn shape the development of the community. Although the authors are careful in differentiating between the notions of infrastructure and artefact ecology, they do acknowledge the overlaps between the two of them – especially in terms of the infrastructural elements connected with artefact ecologies, e.g., space, Wi-Fi availability, etc. – and note that the '*work that goes into making the [artefact] ecology work* […] could be described as *infrastructuring*, with local adaptations of familiar artifacts, introduction of new, inertia and tensions as fundamental conditions for community work' (Bødker et al., 2016b, p. 1152, italics in the original).

Overall, the works outlined in this section suggest that infrastructuring in volunteer-based settings can be quite challenging due to inherent issues like weak organisational structures, higher volunteer turnover and shortage of financial and human resources. The case we present highlights these factors and help us to further understand what issues we should keep in mind facilitate the infrastructuring work in these settings.

3 An ethnographically informed study of the nomadic culture within the ESF

In what follows, we provide an overview of the research study underpinning the findings herein presented, describing the research context, and introducing our data collection and data analysis procedures. We also reflect upon

the limitations of the presented results, as for example the limited generalis-ability of the findings. As we will argue, the in-depth accounts and the rigor-ous data collection and analysis procedures employed contribute towards the trustworthiness and authenticity of the findings, which are two major quality criteria of qualitative research (Guba, 1981).

It is worth pointing out that the research context that we describe does not consist in recent data. We have revisited it in the light of the infrastructuring lit-erature, and Bødker et al.'s (2016b) comments on the work needed to make an ecology of artefacts work, even after changes in the digital landscape. While it is true that, back in 2010, social media platforms like Facebook and Twitter were less prevalent, and the likes of WhatsApp, Telegram, and other messenger apps did not exist, it does not alter the fact that we need a good sense of the chal-lenges faced in assembling sociotechnical resources in a variety of organising contexts. Indeed, and in passing, our work tends to show that use of these new Web 2.0 technologies remained relatively marginal (at least until the advent of Covid). Our data portray a peculiar context where infrastructuring happens that, we argue, allows us to make interesting conceptual contributions to the field, as made clear ahead.

3.1 **Research context**

The World Social Forum (WSF) movement is an initiative started by thou-sands of social activists working against globalisation at Porto Alegre in 2001. Since its inception, WSF has moved to Asia and Africa as well. Fol-lowing the success of the WSF in 2001, different regional and thematic forums with independent organising processes emerged. ESF was a central event for European activists and organisations participating in anti-globali-sation social movements.

ESF was held in different locations between 2002 and 2010 (Florence, Paris, London, Athens, Malmö, and Istanbul). The nomadic nature of the forum helped to popularise the social movement in various European regions but also had implications for knowledge transfer processes concerning the initiatives of the members of this social activist network (Saeed et al., 2010).

The organisation of an ESF event was carried out by a local organising com-mittee and the European Preparatory Assembly (EPA). The EPA was an open meeting place for activists and organisations which took place regularly every 3–4 months. It was an informal coordination group and a management body moderating the discussion of the political agenda and taking important decisions, as to where the next ESF would happen. The local organising committee, on the other hand, was the responsible for organising tasks and the logistical arrange-ments with the support of the EPA. It had responsibility of providing logistics for the activists to propose and conduct different activities such as seminars,

workshops, demonstrations, etc. This was usually subdivided in smaller work groups targeting specific challenges.

The local organising committee usually emerged from the articulation among members of the ESF network attending a particular forum. The committees usually came together organically as members from the same country met in ESFs and started informally discussing the possibility of bringing the forum to their country. Once these members had a concrete proposal to host an ESF, they approached the EPA to formally present it. Based on the different proposals received from different countries, the EPA members would select the next venue considering the financial implications as well as the political relevance. Once a decision was made, the activists proposing to host the next forum in their countries were oriented by the EPA to involve more local organizations in the political process. The EPA, hence, was the body fostering the long-term community building, facilitating information sharing and coordinating work. It was the place where tensions and agendas were identified, negotiated, and resolved.

Our study focused on the last two ESF events held respectively in 2008 and 2010. Nevertheless, during the interviews with our participants and the observations carried out during the organisation of those two events, issues from the events in Athens 2006 and London 2004 also surfaced.

3.2 **Data collection**

The empirical findings in this article are based on a long-term ethnographic study of ESF lasting for almost 3 years. This study started after the 4th ESF in Athens, lasting until the 6th ESF in Istanbul, Turkey.

Data has been mainly collected through participant observation and semi-structured interviews with organisers of the event. Due to constrained financial resources, online ethnography (Hine, 2000; Wittel, 2000) has also been employed to complement the data otherwise collected via face-to-face means. This has been implemented by the participation in the ESF mailing lists to observe the exchanges between their members and the observation of the activities in the community websites.

The observations were gathered during eight field visits, which lasted 26 days altogether. Two field visits were carried out in 2008, one of the EPA meetings in Berlin and the second during the ESF 2008 event at Malmö. Throughout 2009, two other field visits of EPA meetings in Vienna and Athens were carried out. In the course of 2010 four other field visits were carried out during EPA meetings in Berlin, Istanbul, and Paris along with the ESF 2010 event in Istanbul. Semi-structured interviews were taken from thirty-one activists; interviews were a mix of onsite and telephone interviews.

All the interviews were recorded to avoid loss of information and the total recorded content was approximately twenty hours.

3.3 **Data analysis**

Data artefacts produced across our long-term ethnographic study – i.e., interview transcripts, fieldnotes, email communications, etc. – have been submitted to a careful thematic analysis consistent with Braun and Clarke's approach (2012), an analytic procedure increasingly used in HCI and CSCW for the past number of years (de Carvalho, 2021). The analysis has been mainly carried out by the three first authors and the generated codes and themes have been refined as the analysis progressed and the writing of the manuscript took place.

The analysis started with a careful reading of each data artefact and annotations as to how some excerpts could be potentially coded. As typical in thematic analysis approaches (Braun and Clarke, 2012), our research question led all the analysis process. This means that during our analysis we were continuously seeking to understand which issues of infrastructuring were manifest in our fieldwork data and whether and how those issues could be connected with the notion of corollary work. Excerpts which were directly connected with the research question were annotated with reflections on how they could potentially impact the general argument being constructed. After this careful reading, a broadly inductive approach to the coding was adopted. Naturally, a deductive approach was used at times, following the premises of thematic analysis, which accepts that a purely inductive or deductive approach to coding is mostly unusual. As Braun and Clarke (2012) note, analysts tend to bring their knowledge to the analysis, even if inadvertently, when they are trying to listen to the data – inductive coding – and also will not ignore relevant aspects of the data when trying to apply predetermined categories to it – deductive coding.

Each data artefact was coded in sequence, and the code schema was developed as the analysis progressed. Each data artefact has been coded by a single person. The coding of the artefacts was subsequently discussed and refined in coordination meetings, involving other authors when possible. Refinements have been incorporated in the code schema following the discussions.

Once all data artefacts have been coded, a second pass was made to ensure consistency and coherence. More than 70 codes have been developed in the process, as for example *technology dependence, levels of technological involvement, difficulties for finding appropriate infrastructure*, and so on.

The coding phase was followed by the phases of searching, defining, and revising themes (Braun and Clarke, 2012). Overall, *four main themes* have been developed out of our analysis: *(1) infrastructuring challenges with the ESF information infrastructure*, which integrates the aforementioned codes; *(2) politics of technology*, which was composed by codes such as *political influence of technology in the work of activists, political decisions on the choice of*

technologies, and so forth; *(3) impacts of discontinuity on information infra-structure*, which feature codes such as *new technological demands, tensions between reuse and reinventing*, and *problems of knowledge and expertise shar-ing;* and *(4) volunteer nature of work*, which have been elaborated on the basis of codes like *volunteers as backbone of social activism, diversity as a result of volunteer work, contrasting work practices among volunteers*, and so on. These infrastructural themes, we argue, are directly connected with all the corollary work necessary for nomadic work practices of large groups of volunteers collab-orating sporadically to take place. Each of these themes are empirically devel-oped in Section 4.

Our analysis was only concluded with the production of this article, where we have further reflected on the generated themes that have been generated across phases 1 to 5 of the thematic analysis procedure and how they could be further elab-orated using an infrastructuring lens. These reflections and analytical developments are laid out in Section 5 ahead.

3.4 Critical reflections on the methodological approach

As with any qualitative study, the findings that we present are only weakly gen-eralisable but stand as a case study of a particular infrastructural configuration, the characteristics of which we discuss below. It is widely accepted that such types of studies are invaluable and can provide transferrable findings, which can also apply to similar contexts (Bryman, 2008; Creswell, 2007). The quality of such studies, as argued by many authors, relies on the *trustworthiness* and *authenticity* of the presented findings, where the former notion concentrates on the *credibility, transferability, dependability* and *confirmability* of the find-ings and the latter to the fair representation of different viewpoints of the rele-vant actors (Morrow, 2005; Shenton, 2004; Guba, 1981). We have paid careful attention to these aspects by following well-established procedures to achieve them, as for example, by engaging representatives of the relevant actors; using *different data collection methods* to capture different perspective on the sub-ject; drawing on a *systematic data analysis approach*; and *triangulating the findings* coming from different data sources (Shenton, 2004; Koch, 1994; Guba, 1981). In doing so, we argue that the findings presented are: credible, for they have followed a rigorous research strategy; transferrable to similar con-texts – as for example organisation of scientific conferences, which is mainly based on volunteer work and faces the challenge of mobilising infrastructures to new locations; dependable, as we have carefully gone through the data arte-facts, discussed results extensively and draw on the relevant literature for our theoretical and analytical arguments; confirmable through empirical evidence presented across Section 4; authentic, as we have listened to the different actors and strived to represent their views and opinions on the subject of interest.

