

# **An Infrastructural Approach to Digital Ethnography: Lessons from the Manchester Infrastructures of Social Change Project.**

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## Introduction

In this chapter I outline how recent work on the anthropology of infrastructure can provide a particularly fruitful set of resources for framing and designing ethnographic analyses of digital technologies. This chapter aims to go beyond work that focuses on digital media practices and the way in which digital devices are given meaning and used by different social groups in order to draw attention to the material, ontological and relational qualities that are built into digital devices. Building on the work of the Infrastructures of Social Change group at the ESRC Centre for Socio-Cultural Change in Manchester, the chapter outlines the potential for developing an ethnographic approach to understanding the formation, circulation and use of digital infrastructural systems and their implications for social life.

The suggestions made in this chapter emerge largely from discussions that I had with an interdisciplinary group of colleagues at the University of Manchester who worked together from 2004 to 2014 at the ESRC Centre for Research on Socio-Cultural Change (CRESC). In the final three years of the centre, the group agreed to work under the heading ‘infrastructure of social change’ and a concerted effort was made to

explore the benefits that might accrue from researching social processes in terms of their manifestation as infrastructure, broadly defined.

People in the group<sup>1</sup> came from a variety of different social science and humanities backgrounds and were researching topics ranging from airports to roads, genomics to sport, urban redevelopment, migration and transformations in work. Many of us had worked at one time or another on issues associated with technologies of different kinds, from the role of information systems in framing business and management as a problem of knowledge, to the role of digital technologies in undoing the textual form of the book. In each of the projects that people had worked on, technological systems figured large. Members of the group were grappling with questions about how to analyse, ethnographically, databases of genetic information, to questions about how to study the technologies used to manage an airport, model a city or imagine future environmental change.

One of the reasons why technologies were so present in our discussions is that we were working to find a way of describing social change. A key preoccupation of the group was how to analyse social change through the deployment of qualitative, and in particular ethnographic methods, and, importantly to see change as inhering not just in social practices but also in the interplay between human and non-human forms. Although coming from diverse disciplinary backgrounds, the group was held together through a commitment to the insights that could be provided by ethnographically informed, deconstructive analyses of how change was generated in differentiated and technologized social worlds. To answer this question we collectively read and explored the work of Henri Bergson, Gilles Deleuze, Felix Guattari and Bruno

Latour<sup>ii</sup> – thinkers whose project of understanding social processes chimed with our own.

A turn to infrastructure was an attempt to concretise this set of discussions that had circled around the relative role of knowledge, information, technology, culture, materiality and embodiment in processes of social change. Thinking of the relationships we had been interrogating and tracing in our different research settings in terms of infrastructure, seemed to provide us with a means of tracking and tracing resonances, affinities and disjunctures across our different fieldsites. It offered the possibility of generating a description of contemporary social processes that kept open the possibility of difference. We tried hard not to resort to evoking the sweeping categories of more epochal accounts of social transformation: capitalism, neoliberalism, and modernity. We were wary of the silencing effect of analyses that emphasised broad historical claims about the nature and scale of social transformation and found that the question of what kind of infrastructures were at play in these different research sites seemed to offer a more nuanced, less prescriptive way of describing social change.

While we initially evoked infrastructure to describe a quality or form of relating that might be social, material or technological, another reason for using the language of infrastructure was its concreteness. Infrastructure offered not just an analytic device but also a presence in the world that was raising its own challenges for experts: engineers, policy makers, scientists and architects, charged with bringing infrastructures into being and making them work. Part of our turn to infrastructure was an attempt to open up a conversation with those who were producing concrete

infrastructural forms – roads, airports, pipelines, borders - in order to both learn from them how infrastructure operated as a site of social change, and to contribute to current political discussions through a comparative analysis of infrastructural relations ethnographically described. It was from both our internal discussions and our engagement with these practitioners and other scholars who had begun to analyse similar infrastructural projects<sup>iii</sup> that there emerged for us some key dynamics at play in the anthropology of infrastructure, which I draw attention to and unpack in this chapter as a means of informing digital ethnography. These are: Infrastructure and Politics, Infrastructure and Scale, and Infrastructural Analytics.

