Mapping the Mast (2014)

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Abstract

There is currently widespread popular, professional and academic interest in communications infrastructures, particularly with the material networks that enable our seemingly immaterial systems to function (Mattern, 2013a). For example, Andrew Blum's (2012) book *Tubes* takes us inside places like the former AT&T telephone exchange on 60 Hudson Street, New York, to reveal the overlooked physical stuff that comprises the internet. Similarly, Timo Arnall's recent film, *Internet Machine* (2014), reveals something of the 'cloud', in cloud computing, via a filmic tour of a giant *Telephonica* data-centre in Alcalá, Spain. These works echo a concern within media scholarship (Horst, 2013; Parks, 2010) for the materials and infrastructures of the "networked society" and the power relations that surround and shape the systems. In this article, I discuss how designers are contributing to the goal of "infrastructure literacy" (Mattern, 2013b) and report on a practice-research project that explores a contested mobile mast in Winchester, UK. The project responds to Parks' (2010) call to analyse mobile media networks by paying close attention to specific nodes in the network, local stories of development and the practices that surround mobile telecommunications infrastructure systems once they are activated.

<Figure 1>

Introduction

My interest in the mobile mast on Byron Avenue developed after reading Lisa Parks' (2010) *Around the Antenna Tree: The Politics of Infrastructure Invisibility*. In the article, Parks (2010) uses the uncanny sight of mobile masts disguised trees (Fig. 1) popping up in the American landscape, to ask what issues are revealed by the (attempted) concealment of communications infrastructure? As Parks (2010) points out, although it is necessary to make certain infrastructures invisible for the purposes of workable urban planning, one of the effects of this "infrastructural invisibility" is that citizens are kept quite naive about the systems surrounding them, that they rely upon, and subsidise. However, in a strange twist, these "trees", that are deliberately designed to be inconspicuous, have actually ended up becoming discursive focal points for various artists (such as the photographer Robert Voit) and citizen groups. Instead of blending into the background, these odd specimens have become a site for generating further public knowledge about wireless and other network systems (Parks, 2010). This prompts Parks (2010, n.p.) to ask how we might find other ways to "visualize and develop literacy about infrastructures and the relations that take shape through and around them". Which presents a compelling question for communication design, that is, how we might find ways to represent mobile masts and other infrastructures in a way that encourages citizens to participate in sustained discussions and decisions about ownership, development and access.

Literature Review

"Study a city and neglect its sewers and power supplies (as many have), and you miss essential aspects of distributional

justice and planning power (Latour and Hermant, 1988). Study an information system and neglect its standards, wires and settings and you miss equally essential aspects of aesthetics, justice and change. Perhaps if we stopped thinking of computers as information highways and began to think of them more as symbolic sewers, this realm would open up to us." (Star, 1999, p.379)

<Figure 2>

In focussing on mobile media infrastructure the project aligns with a broader shift in focus occurring within mobile communications research, that is, a turn towards analysing "stuff", or "things", which is described by Horst (2013) as a third wave of critical work. This third wave of research, aims to move beyond a traditional concern for users, consumption and meaning. Instead, it focuses on the "dynamics of power as they emerge through the technical, social, political, and regulatory infrastructures" (Horst, 2013, p.148). This concern to address physical things, or materials, as a part of the mix of social, cultural, political and economic practices in the study of communication technology, can be seen in tension with the way these technologies are often perceived. For example, when we make a call, or use the internet on our mobile phones, the infrastructure systems required to make this possible are rarely visible, we are only abruptly reminded of our dependence on these larger networks, when we pass under a bridge and lose signal. The very word 'mobile' implies unencumbered movement and freedom, in contrast with the fixed locational constraints of its predecessor, the land-line telephone. Commercial narratives reiterate this perception of the infrastructure network as invisible or immaterial, as exemplified in the advertisement for a mobile network in Figure 2. In this scene a child holds a device that emits cute little clouds that stand in for the reality of the vast, ramifying, material infrastructures that enable the physical portability of these mobile devices. (Mackenzie 2012 cited in Thrift, 2008, p.9).

<Figure 3>

These widely upheld tropes of immateriality are not new, as Blanchette (2011) describes, the myth is prevalent in the history of electronic communications dating back to the telegraph. Quoting Rosenheim (1997), the promise of the telegraph is described as a metaphysical one — "by the annihilation space and time, it allows humankind to escape physical limitations. The power and ubiquity of electricity networks are metaphorically attached to a newly disembodied consciousness" (Blanchette, 2011, p.3). Bringing the discussion into the digital era, he draws a connection with the emergence of networked computers, where we see a rise of similar discourses (Barlow, 1996), again providing further momentum to the idea of communications technology as unbound from the material world. In the context of internet connectivity, Mattern (2013a) citing Mackenzie (2010), describes a similar narrative at work. However, as Mackenzie (2010) points out, our wireless access to the network, via Wi-Fi, at work, home and school is neither as untethered, or ethereal as it seems. Being wireless, or "wirelessness", actually requires a vast amount of wires looping the globe and traversing underground through towns and cities.