4 Infrastructuring and the organisation of activist nomadic events

Understanding infrastructuring, we argue, provides additional nuance when making sense of how nomadicity might be constituted, and how in particular it is constituted in the context of a loose organisational context. The social activist networks we describe are collaboratively arrived at. This means that the infrastructuring challenges for setting up and maintaining information infrastructures, the politics of choosing, integrating, and using particular technological resources for organising and conducting of activist nomadic events, the impacts of the discontinuity of the events and the volunteer nature of the work involved in organising it are distinctive.

Our initial analytical focus was on the sociotechnical configurations of both the human and the technological tools used (mostly web-based) to organise not only the events and the community, but also on the negotiations of conventions and structures around these tools which demonstrated number of social, political, and cultural issues around these processes.

Our perspective is shaped by Star and Bowker (2002)'s categorisation of the relations between infrastructures as technological networks and the social processes they interact with, and with it an associated discourse about the emergence of large technological systems in STS (Science and Technology Studies). Stable elements in the infrastructure discourse have been the extent and duration of the infrastructures we use, its invisibility and taken-for-grantedness, and our dependence on the continuous use of the infrastructure, which frequently appears in the event of infrastructure breakdown. But its title 'How to infrastructure' carried two connotations that distinguish the approach from earlier characterisations: Infrastructures are established by activities ('Infrastructuring'), and there are different ways to perform these activities ('How to'). In Karasti and Blomberg's words infrastructures 'are concerned with characteristics of a phenomenon such as "relational"' whereas 'infrastructuring is meant to direct attention to the more "processual" qualities through which the phenomenon emerges' (2018, p. 235).

4.1 Infrastructuring challenges with the ESF information infrastructure

From the beginning of the ESF, efforts were made to develop information infrastructures to facilitate the organising processes involved. One Italian activist who was also involved in the discussions about setting up technologies for ESF stated:

> Without these technologies it would have been impossible what happened in terms of connections and communications and development of a global network of organisations. Well, there have been tools that facilitated the work in some cases, but it never took off in terms of allowing a more sophisticated and continuous form of interaction and collaboration etc.

The information technologies that activists were aware of generally included websites, email, mailing lists, electronic payment systems, wikis, content management systems, online discussion forums, shared file servers, social media, and various standard office software systems for the production of text, posters, charts, etc., some commercial, some open source, and all part of the global infrastructure of 'the Internet' (cf. Bødker et al., 2016a).

There has been technological involvement at varying levels during the organising process of these forums (Saeed et al., 2011) and as the technological needs of all these forums are very similar, we were particularly interested in finding out how this discrete practice of organising an ESF creates implications for finding IT infrastructure for the ESF. When a possible infrastructure is identified, local factors such as changing community interest, changing self-perception of technology, availability of resources, etc., nevertheless intervene, exposing the *intentional and intervention prone* dimension of infrastructuring (Karasti and Blomberg, 2018). The same infrastructuring approaches are not successful on each occasion. Despite this, previous infrastructural knowledge and experience can help the organising committee to foresee possible challenges and the implications which might emerge. For this reason, it is also important to analyse whether they learn from the infrastructuring processes of previous forums and the implications for information system design. This long-term approach is one way in which aspects of 'learning', previously identified in the literature, can be better clarified (Ribes and Finholt, 2009; Star and Ruhleder, 1996) – see also Lee and Schmidt (2018) for critical discussion.

Furthermore, the activities the actors engaged in to deal with these issues and conflict lines can already be considered 'infrastructuring' activities (Pipek and Wulf, 2009) with regard to the work infrastructures of each ESF event. In Star and Bowker's (2002) terms, the 'global' infrastructure of the Internet underwent an appropriation process for each ESF event that can be called 'infrastructure localisation'. Contrasting the traditional use of 'localisation' in HCI, the term does not relate to the adaptation of interfaces regarding language and local visualisation standards (although they may be part of it), but to the adaptation and configuration of technologies according to the local work and task context.

4.2 **Politics of technology**

Technology introduction can be political in itself (cf. Winner, 1980). As a result, the work of political activists can be affected either negatively or positively. In the case of ESF, the agenda setting process, supported with ESF websites, required political discussions and deliberation at different geographical levels (world/regional/local) and at EPA meetings. Not only that, but the process also often went beyond the organising of the conference, which was mainly the responsibility of the local organising committee and constituted a means to foster a group identity. Decisions were made concerning the selection of the elements of the

technological infrastructure and were not without conflictual elements – see also research on the emergence and establishment of artefacts ecologies within volunteer-based communities, e.g., Bødker et al. (2016a, b). One Swedish activist described his thoughts in the following words:

> It is the cultural conflict between those professionals who want to professionalise the whole process and see OpenESF and these kinds of tools as 'the tools', and then those who claim that democratic decision-making in groups that have eye-to-eye or have representative structures is the way to make decisions….

So, developing information infrastructures in ESF needs consideration of this sensitivity aspect as well. In order to preserve the contents of the ESF 2003, the organising committee planned to store audio recordings of seminars, but the recording equipment did not work so the committee thought of sending volunteers to document the proceedings. This, however, could not be implemented as some people objected. One French activist described this as follows:

> We thought to have some volunteers in each of the sessions and volunteers would make notes, write them down, formalise them, and we could put them online as the résumé of the activity. And some of the members of the organising committee said that we couldn't have such a process because it could only be the voice of the speakers and there should be no external people writing the résumé. So, we gave this idea up, and came to the process that organisers themselves send us rationales before the seminar and résumés after the seminar.

Similarly, during the organising process of ESF 2004 in London, the organising committee outsourced the website development to a private company and only the organising committee checked the publication of content on this website. This later became a source of conflict among activists. The Italian activist described this as follows:

> In London there was really no connection, so they [organising committee] did it with a company. [The development of] the website was given to a company, and they started a new process.

One British activist gave the London Forum the following reason for not extending the previous website:

> They [organisers] wanted something a bit more professional, and they were not sure whether the website would be secure enough because registration would

take place online and people should pay for their registration online. So, saying that, we need a secure website and they thought that giving it to a company would ensure that, while they didn't really trust [volunteers] and it was a big political problem in the London process. There were lot of conflicts within the London process and that [website development] was a part of conflict.

Hence, activists expressed their concerns about the openness of political processes as a result of this conflict. Activists known as 'horizontals' developed their own website with the support of one particular activist. One British activist described her experience with this website as follows:

They have wiki pages, they have a lot of discussion lists, people could make an account and start creating their own pages, and upload content, so it was very much a bottom-up way of using the internet/the web, while the official web was more top down.

She further said:

I know some of the people who launched it and who managed the alternative website. They wanted to have links with the official website, but these were not granted. Basically, in London you have different people using different websites according to their needs, it was the reflection of the political situation.

Additionally, our empirical study showed that technology introduction resulted in *three main concerns*: first the fear that tools may take over control of political process; second the openness of the technology and its acquisition process; and third, the cost incurred on setting them up. Most of the agenda setting takes place by consensus as political agenda setting is agreed at EPA meeting, where initial themes are proposed. After the agreements of themes different organisations propose the activities. Since logistically all activities cannot be centrally organised so there is a "merging" process where, initially, organisers of proposed activities are encouraged to merge their activities voluntarily and later the organising committee tries to unify them. This is a politically sensitive process as every organisation wants visibility so smaller organisations sometimes have concern that they were forced to merge with other activities.

Overall, the findings presented across this section suggest that the technological needs of the social forum could be divided into *three different categories* targeted at different groups of users. As organising an event of this magnitude requires extensive *logistical support*, IT could play a major role in arranging the logistics of the meeting, mainly for the local organisers and the EPA. Additionally, activists/organisations taking part in ESF need to have a *communication platform* at European level to prepare their activities during ESF, to be informed on political developments and to negotiate and perform joint actions. The agenda

definition as well as the content planning of individual tracks and workshops followed a grassroots approach, so this task space addressed all prospective participants of the ESF. The third category of requirements is about *publishing the outcomes* of activities taking place during ESF and addresses the local organisers and the EPA for publicity regarding the event itself, but also other participating organisations and their different national sections.

4.3 Impacts of discontinuity on information infrastructure

Since organising an ESF is a periodic event, the transition time during which the next organising committee is in the process of forming itself also has an impact on localising IT infrastructure.

In case of ESF 2010, the members of the Turkish Organising Committee (TOC) have known well in advance the developers of the previous ESF 2008, but initially they were more concerned about other issues than the realisation of information infrastructure. In 2009, one of the TOC organisers commented on their plans in the following words:

> We have not decided yet; we have a lot of discussion whether we will continue to use the one (website) we had for Malmö, the [members of the] Nordic Organising Committee (NOC) are saying that you could use it and we could put the Turkish part into the system but we have not decided yet whether we are going to use the old one or if we are going to create a new one, because we are not going to need it till the program discussion which is in 2010 so we are kind of waiting to see what kind of program we will do, what kind of social activities we are going to have, and then decide which website we will use.

Similarly, the Greek developer who worked for NOC also highlighted the same issue in following words:

> The cost of the ESF server was covered by the NOC until December 2008, and since December I have paid for it with my credit card and I am trying to find some people from the Turkish organising committee to see if they want to reuse this technology both OpenESF and ESF 2008 website, to copy it and set up a new site.