### 1. Infrastructural Relations and Politics

Ethnographies of digital technologies are often put forward as an antidote to more explicitly political analyses of digital devices and their implications. Technology is a powerful cultural imaginary (Marx 2010) and both the fear and the promise of digital technologies in particular risk stifling analysis, so caught up are they in political projects of different kinds. Much early enthusiasm for the internet for example was driven by libertarian promises of an emancipatory future that would be able to circumvent institutional structures and untether individuals from the controls of government by creating a new frontier where information could circulate and communities could form (Rheingold 1993). As with all frontiers, hot on the heels of this promise of freedom came the threat that this space would be colonised by capital and delimited by institutions of regulatory control. The initial freedoms of the Internet have been increasingly curtailed by the securitisation of online space by corporations and by governments in the name of protecting the customer from fraud, and shielding

the citizen from both digital and non-digital forms of violence (Coleman and Golub 2008).

Whilst this oscillation between libertarian ideals and the colonising tendencies of capital might be understood as a battle over competing ideologies, many scholars have asked whether there might be something particular to the relational principles of the digital that lends itself to mobilisation by these particular political imaginaries. As Dominic Boyer (2013) points out in his work on the digital transformations of journalism, political ideologies are not divorced from the particular circumstances in which they arise. Whilst the libertarian promise of new digital frontiers has precedent in prior political movements, it is not insignificant that it re-emerges and is refigured through the affordances of digital technological forms.

This is where ethnographic approaches to infrastructure offer some resources. Anthropological studies of infrastructure look at the way in which political relations emerge out of struggles with mundane matters of concern. Nikil Anand's (2010) recent work on the politics of water supply in Mumbai is a wonderful example of the way in which a close anthropological attention to situated battles for access to material resources can reveal the way in which distributions of responsibility between different kinds of social actors are established. Here the citizen and the state are shown to be remade through techniques of political negotiation that include technical practices of measurement, the normativity of appropriate forms of political participation, and the appearance (or not) of water as a material agent effecting possibilities for social and political life in Mumbai. Similarly the work that Penny Harvey and I (2015) conducted on road construction in Peru took roads as a

distributed object through which we could study the historical and contemporary formation and deformation of political relations. We found politics to inhere not only in ideological positions but also in expert practices, spatial imaginaries and issues of social responsibility that appeared when matter – mud, asphalt, sand and stones - were transformed and relocated.

What then would this look like when brought into the digital arena? Recent work on the sociology and anthropology of ‘big’ data provides a good example of how an infrastructural approach to digital politics might proceed. One of the capacities of digital technologies identified by anthropologists of the digital is their ability to produce, replicate and circulate data in ways that are qualitatively different to prior methods of information collection, distribution and retrieval (boyd and Crawford 2012). Struggles over appropriate uses of this data has opened up deeply contentious discussions about what data is, who it belongs to, and how it should be used (Gitelman 2013). From concerns over copyright and piracy (patent), to questions of privacy and international security (Amoore, 2011), the issue of who or what produces data, how this data circulates, and to what uses it is put constitute important sites of politics.

An ethnographic approach deriving from the anthropology of infrastructure aims to trace these issues, debates and controversies by investigating how they become manifest in relation to specific material configurations. A concern with international security would take as Louise Amoore (2011) has done, a specific database being developed, with a view to tracing, tracking and analysing the activities of citizens. It would explore the tensions around the practice of trying to derive, algorithmically the

probabilities of someone constituting a security risk. Approaching this as an ethnography of infrastructure would entail an investigation into the institutional, political and regulatory issues that are confronted in the formation of such a database, and the unforeseen consequences of such a database as it is put into use. It would look at how these unforeseen consequences are known and dealt with, the classificatory principles that are materialised in the structure and form of such an information system, and the means by which such a system is itself imbued with infrastructural qualities that allows it to 'stand for itself' (Wagner, 1986).

This act of tracing politics as it inheres in infrastructural forms poses some important challenges to ethnography. First is the sense of where the ethnographic field lies (Amit 2000). The focus on infrastructure rather than social group or community has the effect of both siting an ethnography in a concrete set of material relations that are demarcated by specific institutional, technological, material, regulatory and social contours. At the same time these relationships are often internationally distributed, historically embedded and at the same time located in particular places. The anthropology of infrastructure thus adds a nuance to Marcus' (1995) call for multi-sited ethnography, emphasising less the multi-sited quality of ethnographic research into infrastructural forms than the tendency of studies of infrastructure to force a reconsideration of what constitutes the 'sit-uatedness' of any field site. It is to this quality of sitedness and to the capacity of infrastructure to disrupt the anthropological concept of the field site that the next section turns.