As a result, as ESF approached, TOC was not able to set up the event website. TOC's underlying assumption had been that the Greek developer would set it up for free. When he was not able to volunteer his services, a member of TOC started to explore it and found that the website was not easily configurable, and it required knowledge of the Plone content management system for its realisation.

For setting up information infrastructures, the organisation committees were always torn between 'reuse' and 'reinvent' patterns. With scant resources by way

of time and money, the decisions usually emerged from the activists driving a certain technology. There was rarely a systematic evaluation of different alternatives. Reusing options would have involved the use of the domains of earlier events, the reuse of software being developed/used in organisation tasks, and the reuse of servers and data spaces. But in most cases, the actors focused on getting things done. Organising committees had their own constraints and preferences so they only took short-term decision and did not plan beyond the upcoming ESF event, e.g., as the event moved to another location, reusability and extensibility of the website could have helped the process. Due to the nomadic nature of the ESF event and weak organisational structure, there was always a need for some backbone mechanism to coordinate the activities about IT decision making. The new organising committee that was responsible for the next event normally did not know much about the technological needs of the event beforehand. So, after the problems in London ESF, it was decided by EPA to have a group, responsible for the web dimension of the forum, and so a web team evolved. This group of volunteers provided some sort of sustainability in the infrastructure. Some volunteers even joined forces with the volunteers of the WSF, trying to realise the idea of a tailorable event website which can be configured for each social forum event whether regional, local, or global. The idea of a centralised web team could not be realised in its true essence as the EPA could not decide on financial matters. Only the organising committee was used to make the decisions where costs were involved.

In a globalised world, organisational boundaries have blurred, and people have to collaborate in different ad hoc settings, where not only the establishment of trust (cf. Bechky, 2003, 2006; Meyerson et al., 1996) but also the availability of information infrastructures becomes challenging. Ellingsen and Monteiro (2003) analyse the design and use of an electronic patient record system in hospitals and display conditions for the integration of information infrastructures in relation to existing information systems. They characterise the lack of integration of different information sources and show strategies for dealing with identical and non-identical information from these sources. In the case of health, professional infrastructure needs to be instantiated repeatedly, but the actors are somewhat stable, whereas in the case of living labs (cf. Björgvinsson et al., 2012) and publics (cf. Le Dantec and DiSalvo, 2013) information infrastructures keep on evolving and re-instantiation is not required.

Due to the nomadic nature of ESF, time after time a new set of actors became responsible for finding the information infrastructures and the actors who were responsible for maintaining the information infrastructures at previous instances may no longer be accessible. As the technological requirements of each ESF are similar, we were interested in finding the problems in localisation process of such information infrastructures. As a result, this could in turn be an important input for sustainable system design.

4.4 **Volunteer nature of work**

The volunteers are the backbone of social activist organisations. These volunteers, we have seen, come from virtually all European countries and sometimes also from other non-European countries surrounding the Mediterranean. On a few occasions, problems arose which may have resulted from the cultural stereotypes of the actors involved (e.g., in the transition from Paris to London), but usually the participants were willing to put these issues behind them to reach the common goal. There were, however, some immutable intercultural problems, e.g., with regard to language or with regard to differences in the legal systems and the resulting business conventions at the various sites. These problems complicated the organisation process, and in particular the process of passing on knowledge and experiences from prior meetings, and the challenges had to be met with an increased amount of communication work.

A concept that united and divided the actors more strongly than their national identities was the idea of being a grassroots initiative. While all actors subscribed to the idea on a political and philosophical level, the needs of the members of the organising committees, who took the full responsibility with regard to legal and financial issues, came into conflict with these ideals, e.g., when it came to financial risk management in Malmö, or when the participation status of the Palestinian organisation Hamas was discussed.

And finally, the experiences, interests and work practices brought to the table by the different actors when organising an ESF event were also more important than cultural issues or national identities. Although the EPA served as a continuous platform to discuss political as well as organisational issues with regard to the ESF process and the next event, it had neither the intention nor the capacity to streamline practice diversity and to establish processes and routines for the work practice of the organising teams or any other group of volunteers supporting the events. As a result, these groups reused many of the experiences and routines that the actors involved knew and tried to learn as much as possible from prior organisation committees by interviewing their experts and analysing the knowledge artefacts created along the way, which is common in unstable organisational settings (Pipek et al., 2012).

The availability of technically minded volunteers can benefit the setting up and localising of information infrastructures. However, this localisation process can be subject to individual preferences. Similarly, in ESF, many infrastructural artefacts were maintained by activists, who used to apply a quick fix, resembling findings from Bødker and colleagues (Bødker et al., 2016a) concerning the infrastructuring or artefact ecologies in response to happenstance. This was quite evident at many different instances. Different people introducing new technologies have different technological preferences and experiences, so they designed the systems which they thought were appropriate, instead of making an overall strategic vision for the future use of forums. This was further evident when there

was a large funding available after the Paris forum. However, instead of having a well thought out policy, organisers let the people decide which technology they wanted to develop. It became common for activists working on the ESF process to expect a website for each event where they could propose activities and get information about the event, but no one was interested in how to set this up. It was the sole responsibility of the organising committee to make the website available, though individual organisations depended on that website for their own mobilisation activities. Once an organisation was registered on an event website, it could propose the activity which it wants to organise at the upcoming ESF. As there was a considerable delay in setting up the ESF 2010 website, the activists started wondering how they would be able to mobilise people in the absence of it. The collaborative website used during ESF 2008 was offline already, and some activists suggested to activate this old site, but the TOC – although realising its importance – had no money to finance it so it became inactive. The official ESF website was not updated for almost one year because the volunteers stopped working on it. EPA meetings took place regularly every three to four months, but there was no information about them on the website. One activist who worked on ICT activities for the ESF described the following reason for not updating the official website:

> I think the last webmaster was 'XYZ' and she just stopped doing it, because at some point she was doing a lot on a voluntary basis, and she had no money to go to EPAs. She said 'Ok, you want me to be the webmaster, but then, at least, if you don't pay me, give me the possibility to come to the meetings.' So, she stopped.

After almost one year, other activists noted outdated information on the website and brought up this issue on the mailing list. The activist maintaining the website at the time stated that the people in the ESF had no interest in the website. She therefore decided to stop updating it and waited for a response. At that time, the control of the website was handed over to another activist who implemented minor updates on the website.

As seen with regard to the development of the Malmö central event website, instead of extending the already existing website of the ESF 2006 Athens event, it was decided to develop the website from scratch. This decision was based on the offer of a social company to develop a new website for free – an attempt that eventually failed. It has been observed that the importance of involving users in the technology design had been accepted and users had also been involved in the discussions. However, due to the lack of resources, users' concerns could not be adequately taken into consideration. Furthermore, the volunteers kept on changing and there was no well-defined technical documentation of the technological artefacts at the moment Again, this closely relates to Krüger et al. (2021) who observed in a broadly similar context – a group of heterogeneous actors working

with migrants – that volunteers (and migrant participants) came and went in an unpredictable fashion. This hampers the sustainability of the technological arte-facts and new volunteers may prefer to propose new solutions instead of reverse engineering the available tools. The technologies used in developing these arte-facts also differ widely. People select the development environment based on their preferences and often the long run perspective is ignored. This leads to the complete redesign of the system at a later point in time.

During ESF 2008, the NOC initially tried to recreate the website from scratch since they did not want to pay for it. Ultimately, due to problems with that arrangement, they had to hire the same Greek developer to extend the ESF 2006 website for ESF 2008. Similarly, the collaborative website (OpenESF), which was used during the ESF 2008, was no longer used during ESF 2010. The Greek designer, who had configured this open-source application, wanted to have a regular income for the maintenance and server costs. However, the TOC did not have any money, so the site went offline.

As the empirical data highlights that ESF setting had issues in finding and using IT infrastructures mainly due to lack of technical and financial resources and majority of interventions were imposed mainly due to personal choice instead of needs assessment. In other words, they lacked infrastructural compe-tence (Erickson and Sawyer, 2019; Sawyer et al., 2019).

These findings suggest that, in order to better support initiatives as the ones put forward by the ESF, technological solutions need to be aligned with organisa-tional practices. The changing set of volunteers makes the participation of activ-ists in the design process particularly complex. At the start of the ESF process, the organising committee did not know much about the whole organisational pro-cess because they were also new to the process, hence their participation in the design was not likely to improve the artefacts and thus they relied on what was available. When the event was over, they became the 'experts' because they knew the weaknesses of the artefacts. However, by this point, the event had already moved to a new organising committee, and they were no longer active in the organising process.

Our findings therefore suggest that, due to volunteer nature of work in social settings, volunteers have a higher degree of 'local' preference for technology selection in activist networks, and IT infrastructure is assigned greater signifi-cance to the process of knowledge transfer (cf. Bødker et al., 2016a). Five catego-ries are relevant for knowledge transfer and reuse in organisations, as described by Zargar (2013): (1) *knowledge*: the transferability of knowledge is related to its codifiability, teachability, complexity and system dependency; (2) *source*: incen-tives and interests can influence the actor at the source of knowledge and thus the process of knowledge transfer; (3) *recipient*: knowledge absorption depends heavily on the absorptive capacity of the recipient; (4) *context*: knowledge dis-closure and access can facilitate the process of knowledge transfer and (5) *social*

network patterns: individuals are embedded in their social structure and movements and this influences the diffusion of knowledge. The consideration of these determinants might assist in resolving the difficulties in (re)instantiating IT infrastructure. All these lead to a non-centralised approach for sustainable system design. Busnel et al. (2013) have provided some insights into how community-driven development based on new models can provide an open and decentralised way to produce software parts which are easy to use and reuse.