## 2. Infrastructure and Scale: Beyond Structure and Agency

By virtue of their systemic, distributed and networked relationality, infrastructures necessarily exceed that which is materially present and draw attention to that which is not immediately visible. The very idea of infrastructure implies an inherently networked, distributed or systemic form of social and material organisation. Whilst infrastructures are encountered in day-to-day living, their systemic qualities always posit an extension beyond their tangible form, or indeed their diagrammatic representation. Once again the road is a good example of this. Roads are simultaneously things that are made, repaired, and travelled, and things that open up routes of imaginative connection to other places, from the village to the nation state to the transnational flows of goods and people from elsewhere.

Given that this extendable quality of the infrastructural form seems central to its contemporary manifestation as a social and political issue, this raises the question of just how and when material arrangements manifest this sense of extensivity. In order to consider the practices by which particular arrangements are able to flip into and out of an infrastructural mode, our group at CRESC invoked the idea that infrastructures are material arrangements which are not just tacking between the invisible and the invisible, but which manifest themselves in ‘vanishing points’.

The vanishing point is a concept used in geometry to refer to a particular effect in perspectival representation where lines converge into a point of disappearance.

Historians of art have located the vanishing point as the invention of the enlightenment, a technical advance that enabled the development of perspectival drawing (Jay 1988). With infrastructures often graphically represented in the perspectival style, the vanishing point seemed a particularly apt metaphor for thinking

about the relationship between the immediacy and extendibility of infrastructure. Certain infrastructural forms like roads, railways and electricity networks very literally produce the vanishing point as an ocular effect, with parallel lines disappearing into a indiscernible spot at the horizon. Moreover, infrastructures are often discussed in terms of their invisibility (Star and Ruhleder 1996). On the one hand infrastructures are frequently located underground or otherwise out of sight, something that is particularly the case with digital technologies whose material infrastructural basis is so obscured we have no difficulty imagining information as ‘floating’ in an ungrounded cloud (Starosielski 2015). At other times infrastructures exist as quite visible structures but remain unseen in that they are taken for granted. At other times they are only partially visible, accessible only from a particular vantage point or via a diagrammatic abstraction. This is particularly relevant when it comes to thinking about digital infrastructures because although the wires and cables that allow information transmission to occur are often invisible, the information they transmit is valuable precisely because it can be made visible in some kind of representational form. The promise of information depends on the capacity of digital devices to leave readable material traces that allow information to be captured, analysed and visualised in ways that were not previously possible. Information infrastructures are thus strangely invisible and hyper visible at the same time.

To understand this tension, the vanishing point is a useful notion. It allows us to pay attention to the particular way in which certain material formations – whether objects such as a computer, a faucet, a telephone, or an airport, a supermarket, or a road work - operate on the basis of systems of interconnectivity and technical operation that are rendered invisible by casings, containers, sockets and standards that work to hold

them in place, and at the same time open up to new images that remake the imagination in their unfolding.

In this respect, the vanishing point of infrastructural formations operates rather like what Sassen (2001) has called an ‘analytic borderland’, giving ‘discontinuities a terrain’ and preventing them from ‘being seen as mutually exclusive’ (Sassen, 2001: 17). Here in the concept of the vanishing point, the apparent discontinuities between matter and the imagination or the immediate and the extended are held together in a single moment. It is the vanishing points of infrastructural formations that draw forth questions about their extendibility, about what it is that holds them together, what we need to better visualise, and what kinds of relations are needed to effect their transformation.

To stay with the ocular metaphor, the concept of vanishing points also allows us to consider the relationship between infrastructure and positionality. Vanishing points are not simply a quality of a material arrangement itself, but are tied to the position of a viewer, altering as the subject position moves in relation to the infrastructural object. Travel along the road or the rail line and the vanishing point recedes into the distance. Dig up the ground where fibre-optic cables penetrate, or unpack their institutional affiliations and the vanishing points of these relations also shift. In this respect, the concept of the vanishing point can help us move beyond an overly fixed opposition between the seen and the unseen, the visible and the invisible, the located and the extensive. Instead, an attention to the vanishing points of digital infrastructure requires forces us to focus on the particular technologies, techniques and relations that enable an infrastructural imagination at any particular moment.

A final advantage of the notion of the vanishing point is that it allows us to move beyond a common trope that infrastructures only become visible when they fail (Star and Ruhleder, 1996). Whilst the breakdown of infrastructural systems is certainly a key political preoccupation it is not strictly true that the infrastructural only becomes visible at this moment of failure. Questions about the make-up of infrastructure might become that much more pertinent when they fail or when the spectre of their potential failure is put on the table, but what the work of the CRESC group has shown is that the appearance of infrastructure is not only a function of failure, but the manifestation of an attentiveness to the extendibility of the present and the immediate into broader systemic configurations (see also Knox, forthcoming).