5 Discussion

In this article we have drawn on a literature concerning 'infrastructuring' to highlight the very specific ways in which points of infrastructure arise in the context of episodic, quasi- organisational, networks of volunteers and how this can shed light on the corollary work necessary for nomadic practices of these networks of volunteers to take place. In so doing, we show how conventional treatments of work arrangements, predicated on clear demarcations of organisational role, specified infrastructural conditions and delimited spatial and temporal conditions (place of work; times of work) do not adequately describe the real lives of people in these circumstances. These treatments and their associated practices, we argue, are manifestations of the corollary work necessary for the making of technologically mediated nomadicity (cf. Gray et al., 2020).

Conventional business and governmental organisations typically have continuous work practices addressing this challenge by establishing well-defined organisational structures (e.g., IT departments), policies and monitoring strategies for the establishment of new parts in an IT infrastructure. These IT departments work to fulfil the organisational needs by continually updating IT infrastructures and aligning them to organisational objectives. In Star and Ruhleder's terms, then, they are characterised by features such as transparency, routine, stability, are learned or internalised as part of a community of practice and have a reach beyond immediate events (Star and Ruhleder, 1996). Mark and Su (2010), in contrast, show how nomadicity typically has other features. These include the fact that use is often nonroutine and hence the infrastructure is less transparent. The infrastructure, as they put it, has to be reassembled. How it is to be used has to be rediscovered or reinvented. For the nomad, familiarity with the conventions associated with practice may be less, or even absent (Mark and Su, 2010).

Having said that, it is worth pointing out that nomadicity, as it is termed, while in increasingly common usage, is not a unitary concept. We subscribe to a view expressed by Gray et al. (2020) that poses a challenge to 'essentialist' or binary distinctions between sedentary and mobile or nomadic working and hence a view which requires a careful look at different contexts. The reality for many people will be that, as T-Nomads, they are engaged in behaviours which entail a whole constellation of arrangements, circumscribed by spatial contingencies, temporal

requirements, and so on (de Carvalho, 2014; Mark and Su, 2010; Jarrahi and Nelson, 2018). When we use a term of this kind, it is not always clear whether we are referring to work that takes place away from its traditional locations; to work that takes place when actually on the move; to work that, out of necessity, takes place in many different locations; to work that takes place under different infrastructural constraints; or indeed any and all of these things (Ciolfi and de Carvalho, 2014). It is all the more important, then, to examine contexts which illustrate how nomadicity takes the specific shape that it does.

Indeed, the Covid crisis and the concomitant increase in working from home has, paradoxically thrown this into relief, since this has entailed a great deal more work away from the office, a great deal less working on the move, an increased reliance on infrastructures of some kind (but these may include such things as domestic arrangements and the allocation of spaces in the home, and so on), and the negotiation of the temporary as against permanent infrastructural arrangements. The contingent nature of the term throws very specific organisational forms into sharp relief. While typologies of this kind are invaluable for sensitising us to the dimensions of infrastructure, they at best only partially describe the lives of real people engaged in real activities (Gray et al., 2020). Put simply, there may be different kinds of nomadicity with different ramifications in relation to the nine-fold typology that Star, Ruhleder and Bowker constructed, those of *embeddedness, transparency, reach or scope, learned as part of membership, linked with conventions of practice, embodiment of standards/plugged in other infrastructures, building on installed base, visible on breakdown* and *fixed in modular increments* (Bowker and Star, 1999; Star and Ruhleder, 1996). We draw on some aspects of the typology below in order to highlight the particular configurations that result from the distributed, sporadic, and discontinuous collaborative work of activist networks.

5.1 Particularities of nomadic practices in social activist networks

The organisation we describe, one which is temporary, at least in the sense that its infrastructural form is required only at a specific time, sits somewhere between stable organisational forms and the work of the individual T-Nomad. Its particularities lie in the fact that the ESF has a relatively long term, but nevertheless sporadic existence. Moreover, the fact that a variety of local organisations coalesce at specific moments to manage the emergence of a more global but temporary organisational form brings with it relatively unique infrastructuring difficulties. In this case, we saw how the ESF, engaged in various activities such as organising academic conferences, exhibitions, trade fairs and other periodic events, entailed organising teams which kept on changing. Each time a new organising committee became responsible for setting up infrastructure, the absence of such infrastructure, meant that the execution of required tasks is difficult. The use of social media might partially support such settings by facilitating communication

and document sharing but does not resolve the problem of an ever-changing membership, fluid responsibilities and uneven information exchange. We identified a series of features which we feel describe this *evolving* set of infrastructural arrangements and highlights their *emerging and accreting* dimension, insofar it stresses the in-the-making nature of infrastructures.

Firstly, the infrastructural arrangements that we have observed are characterised by ongoing collaborative effort, much of which is problematised by cultural diversity, fluid roles, and uncertainties about responsibility. Our findings suggest information exchange on collaborative websites, a component of the technological infrastructure. Cooperative outcomes like planning for a joint activity, political campaigning, etc., evolve along with an agenda definition process supported by ESF websites, which required political discussions and deliberation at different geographical levels (world/regional/local) and at EPA meetings. In general, our findings suggest that the embeddedness of technological infrastructures in everyday life requires sustainable and dependable technological solutions. The results of this study help to understand the difficulties faced by the actors in re-instantiating IT infrastructures, which could be an important input for sustainable system design. The aim was to research the differences between information infrastructures in volunteering communities/social networks compared to those in an organisation.

Secondly, these efforts are episodic so there are significant discontinuities as new technological demands, tensions between reuse and reinventing, and problems of knowledge and expertise sharing occurred. What is interesting about this case is that the degree of *transparency* in respect of infrastructural components was very variable. There was, without question, an *installed base* upon which the infrastructural components were developed. We have seen, unsurprisingly in such a widely distributed content, how things like the Internet and the World Wide Web served as construction sites for the technological infrastructure used by the participants. Several components of the ESF technological infrastructure included other infrastructures, e.g., content management systems, databases, etc. As an example, the websites of ESF were built on the top of other infrastructures, including content management systems like Plone, SPIP and databases like MySQL or ZODB. Similarly, mailing lists were established using different provider websites. The translation system developed to facilitate exchange from people from different parts of the world, who did not necessarily share a common language, used radios, interpreting devices, amplifiers etc. whereas the visualisation tools used different databases and multiple front-end platforms like JAVA Swing. Thus, there was a degree of stability. Having said that, whenever a new initiative arose, the idea of setting up a mailing list emerged, yet no one considered how it functioned. The usual practice was that interested people wrote their email address on papers which circulated, and the person creating this mailing list would add all those people to it. As the technological requirements of ESF

are similar, we were interested in investigating how IT infrastructure evolves over time and how it is re-instantiated for the next ESF. Mailing lists were a transparent, regularly used, infrastructural component to support information exchange. Similarly, the language interpretation system became a common resource for activists to understand the discussions and to avoid ambiguities and misunderstandings in connection with the use of English as a common (foreign) language. Beside this, new mailing lists to coordinate their tasks effectively were continually established. Once the lifecycle of these working groups' ends, the associated mailing lists tend to be inactive. The language interpretation system as an important infrastructure for the ESF event itself was developed in ESF 2006 and reused in 2008, albeit less successfully. Visualisation tools to illustrate the composition of participants, organisations and topics were only used at the ESF 2002 in Paris. Other resources were more ephemeral, became obsolete, or lacked stability.

Thirdly, they are characterised by severe resource constraints, connected to the fact that those involved largely engaged in a voluntary capacity, although professional elements intervened occasionally. Involvement is primarily characterised by ideological and political commitments associated with activism, but activism in general is not well-resourced. This was evident in relation to the way in which learning about infrastructural matters was or was not done, and whether conventions of practice were established. Resource constraints were a factor when the infrastructure became *visible on breakdown*. For instance, the delay of the establishment of the 2010 website became a breakdown when financial reasons made it impossible to access and adjust the 2008 website and the 'OpenESF' tool to organise the process. Similarly, when some of the activists could not access the European mailing list, its importance became visible, and the problem was rectified. The contingent nature of commitments was evident in that activists working on the ESF would expect things like a website for each event where they could propose activities and find information about the event and would take for granted the work to bring this website alive. A major problem, however, was that no-one was interested in how to set this up. Indeed, the problem of motivating contribution in infrastructuring work has been identified and extensively discussed in Ribes and Finholt (2009), who show that tensions exist between individual and community; between development and maintenance, and between research and quality maintenance. In our case, it is tensions between participating communities that matter. It was difficult, as seen across Section 4, to establish and sustain clear conventions of practice in every respect. In other contexts, however, we have seen that infrastructural elements shaped and were shaped by conventions of practice. For instance, for the first ESF, the event website originated from the necessities of the logistical complexities of organising an ESF. Merging different and yet similar activities into one became an important aspect of ESF organisation to focus and strengthen the activities. The conventions for moderating the merging were supported and implemented on the websites of later events. Similarly, the experiences

during ESF 2004 where people felt the need for an additional, more open website led to the decision that there should be separate official websites and other collaborative websites to support the organisation process.

Lastly, they entail specific temporal and spatial constraints. Activists are very widely distributed in time and space. Infrastructures, in such circumstances, must have a *spatial and/or temporal reach*. Because the general tasks concerned with organising ESF events remained the same, sometimes the same websites were reused, extended, or re-developed with almost the same set of functionalities. A clear example concerning this refers to the event website that was dedicated to one specific event at a specific time and has the specific purpose of facilitating the logistics of this event. Similarly, collaborative websites were developed to help activist groups that may be distributed on national or even European levels to collaborate informally to prepare for their proposed activities in respective ESF events where these sites were operational.

5.2 **An infrastructuring perspective**

By using infrastructuring as an analytical focus, it becomes easier to look at even very heterogeneous ecosystems of people, technologies, and usages, and it also becomes easier to acknowledge activities that do not create usages directly but help to make usages possible. The results of our analysis show that the work in activist networks is relatively unique. Sometimes there is neither a continuous work practice nor a stable set of resources that would support updating and managing the necessary technological infrastructures. Furthermore, due to the discrete nature of the practices, activist networks have high and low points of participation and only in times of high participation is the need for technological infrastructure primary. The maintenance during these low points of interest is quite complex as few people are taking care of the infrastructure. As a result, reconfigurations are punctuated. There are times when very little happens and others when setting up the necessary infrastructure becomes a matter of urgency.

Equally, such networks have ultimately to be integrated with the available 'global' infrastructure of online tools and this entails negotiating their usages against the backdrop of an international setting. Infrastructuring may be influenced by the choices and preferences of volunteers as they come and go instead of solely facilitating organisational needs (de Carvalho et al., 2017a). Similarly, repeated efforts to find a suitable user infrastructure may hamper the maturity of IT artefacts, because new (unstable) artefacts emerge frequently. There are significant demands on collaborators who have to engage in bridging, assembling, and circumventing to make the infrastructure work (Erickson and Jarrahi, 2016). In order to succeed, T-Nomads need to develop infrastructural competence so to be able to artfully overcome emergent difficulties: they must become bricoleurs (Erickson and Sawyer, 2019; Sawyer et al., 2019).

The maintenance of the human infrastructure, which is itself responsible for the technological infrastructure is also quite challenging within such communities. The volunteers are backbone of social activist organisations and, as such, the human infrastructure is subject to constant changes. This requires a further layer of work to keep track of who is doing what for the community, as volunteers might be unable to engage in some of the community activities due to other commitments (Saeed et al., 2010). Again, this refers back to what Mark and Su (2010) call the interplay of technical, physical, and human infrastructure, in allusion to the embeddedness of the technical infrastructure within other social arrangements, which can affect nomadic practices. Supporting an effective interplay between these infrastructures would be key for fostering the development of stronger and, to some extent, more stable nomadic cultures.

Overall, it can be said that infrastructuring in nomadic community of activist networks has some unique characteristics, as compared to previously studied work contexts, as depicted in Table 1. These characteristics can be summed up as involving sporadic bursts of activity; as being distributed across space and time, with fluid degrees of activity by a changing membership; as involving disparate and often local interests; as entailing diverse technological preferences and involving a high degree of reinvention. These characteristics are much less evident, we suggest, in stable organisational environments, and much less prevalent in individual work contexts.

The volunteer-based organisational structure and discontinuous organization of ESF hampered the emergence of a sustainable IT infrastructure (here web technologies: web sites, online forums, chat, email, mailing lists, etc.). In a situation with very limited resources, the experience, expertise, networking skills, willingness to learn and workloads of the individuals involved became the sources that framed the practice.

The knowledge transfer between the organisers of subsequent events suffered from different experiences and the perspectives individuals had on possible technology usages (Saeed et al., 2019). The volunteers tended to employ IT solutions based on their own technological preferences and experiences instead of responding to organisational requirements that could be derived from prior experiences. With the passage of time, old volunteers leave the process, and a new set of volunteers take over the responsibility to set up and maintain IT infrastructures without knowing the past history and experiences. The lack of evaluation of usages and effects of IT artefacts on practices resulted in immature IT artefacts, which, instead of helping, reduced the motivation of users. Often this dissatisfaction with IT infrastructure also reduced motivation among activists to include in learning processes about previous efforts to find and use available IT infrastructures. As a result, each time ESF activists had to start from scratch again and faced similar problems in (re)instantiating IT infrastructure.

Table 1. Infrastructuring in different work contexts

Category	Conventional business and governmental organisations	Non-standard forms of employments	Volunteer-based Communities	Nomadic Community of Activist Networks
Financial support	Continuously financed	Partially or not financed, based on personal resources	Not financed or project-based resources	No 'global' financed or project-based resources
Need	Continuous need	Continuous need	Continuous need	Sporadic bursts
Engagement	Continuous	Continuous	Continuous but with varying levels of interest and participation	Episodic, with significant 'bursts' of participatory activity
Responsibility	Usually, one department responsible for information infrastructures	Individually maintained	Many volunteer (groups of) people engaged, with some membership changes	Distributed (volunteer) (groups of) people, with large changes in membership over time.
Politics of technology	Strategy of the organisation is orientation	Personal strategy is orientation	Different interests and democratic orientation	Different interests and (local) hierarchies
IT selection process	More based on organisational requirements	More based on own technological preferences	Fairly consistent technological preference community members	Heterogeneous technological preferences
Technology transfer	Continuous use or more 'reuse'	Continuous use or more 'reuse'	Continuous use or more 'reuse'	More 'reinvention'
Key references	(Bietz et al., 2010; Bowker et al., 2010; Karasti and Baker, 2004; Karasti and Blomberg, 2018; Pipek and Wulf, 2009; Ribes and Finholt, 2009; Star and Bowker, 2002; Star and Ruhleder, 1996)	(de Carvalho, 2017a; Erickson and Jarrahi, 2016; Erickson et al., 2014; Gray et al., 2020; Humphry, 2014; Jarrahi et al., 2021; Mark and Su, 2010; Swayer et al., 2019; Rossitto et al., 2014)	(Bødker et al., 2016a, b; Goecks et al., 2008; Juris et al., 2008; Kim et al., 2014; McIver, 2004; Mcphail et al., 1998; Rohde, 2004; Voida et al., 2011; Wulf et al., 2013)	(de Carvalho et al., 2017b; Kavada, 2009; Saaed et al., 2010, 2011, 2019)

5.3 **Limitations**

As we have pointed out, we are reanalysing data collected before the advent of some new information and communication technologies associated with Web 2.0. It is possible that these technologies might again alter the landscape we describe. However, as yet, we have no evidence with which to assess the way in which they, putatively, might be used in development work since there appear to be no examples as yet in the literature.

Further, we did not conceive our task as being essentially theoretical (in any strong sense) but rather attempt to bring to bear a case study which demonstrates some unusual features. In so doing, we suggest that any typology of nomadicity needs additional nuance.

Our focus has been very much on the development of the sociotechnical infrastructure for the purposes of dispersed activists. As we have pointed out, these activists can be viewed as one unusual kind of T-Nomad, as they move across different locations, finding and using the resources necessary for their activist work. Our interest was limited, however, to the infrastructuring work that had to take place in support. We have not, therefore, paid attention to the way in which the infrastructures are used while ESF meetings were subsequently taking place. That, in itself, is an interesting topic but it falls beyond of the scope of this article.

6 Conclusions

In this article, we have introduced an in-depth study of the nomadic practices to be found in social activist communities and highlighted the challenges in maintaining sustainable human and technological infrastructures for such practices. Our application field came to life as a part of the WSF movement, an initiative started by thousands of social activists working against globalisation at Porto Alegre, Brazil, in 2001, and ramified in different regional and thematic forums with independent organising processes, as the ESF. Our objective here was hence to highlight the challenges in sustaining information infrastructures for social activist (volunteer) organisations. To our knowledge, this has not been the subject of previous work in CSCW.

We focused particularly on problems faced in finding the relevant components of human and technological infrastructures of the community at the time of need, which provided challenges to design and appropriate sustainable information infrastructures. For that we introduced findings from a long-term study of the infrastructuring practices in the ESF and articulated their connections with existing conceptions of 'infrastructure' (Star and Bowker, 2002; Bowker and Star, 1999; Star and Ruhleder, 1996), along with Mark and Su's (2010) findings on the relevance of making infrastructure visible for people engaged in nomadic practices and Erickson and colleagues' arguments about

the relevance of infrastructural competence for the sustainability survival of nomadic initiatives (Erickson and Jarrahi, 2016; Erickson and Sawyer, 2019; Sawyer et al., 2019). In so doing, we draw attention to a continuum of practices in which the specific features of a constrained resource in distributed community of volunteers form a distinctive point between the tradition organisational context and that of the individual nomadic worker.

As discussed by Gray et al. (2020), theorisations on nomadicity should not rely on binary understandings and move away from 'essentialist' definitions of place and time to 'processual' definitions that highlight the emergent, dynamic, relational, and progressive nature of nomadic practices (cf. de Carvalho, 2014). We argue that, in order to foster and sustain cultures of this kind it is necessary to pay attention to the issues of infrastructure and infrastructuring which arise in situations which are episodic and hence characterised by bursts of activity, where resource availability, both human and technical, is endlessly mediated, and where local and global interests do not always align (Rossitto et al., 2017). These tensions, we suggest, continue to exist, regardless of the particular technical facilities that are – in principle – available and are negotiated and overcome through corollary work.

Furthermore, we argue that elaborating design methods to support the re-instantiation of such community infrastructures constitutes potential support for such nomadic culture. This is a potential new direction for research on technologically mediated nomadicity and the nomadic cultures emerging from the popularisation of such practices, which we want to pursue.