By drawing attention not to the breakdown of infrastructure, but to their vanishing points it becomes possible then, to point to the way in which the infrastructural appears via a particular mode of attention, that is both indicative and formative of contemporary social relations. This raises questions about whether the ethnography of infrastructure does something more than simply expand the field sites that anthropologists pay attention to, and actually changes the nature of anthropological analysis itself. It is to this possibility of a transformation not only of the sites of anthropology but also the of analytic resources and theoretical assumptions that we as ethnographers deploy in our analysis of social relations that I turn in the final section.

### 3. Infrastructural Analytics

One of the implications of the discussion so far is that infrastructures are more than simply a historical or contemporary phenomena to which social scientists should attend if we are to understand the worlds in which we live. The qualities of infrastructure that I have touched on – their capacity to act as technologies of mediation, as sites for differentiation and as vanishing points, all point to the possibility that there may be a distinctive analytic stance that could derive from this attention to infrastructure. To suggest this is not entirely surprising in light of the history of infrastructural thinking in relation to digital technologies.

Susan Leigh-Star, a stalwart of analyses of systems of information, classification and technological organisation wrote, in 1996, a joint authored piece with Karen Ruhleder which was one of the first, and remains one of the most influential systematic analyses of infrastructures and their social function. In the article they set out a rationale for why an attention to infrastructure might provide a specific kind of analytic viewpoint on modern forms of social organisation. The central argument of this piece was that what was specific, unique and challenging about these information technologies was that they performed an *infrastructural* way of being in the world. What was significant was less that these technologies were self-evidently infrastructures, and more that they raised a broader set of questions for anthropological research about the qualities which rendered particular arrangements of people and things ‘infrastructural’. For Star and Ruhleder, infrastructure was not so much a thing to be defined - a particular set of relationships that fulfilled certain conditions. The question the ethnographer was encouraged to ask was not *what* is an infrastructure, but “*when* is an infrastructure?” (Star and Ruhleder 1996: 112).

This offers an instructive starting point for thinking about how the focus on infrastructure that we developed at CRESC might re-inflect an ethnographic attention to digital technologies. Much discussion within digital anthropology has centred on the question of the status of technologies themselves – what is the difference between online and offline, what is the digital, what is the difference between the virtual and the actual. For infrastructure studies to begin with the question not what is a digital infrastructure but *when* is a digital infrastructure immediately expands the ambition of digital anthropology from one of dividing the world up into a series of discrete sub-specialisms or multiple fieldsites, to the question of the power of relational assumptions that inhere in decisions about how to construct the world in which we live. The question ‘when is an infrastructure?’ draws attention to the work that the appeal to infrastructure does, and requires not that we go out looking for concrete infrastructures to study, but that we attend to the operations through which digital devices, technologies and material arrangements become ‘infrastructural’.

Let us consider this through the concrete example of smart meters, those digital devices that enable energy companies to continuously monitor energy use in people’s homes<sup>iv</sup>. In what sense might these devices be understood to be infrastructural?

Taking Star and Ruhleder’s definition of the infrastructure we might argue that it is only when a smart meter is installed, when the internet connection through which information from the smart meter is sent is up and running, when the databases and servers that collect information at the energy company are functioning and correctly configured, when the correct email address is used to contact the consumer about what their energy usage is and when the consumer reads and understands their bill that we can say that this set of relationships is operating in terms that fulfil Star and

Ruhleder's definition of the infrastructural. On the other hand, at the moment when the engineer who installs the meter is concentrating on getting it to attached to the wall, when the customer finds the glow from the energy display irritating and turns it around to face the wall, or when the heating engineer has to master the manual that describes how the digital rather than analogue meter works, the infrastructural qualities of the technology falls away.

Methodologically then, attending to infrastructure in Star and Ruhleder's terms is not about finding something that is or is not an infrastructure to study, but becoming aware of the way in particular arrangements of things can move in and out of an infrastructural mode of being. Digital technologies are not the only technologies that can perform this infrastructural move, but as their benefits are frequently associated with their capacity for connectivity, these infrastructural qualities often come to the fore in evaluations of their functional success or failure. An infrastructural analytic, then, is not just something that we can deploy as scholars, but something that we need to be aware of as a particular aspect of being in the world that characterises contemporary social relations.