Our contribution draws attention to relevant issues concerning the corollary work necessary for the organisation of large and complex collaborative nomadic events, where people from different parts of the world congregate to work together on a cause. It can therefore inform people who would like to design collaborative technology to support the organisation of such events or engage in it. The key factor for using Star and Bowker's (2002) categorisation of what makes a technology an infrastructure is that it focuses not on the availability of technological devices and their interconnections or on the development and differentiation of functionality, but on the framing conditions that lead users to depend on a compound of technologies. They point out that although an infrastructure may be 'global', these dependencies form at a local level. And although it is the domain of engineering practices to provide the technological network, it is a heterogeneous group of actors including programmers, administrators, moderators, and end-users whose (often 'only' social) activities lead to formation of the infrastructural relation between users and technologies.

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References

Bechky, Beth A. (2003). Sharing meaning across occupational communities: The transformation of understanding on a production floor. *Organization Science*, vol. 14, no. 3, May – June 2003, pp. 312–330.

Bechky, Beth A. (2006). Gaffers, gofers, and grips: Role-based coordination in temporary organizations. *Organization Science*, vol. 17, January – February 2006, no. 1, pp. 3–21.

Bietz, Matthew J.; Eric P. S. Baumer; and Charlotte P. Lee (2010). Synergizing in Cyberinfrastructure Development. *Computer Supported Cooperative Work (CSCW)*, vol. 19, nos. 3–4, August 2010, pp. 245–281. https://doi.org/10.1007/s10606-010-9114-y.

Bjögvinsson, Erling; Pelle Ehn; and Per-Anders Hillgren (2012). Design things and design thinking: contemporary participatory design challenges. *Design Issues*, vol. 28, no. 3, July 2012, pp. 101–116. https://doi.org/10.1162/DESI_a_00165.

Bødker, Susanne; Henrik Korsgaard; Peter Lyle; and Joanna Saad-Sulonen (2016a). Happenstance, strategies and tactics: Intrinsic design in a volunteer-based community. In *NordiCHI'16: Proceedings of the 9th Nordic Conference on Human-Computer Interaction, Gothenburg, Sweden, 23–27 October 2016.* New York: ACM Press. https://doi.org/10.1145/2971485.2971564.

Bødker, Susanne; Henrik Korsgaard; and Joanna Saad-Sulonen (2016b). 'A Farmer, a place and at least 20 members' the development of artifact ecologies in volunteer-based communities. In *CSCW'16: Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing, San Francisco, California, USA, 27 February – 2 March 2016.* New York: ACM Press, pp. 1142–1156. https://doi.org/10.1145/2818048.2820029.

Bogdan, Cristian; Chiara Rossitto; Maria Normark; Pedro Jorge Adler; and Kerstin Severison-Eklundh (2006). On a Mission without a Home Base: Conceptualizing Nomadicity in Student

Group Work. In P. Hassanaly, T. Herrmann, G. Kunau; and M. Zacklad (eds): *Proceedings of the 2006 conference on Cooperative Systems Design: Seamless Integration of Artifacts and Conversations - Enhanced Concepts of Infrastructure for Communication, 18 May 2006.* Amsterdam, Netherlands: IOS Press, pp. 23–38.

Bowker, Geoffrey C.; Karen Baker; Florence Millerand; and David Ribes (2010). Toward Information Infrastructure Studies: Ways of Knowing in a Networked Environment. In J. Hunsinger, L. Klastrup; and M. Allen (eds): *International Handbook of Internet Research*. Dordrecht, Netherlands: Springer, pp. 97–117. https://doi.org/10.1007/978-1-4020-9789-8.

Bowker, Geoffrey C.; and Susan Leigh Star (1999). *Sorting Things Out: Classification and Its Consequences*. Cambridge, MA, MIT press.

Braun, Virginia; and Victoria Clarke (2012). Thematic Analysis. In H. Cooper; P. M. Camic; D. L. Long; A. T. Panter; D. Rindskopf; and K. J. Sher (eds): *APA Handbook of Research Methods in Psychology, Vol 2. Research Designs: Quantitative, Qualitative, Neuropsychological, and Biological*, pp. 57–71. Washington, DC: American Psychological Association. https://doi.org/10.1037/13620-004.

Bryman, Allan (2008). *Social Research Methods*. 3rd ed. New York: Oxford University Press.

Busnel, Yann; Nuno Cruz; Denis Gillet; Adrian Holzer; and Hugo Miranda (2013). Reinventing mobile community computing and communication. In *TrustCom'13: Proceedings of the 2013 12th IEEE International Conference on Trust, Security and Privacy in Computing and Communications, Melbourne, Australia, 16–18 July 2013.* Washington, DC: IEEE Computer Society, pp. 1450–1457. https://doi.org/10.1109/TrustCom.2013.175.

Ciborra, Claudio U.; and Ole Hanseth (2000). From Control to Drift. In C. U. Ciborra; K. Braa; A. Cordella; B. Dahlbom; A. Failla; O. Hanseth; V. Hepsø; J. Ljungberg; E. Monteiro; and K. A. Simon (eds): *From Control to Drift – The Dynamics of Corporate Information Infrastructures*. New York: Oxford University Press, pp. 1–11.

Ciolfi, Luigina; and Aparecido Fabiano Pinatti de Carvalho (2014). Work Practices, Nomadicity and the Mediational Role of Technology. *Computer Supported Cooperative Work (CSCW)*, vol. 23, no. 2, April 2014, pp. 119–136, https://doi.org/10.1007/s10606-014-9201-6.

Creswell, John W. (2007). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. 2nd ed. Thousand Oaks: SAGE.

de Carvalho, Aparecido Fabiano Pinatti (2013). *Technologically-mediated Nomadicity in Academic Settings: Tm-N as a Dynamic and Emergent Process.* PhD Dissertation. Limerick: University of Limerick, Department of Computer Science and Information Systems.

de Carvalho, Aparecido Fabiano Pinatti (2014). Collaborative Work and Its Relationship to Technologically-Mediated Nomadicity. In C. Rossitto; L. Ciolfi; D. Martin; and B. Conein (eds): *COOP'14: Proceedings of the 11th International Conference on the Design of Cooperative Systems*, *Nice, France, 27–30 May 2014.* Cham: Springer, pp. 209–224. https://doi.org/10.1007/978-3-319-06498-7_13.

de Carvalho, Aparecido Fabiano Pinatti (2021). Thematic Analysis for Interactive Systems Design: A Practical Exercise. In *ECSCW'21: Proceedings of 19th European Conference on Computer-Supported Cooperative Work, Zurich, Switzerland, 7–11 June 2021.* European Society for Socially Embedded Technologies. https://doi.org/10.18420/ecscw2021_wsmc06.

de Carvalho, Aparecido Fabiano Pinatti; Luigina Ciolfi; and Breda Gray (2011). The Making of Nomadic Work: Understanding the Mediational Role of ICTs. In M. M. Cruz-Cunha; and F. Moreira (eds): *Handbook of Research on Mobility and Computing: Evolving Technologies and Ubiquitous Impacts*. Hershey, PA: IGI Global, pp. 381–396.

de Carvalho, Aparecido Fabiano Pinatti; Luigina Ciolfi; and Breda Gray (2017a). Detailing a Spectrum of Motivational Forces Shaping Nomadic Practices. In *CSCW'17: Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing, Portland,*

Oregon, USA, 25 February – 1 March 2017. New York: ACM Press, pp. 962–977. https://doi.org/10.1145/2998181.2998313.

de Carvalho, Aparecido Fabiano Pinatti; Saqib Saeed; Christian Reuter; and Volker Wulf (2017b). The Role of Technological Infrastructure in Nomadic Practices of a Social Activist Community. *International Reports on Socio-Informatics (IRSI)*, vol. 14, no. 3, pp. 41–47.

DiSalvo, Carl; Andrew Clement; and Volkmar Pipek (2013). Participatory Design For, With, and By Communities. In J. Simonsen; and T. Robertson (eds): *International Handbook of Participatory Design*. Oxford: Routledge, pp. 182–209.

Dourish, Paul (1999). Software infrastructures. In M. Beaudouin-Lafon (ed): *Computer Supported Cooperative Work*. Chichester, New York, Weinheim, Brisbane, Singapore, and Toronto: John Wiley & Sons.

Edwards, Paul N.; Steven J. Jackson; Geoffrey C. Bowker; and Robin Williams (2009). Introduction: An Agenda for Infrastructure Studies. Journal of the Association for Information Systems (JAIS), vol. 10, no. 5, pp. 364–374.

Ellingsen, Gunnar; and Eric Monteiro (2003). A Patchwork Planet Integration and Cooperation in Hospitals. *Computer Supported Cooperative Work (CSCW)*, vol. 12, no. 1, February 2003, pp. 71–95. https://doi.org/10.1023/A:1022469522932.

Erickson, Ingrid; and Mohammad H. Jarrahi (2016). Infrastructuring and the Challenge of Dynamic Seams in Mobile Knowledge Work. In *CSCW '16: Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing, San Francisco, California, USA, 27 February – 2 March 2016.* New York: ACM Press, pp. 1321–1334. https://doi.org/10.1145/2818048.2820015.

Erickson, Ingrid; Mohammad H. Jarrahi; Leslie Thomson; and Steve Sawyer (2014). More than Nomads: Mobility, Knowledge Work, and Infrastructure. EGOS 2014 Subtheme 52: Mobile Work, Technology, and Issues of Control. http://www.jarrahi.com/publications/EGOS_Erickson_Subtheme52.pdf. Accessed 13 Mai 2022.