### Conclusion: Ethnographic Challenges in the Anthropology of Digital Infrastructure

In this chapter I have outlined how a broadly infrastructural approach might be useful when conducting an ethnography of digital technologies. I end the chapter with two reflections on the challenges of such an approach. The first is about boundaries. All ethnographic research requires that some kind of boundaries become established around the object being studied. However the extensivity of infrastructural relations

can create problems for this kind of boundary work, making it at times difficult to design a project that has a logical set of limits. More work needs to be done on thinking methodologically about how as ethnographers we deal with the infrastructural relations described in this chapter. Is George Marcus' idea of multi-sited ethnography enough? What happens to the promise of ethnographic comparison in light of ethnographies of infrastructure? Do we move from comparative ethnography to an ethnography of global connectivity and if we do, then how do we retain an openness to difference in ways that does not just locate difference in the local, and universality in the techniques and forms of infrastructure itself. And lastly how do we manage the boundaries between ethnography of and ethnography through infrastructure? What kind of collaborative relationships might we need to forge as we work with interlocutors to co-produce understandings of more-than-human relationalities? Are there methods we can learn from the engineers and bricoleurs that develop infrastructural systems in order to develop new methods of infrastructural inversion – prototyping, experimentation, diagnostic tests, through which the project of ethnography might be expanded?

The second issue that this kind of approach raises is one of analytic distance. If infrastructure is the term that is deployed to describe the relational qualities inherent to technical systems, then does the deployment of the same terminology in framing an analytical stance close down the possibility of seeing the practices entailed in relation to any particular infrastructure in self-similar rather than self-differing ways? That is, does approaching roads, databases, oil pipelines, sewage systems, and communications networks as infrastructure, open up or close down the possibility of gaining a fresh anthropological perspective on the way in which these material

formations participate in social worlds? I would caution that a turn to infrastructure should be deployed only insofar as it is analytically and conceptually generative. It may be that alternative concepts – ferality (Tsing 2015), recursivity (Kelty 2008), friction (Tsing 2005), algorithmicity (Kockleman 2013), pre-emption (Anderson 2010) – will emerge from the study of infrastructure to create new resonances and lines of association and affinity through which we can continue to approach the social implications of distributed material processes.

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### Notes

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<sup>i</sup> The group was led by Penny Harvey and myself and during the time of discussions about infrastructure included Eleanor Casella, Adolfo Estalella, Jeanette Edwards, Gillian Evans, Gemma John, Yannis Kallianos, Christine Maclean, Damian O’Doherty, Annabel Pinker, Madeleine Reeves, Elizabeth Silva, Nick Thoburn, Kath Woodward, and Peter Wade.

<sup>ii</sup> Books that we collectively read included *Matter and Memory* (Bergson, 1912) *A Thousand Plateaus* (Deleuze and Guattari 1988), *Difference and Repetition* (Deleuze 1968), *Francis Bacon* (Deleuze 2003), *Cinema 1 and 2* (Deleuze 1986, 1989), *The Fold* (Deleuze 1993), *Reassembling the Social* (Latour 2005) and *An Enquiry into Modes of Existence* (Latour 2013)

<sup>iii</sup> For example Nikil Anand (2011) on water infrastructure, Brian Larkin (2008) on media infrastructure, Dominic Boyer and Cymene Howe (2016) Andrew Barry (2013) and Timothy Mitchell (2011) on energy infrastructures, Stephen Collier (2011) on cities and housing, and Casper Bruun-Jensen (2015) on environmental infrastructures.

<sup>iv</sup> Noortje Marres (2013) has also looked at the smart meter as an example of digital technologies that participate in the formation of contemporary social life.

## Abstract

This chapter outlines an approach to digital ethnography that emerges from the work of the Infrastructures of Social Change Research Group at the ESRC Centre for Research on Socio-Cultural Change at the University of Manchester. Building on the discussions of an interdisciplinary group of scholars working across anthropology, sociology, management and organization studies and continental philosophy at the University of Manchester, the chapter describes how infrastructures offer both a fruitful empirical focus and analytical resource for understanding contemporary processes of social change. The chapter outlines in particular how the infrastructural approach developed at CRESC might be deployed in the design of ethnographic research on digital infrastructures. It explores how the study of infrastructure provides a way of approaching a) the political qualities of technological relations b) the scaling capacity of infrastructures, and c) the analytical presuppositions contained in the description of infrastructural relations.

## Biographical Note

Hannah Knox is a Lecturer in Digital Anthropology and Material Culture at University College London. She has published widely on the anthropology of infrastructure, technology, environment, and expertise. Her books include *Objects and Materials: A Routledge Companion* (2013) and *Roads: An Anthropology of Infrastructure and Expertise* (2015).