Erickson, Ingrid; Deepti Menezes; Raghav Raheja; and Thanushree Shetty (2019). Flexible Turtles and Elastic Octopi: Exploring Agile Practice in Knowledge Work. *Computer Supported Cooperative Work (CSCW)*, vol. 28, nos. 3–4, June 2019, pp. 627–653. https://doi.org/10.1007/s10606-019-09360-1.

Erickson, Ingrid; and Steven Sawyer (2019). Infrastructuring as bricolage: Thinking like a contemporary knowledge worker. In M Kornberger; G.C. Bowker; J. Elyachar; A. Mennicken; P. Miller; J.R. Nucho; and, N. Pollock (eds): *Thinking Infrastructures*. Bingley: Emerald Publishing Limited, pp. 321–334. https://doi.org/10.1108/S0733-558X20190000062020.

Farooq, Umer; Cecelia B. Merkel; Heather Nash; Mary Beth Rosson; John M. Carroll; and Lu Xiao (2005). Participatory Design as Apprenticeship: Sustainable Watershed Management as a Community Computing Application. In *HICSS'05: Proceedings of the 39th Hawaii International Conference on System Sciences, Big Island, Hawaii, 3–6 January 2005.* Washington, DC: IEEE Computer Society; pp. 178c. https://doi.org/10.1109/HICSS.2005.485.

Fischer, Joel E.; Enrico Costanza; Sarvapali D. Ramchurn; James Colley; and Tom Rodden (2014). Energy Advisors at Work: Charity Work Practices to Support People in Fuel Poverty. In *UbiComp'14: Proceedings of the 2014 ACM International Joint Conference on Pervasive and Ubiquitous Computing, Seattle, Washington, 13–17 September 2014.* New York: ACM Press, pp. 447–458.

Fuster Morell, M. (2010). Participation in Online Creation Communities: Ecosystemic Participation? In *JITP'10: Proceedings of the Journal of Information Technology and Politics Conference: Politics of Open Source*, Amherst, Massachussets, USA, 6–7 May 2010. Taylor & Francis, pp. 270–295.

Goecks, Jeremy; Amy Voida; Stephen Voida; and Elizabeth D. Mynatt (2008). Charitable technologies: Opportunities for collaborative computing in nonprofit fundraising. In *CSCW'08:*

Proceedings of the 2008 ACM Conference on Computer Supported Cooperative Work, San Diego, CA, USA, 8–12 November 2008. New York: ACM Press, pp. 689–698.

Gray, Breda; Luigina Ciolfi; and Aparecido Fabiano Pinatti de Carvalho (2020). *Made to Work: Mobilising Contemporary Worklives*. Abingdon, and New York: Routledge.

Guba, Egon G. (1981). Criteria for Assessing the Trustworthiness of Naturalistic Inquiries. *Educational Communication and Technology Journal (ECTJ)*, vol. 29, no. 2, Summer 1982, pp. 75–91.

Hanseth, Ole; and Nina Lundberg (2001). Designing Work Oriented Infrastructures. *Computer Supported Cooperative Work (CSCW)*, vol. 10, nos. 3–4, September 2001, pp. 347–372. https://doi.org/10.1023/A:1012727708439.

Hemsley, Jeff; Ingrid Erickson; and Mohammad H. Jarrahi (2020). Digital Nomads, Coworking, and Other Expressions of Mobile Work on Twitter. *First Monday*, vol. 25, no. 3, pp. 1–22.

Hine, Christine M. (2000). *Virtual Ethnography*. London: Sage Publications.

Hughes, Thomas (1983). *The Networks of Power: Electrification in Western Society, 1880–1930*. Baltimore, and London: The Johns Hopkins University Press.

Humphry, Justine (2014). Officing: Mediating Time and the Professional Self in the Support of Nomadic Work. *Computer Supported Cooperative Work (CSCW)*, vol. 23, no. 2, April 2014, pp. 185–204. https://doi.org/10.1007/s10606-013-9197-3.

Jarrahi, Mohammad H.; and Sarah B. Nelson (2018). Agency, sociomateriality, and configuration work. *Information Society*, vol. 34, no. 4, pp. 244–260. https://doi.org/10.1080/01972243.2018.1463335.

Jarrahi, Mohammad H.; Sarah B. Nelson; and Leslie Thomson (2017). Personal Artifact Ecologies in the Context of Mobile Knowledge Workers. *Computers in Human Behavior*, vol. 75, October 2017, pp. 469–483. https://doi.org/10.1016/j.chb.2017.05.028.

Jarrahi, Mohammad H.; Gemma Newlands; Brian Butler; Saiph Savage; Christoph Lutz; Michael Dunn; and Steve Sawyer (2021). Flexible work and personal digital infrastructures. *Communications of ACM*, vol. 64, no. 7, July 2021, pp. 72–79.

Juris, Jeffrey; Giuseppe Caruso; and Lorenzo Mosca (2008). Freeing Software and Opening Space: Social Forums and the Cultural Politics of Technology. *Societies Without Borders*, vol. 3, no. 1, pp. 96–117. https://doi.org/10.1163/187219108X256235.

Karasti, Helena (2014). Infrastructuring in participatory design. In *PDC'14: Proceedings of the 13th Participatory Design Conference: Research Papers - Volume 1, Windhoek, Namibia, 6–10 October 2014*. New York: ACM Press, pp. 141–150. https://doi.org/10.1145/2661435.2661450.

Karasti, Helena; and Karen S. Baker (2004). Infrastructuring for the long-term: ecological information management. In *HICSS'04: Proceedings of the 37th Annual Hawaii International Conference on System Sciences, Big Island, Hawaii, USA, 5–8 January 2004*. Washington, DC: IEEE Computer Society. https://doi.org/10.1109/HICSS.2004.1265077.

Karasti, Helena; and Jeanette Blomberg (2018). Studying Infrastructuring Ethnographically. *Computer Supported Cooperative Work (CSCW)*, vol. 27, no. 2, April, 2018, pp. 233–265. https://doi.org/10.1007/s10606-017-9296-7.

Karasti, Helena; Volkmar Pipek; and Geoffrey C. Bowker (2018). An Afterword to 'Infrastructuring and Collaborative Design'. *Computer Supported Cooperative Work (CSCW)*, vol. 27, no. 2, April 2018, pp. 267–289. https://doi.org/10.1007/s10606-017-9305-x.

Kavada, Anastasia (2009). Email lists and the construction of an open and multifaceted identity: the case of the London 2004 European Social Forum. *Information, Communication & Society*, vol. 12, no. 6, pp. 817–839. https://doi.org/10.1080/13691180802304854.

Kim, Sunyoung; Jennifer Mankoff; and Eric Paulos (2014). *Reflecting the Current Practices of Technology Use in Volunteer Data Collection Activities on the Opportunities of Mobile Technology*. Technical Report no. CMU-HCII-14-107. Pittsburgh, PA: Carnegie Mellon University, School of Computer Science, Human-Computer Interaction Institute.

Koch, Tina (1994). Establishing Rigour in Qualitative Research: The Decision Trail. *Journal of Advanced Nursing*, vol. 19, no. 5, May 1994, pp. 976–986. https://doi.org/10.1111/j.1365-2648.1994.tb01177.x.

Krüger, Max; Anne Weibert; Debora De Castro Leal; Dave Randall; and Volker Wulf (2021). "What is the Topic of the Group, Please?" On Migration, Care and the Challenges of Participation in Design. *Proceedings of the ACM on Human-Computer Interaction*, vol. 5, no. CSCW2, October 2021, pp. 1–29. https://doi.org/10.1145/3476050.

Le Dantec, Christopher A.; and Carl DiSalvo (2013). Infrastructuring and the formation of publics in participatory design. *Social Studies of Science*, vol. 43, no. 2, February 2013, pp. 241–264. https://doi.org/10.1177/0306312712471581.

Lee, Ahreum; Austin L. Toombs; Ingrid Erickson; David Nemer; Yu-Shen Ho; Eunkyung Jo; and Zhuang Guo (2019). The social infrastructure of Co-spaces: Home, work, and sociable places for digital nomads. *Proceedings of the ACM on Human-Computer Interaction*, vol. 3, no. CSCW, November 2019, pp. 1–23. https://doi.org/10.1145/3359244.

Lee, Charlotte P.; and Kjeld Schmidt (2018). A Bridge Too Far?: Critical Remarks on the Concept of 'Infrastructure' in Computer-Supported Cooperative Work and Information Systems. In V. Wulf: V. Pipek: M. Rohde: G. Stevens; and D. Randall (eds): *Socio-Informatics: A Practice-based Perspective on the Design and Use of IT Artifacts*. Oxford, UK: Oxford University Press, pp. 177–218.

Liegl, Michael (2014). Nomadicity and the Care of Place - On the Aesthetic and Affective Organization of Space in Freelance Creative Work. *Computer Supported Cooperative Work (CSCW)*, vol. 23, no. 2, April 2014, pp. 163–183. https://doi.org/10.1007/s10606-014-9198-x.

Mark, Gloria; and Norman M. Su (2010). Making Infrastructure Visible for Nomadic Work. *Pervasive and Mobile Computing*, vol. 6, no. 3, June 2010, pp. 312–323. https://doi.org/10.1016/J.PMCJ.2009.12.004.

McIver, William J. (2004). Tools for Collaboration between Transnational NGOs: Multilingual, Legislative Drafting. *Proceedings of International Colloquium on Communication and Democracy: Technology and Citizen Engagement*, *Fredericton, New Brunswick, Canada*, *4–6 August*. National Research Council Canada.

Mcphail, Brenda; Terry Costantino; David Bruckmann; and Andrew Clement (1998). CAVEAT Exemplar: Participatory Design in a Non-Profit Volunteer Organisation. *Computer Supported Cooperative Work (CSCW)*, vol. 7, nos. 3–4, September 1998, pp. 223–241. https://doi.org/10.1023/a:1008631020266.

Meyerson, Debra; Karl E. Weick; and Roderick M. Kramer (1996). Swift trust and temporary groups. In R. M. Kramer; and T. R. Tyler (eds): *Trust in organizations: Frontiers of theory and research*. Thousand Oaks, London, and New Delhi: Sage Publications, pp. 166–195.

Morrow, Susan L. (2005). Quality and Trustworthiness in Qualitative Research in Counseling Psychology. Journal of Counseling Psychology, vol. 52, no. 2, pp. 250–260. https://doi.org/10.1037/0022-0167.52.2.250.

Pilemalm, Sofie (2002). *Information Technology for Non-Profit Organisations: Extended Participatory Design of an Information System for Trade Union Shop Stewards*. PhD Dissertation. Linköping: Linköping University, Department of Computer and Information Science, MDALAB - Human Computer Interfaces.

Pini, Barbara; Kerry Brown; and Josephine Previte (2004). Politics and identity in cyberspace: A case study of Australian women in agriculture online. In W. van de Donk; B. D. Loader; P. G. Nixon; D. Rucht (eds): *Cyberprotest: New Media, Citizens and Social Movements*. London, and New York: Routledge, pp. 259–275.

Pipek, Volkmar; and Volker Wulf (2009). Infrastructuring: Toward an Integrated Perspective on the Design and Use of Information Technology. Journal of the Association for Information Systems (JAIS), vol. 10, no. 5, pp. 447–473. https://doi.org/10.17705/1jais.00195.

Pipek, Volkmar; Volker Wulf; and Aditya Johri (2012). Bridging Artifacts and Actors: Expertise Sharing in Organizational Ecosystems. *Computer Supported Cooperative Work (CSCW)*, vol. 21, nos. 2–3, June 2012, pp. 261–282. https://doi.org/10.1007/s10606-011-9138-y.

Ribes, David; and Thomas A. Finholt (2009). The long now of infrastructure: Articulating tensions in development. *Journal of the Association for Information Systems (JAIS)*, vol. 10, no. 5, May 2009, pp. 375–398. https://doi.org/10.17705/1jais.00199.

Rohde, Markus (2004). Find what binds. Building Social Capital in an Iranian NGO Community System. In M. Huysman; and V. Wulf (eds): *Social Capital and Information Technology*. Cambridge, MA: MIT Press, pp. 75–112.

Rossitto, Chiara (2009). *Managing Work at Several Places: Understanding Nomadic Practices in Student Groups*. PhD Dissertation. Stockholm: Stockholm University, KTH Computer Science and Communication Department.

Rossitto, Chiara; Cristian Bogdan; and Kerstin Severinson-Eklundh (2014). Understanding Constellations of Technologies in Use in a Collaborative Nomadic Setting. *Computer Supported Cooperative Work (CSCW)*, vol. 23, no. 2, April, 2014, pp. 137–161. https://doi.org/10.1007/s10606-013-9196-4.

Rossitto, Chiara; Aparecido Fabiano Pinatti; Luigina Ciolfi; Airi Lampinen; and Breda Gray (2017). Nomadic Cultures Beyond Work Practices. *International Reports on Socio-Informatics (IRSI)*, vol. 14, no. 3, pp. 5–14.

Rossitto, Chiara; and Kerstin Severison-Eklundh (2007). Managing Work at Several Places: A Case of Project Work in a Nomadic Group of Students. In *ECCE'07: Proceedings of the 14th European Conference on Cognitive Ergonomics, London, UK, 28–31 August 2007*. New York: ACM Press, pp. 45–51. https://doi.org/10.1145/1362550.1362562.

Rossitto, Chiara; and Airi Lampinen (2018). Co-Creating the Workplace: Participatory Efforts to Enable Individual Work at the Hoffice. *Computer Supported Cooperative Work (CSCW)*, vol. 27, no. 3–6, December 2018, pp. 947–982. https://doi.org/10.1007/s10606-018-9319-z.

Saeed, Saqib; Volkmar Pipek; Markus Rohde; Christian Reuter; Aparecido Fabiano Pinatti de Carvalho; and Volker Wulf (2019). Nomadic Knowledge Sharing Practices and Challenges: Findings from a Long-Term Case Study. IEEE Access, vol. 7, pp. 63564–63577. https://doi.org/10.1109/ACCESS.2019.2916903.

Saeed, Saqib; Volkmar Pipek; Markus Rohde; and Volker Wulf (2010). Managing Nomadic Knowledge: A Case Study of the European Social Forum. In *CHI'10: Proceedings of the 28th International Conference on Human Factors in Computing Systems, Atlanta, Georgia, USA, 10–15 April 2010*. New York: ACM Press, pp. 537–546. https://doi.org/10.1145/1753326.1753406.

Saeed, Saqib; 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)*, vol. 20, October 2011, pp. 265–304. https://doi.org/10.1007/s10606-011-9144-0.

Sawyer, Steve; Ingrid Erickson; and Mohammad H. Jarrahi (2019). Infrastructural Competence. In J. Vertesi; D. Ribes; C. DiSalvo; Y. Loukissas; L. Forlano; D. K. Rosner; S. J. Jackson; Hanna R. Shell (eds): *digitalSTS: A Field Guide for Science & Technology Studies*. Princeton, NJ: Princeton University Press, pp. 267–279. https://doi.org/10.2307/j.ctvc77mp9.22.

Shenton, Andrew K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, vol. 22, no. 2, pp. 63–75. https://doi.org/10.3233/EFI-2004-22201.

Star, Susan L. (1999). The Ethnography of Infrastructure. American Behavioral Scientist, vol. 43, no. 3, pp. 377–391. https://doi.org/10.1177/00027649921955326.

Star, Susan L.; and Geoffrey C. Bowker, (2002). How to Infrastructure. In L. A. Lievrouw; and S. Livingstone (eds): *Handbook of New Media*. London: SAGE Publications, pp. 151–162.

Star, Susan L.; and Karen Ruhleder (1996). Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces. *Information Systems Research*, vol. 7, no. 1, March 1996, pp. 111–134. https://doi.org/10.1287/isre.7.1.111.

Stoll, Jennifer; W. Keith Edwards; and Elizabeth D. Mynatt (2010a). Interorganizational coordination and awareness in a nonprofit ecosystem. In *CSCW'10: Proceedings of the 2010 ACM Conference on Computer Supported Cooperative Work, Savannah, Georgia, USA, 6–10 February 2010.* New York: ACM Press, pp. 51–60. https://doi.org/10.1145/1718918.1718930.

Stoll, Jennifer; W. Keith Edwards; and Elizabeth D. Mynatt (2010b). Informal interactions in nonprofit networks. In *CHI'10: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Atlanta; Georgia, USA, 10–15 April 2010.* New York: ACM Press, p. 533. https://doi.org/10.1145/1753326.1753405.

Su, Norman M.; and Gloria Mark (2008). Designing for Nomadic Work. In *DIS'08: Proceedings of the 7th ACM conference on Designing Interactive Systems, Cape Town, South Africa, 25–27 February*. New York: ACM Press, pp. 305–314. https://doi.org/10.1145/1394445.1394478.

Sutherland, Will; and Mohammad H. Jarrahi (2017). The Gig Economy and Information Infrastructure: The Case of Digital Nomad Community. *Proceedings of the ACM on Human-Computer Interaction*, vol. 1, no. CSCW, November 2017, pp. 1–24. https://doi.org/10.1145/3134732.

Voida, Amy; Ellie Harmon; and Ban Al-ani (2011). Homebrew Databases: Complexities of Everyday Information Management in Nonprofit Organizations. In *CHI'11: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Vancouver, Canada, 7–12 May 2011*. New York: ACM, pp. 915–924. https://doi.org/10.1145/1978942.1979078.

Weiser, Mark (1991). The computer for the 21st century. *Scientific American*, vol. 265, no. 3, September 1991, pp. 94–104.

Winner, Langdon (1980). Do Artifacts Have Politics? *Daedalus*, vol. 109, Winter 1980, no. 1, pp. 121–136.

Wittel, Andreas (2000). Ethnography on the Move: From Field to Net to Internet. *Forum: Qualitative Social Research*, vol. 1, no. 1, January 2000. https://doi.org/10.17169/fqs-1.1.1131

Wulf, Volker; Konstantin Aal; Ibrahim A. Kteish; Meryem Atam; Kai Schubert; George P. Yerousis; Dave Randall; Markus Rohde; West Bank (2013). Fighting against the wall: Social media use by political activists in a Palestinian village. In *CHI'13: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Paris, France, 27 April – 2 May 2013.* New York: ACM Press, pp. 1979–1988. https://doi.org/10.1145/2470654.2466262.

Zargar, Mahmood S. (2013). Reusing or Reinventing The Wheel: The Search-Transfer Issue in Open Source Communities. In *ICIS'13: Proceedings of International Conference on Information Systems, Milano, Italy, 15–18 December*. Milan: Association for Information Systems, pp. 3365–3377.