Debunking what Timo Arnall (2013) describes as this 'myth of immateriality' surrounding communications infrastructure and technologies has become quite a popular territory for practice-led critical enquiries. These projects can broadly be described as attempts to counter the

consequences of a process that Cubitt (2014, p.1) outlines as, the "technologization of communication" from letter post to electronic network, that implies diminishingly visible communications channels with progressively greater influence in our everyday lives. In other words, these projects could be seen to aim at what Mattern (2013a) neatly summarises as "infrastructure literacy", that is, they attempt to enable us to see and better understand disappearing technologies that we are increasingly called to work with and are reliant upon. A number of these contemporary projects and texts concerned with a broader range of infrastructures can be found via the #stacktivism hashtag and blog (Figure 4) started by Jay Springett. In addition, Shannon Mattern's (2013a) *Infrastructural Tourism* article on the *Design Observer* website is also a useful resource for critical insight into similar art and design projects in the US and Europe. However, for this article the focus is on communication infrastructure and in the following section I discuss two projects that I felt represented two prevalent themes or directions in practice based enquiries that address the legibility of communication infrastructures.

<Figure 4>

The first theme of concern for practitioners is the visibility of communications infrastructure and technologies that we are so reliant upon. For Arnall (2014) this concern is framed in terms of the implications for interaction design practice and research. Specifically, he seeks to counter the notion that invisibility is an inevitable and desirable quality for ubiquitous computing, Human Computer Interaction (HCI), interface technologies and parts of interaction design. As an example of this 'invisibility', he points to the smooth surfaces of Apple iOS products that bear little relation to the technical infrastructures below and expresses a concern that all this smoothing over, or "black-boxing" of natural edges, seams, and the transitions that constitute technical systems, leads to a loss of agency for both designers and users (Arnall, 2014). In response, he posits the concept of "immaterials" to describe the invisible aspects of interface technologies such as radio-frequency identification (RFID) and aims for us to consider them as "compositional", that is, part of mix of physical materials in the design process. The concept also operates as a call to subject these "immaterials" to "investigation, exploration, and communication of technical and interactional phenomena" In other words; "for the opening up of black-boxes" Arnall (2014).

For Timo Arnall and collaborators Sneve Martinussen, Jørn Knutsen, Jack Schulze and Matt Jones working with these immaterials through interaction design practice research is the method that opens up or renders visible these technical systems. As an example, an output from their *Immaterials: Satellite Lamps* (2014) project is a film showing a series of large flickering spherical lights mounted on wooden tripods standing on city streets, that change brightness according to the accuracy of received signals from the invisible Global Positioning System (GPS) satellites overhead. The shimmering lights remind the viewer of the impact of the urban environment on the technology, the inconsistencies and what Chalmers et al (2003) calls "seams", in what is usually considered a ubiquitous and pervasive network . In the *Immaterials: WiFi Light Painting* (2011) project (Figure 5 and 6), a series of LED lights attached to a mast also respond to the Received Signal Strength of WiFi networks that permeate an urban environment. The subsequent long-exposure photographs of the mast being carried through the streets, reveal something of what Dunne and Raby (2001, p.26) call the "hertzian space" of devices, in environments, invisibly

communicating via electromagnetic radiation all around us. In both examples, the process of working with these immaterials seems to be a way to learn about their properties to inform future design work and counter the notion of technology as seamless and invisible by evidencing its materiality.

<Figure 5 and 6>

If the first theme concerns visibility and materiality of infrastructure, a second theme that emerges in textual and some practice-based enquiries into communication infrastructure is how these networks work for and against the networks of nation states. This topic is the focus of theorist Benjamin Bratton's (2014) *Stack* concept, derived from the modular layering of software infrastructure (Blanchette, 2011, p.9) and applied to describe different scales of "planetary computation", from vast global energy grids and urban software, through to self-quantification technologies. In keeping with the theme of legibility and mapping, he describes the stack as a schema, a hypothetical plan that attempts to make the composition of new structures of power "more legible and more effective". To put it another way, he has drawn up this conceptual tool to try to make sense of what is happening as modern states, territorial, legal and political run with and at times against the grain of the confluence of global material-information systems that comprise a Stack.

Bratton's (2014) interest in how infrastructures distort and deform traditional modes of political geography, jurisdiction, and sovereignty, is shared by Keller Easterling (2014), who describes the phenomena as "Extrastatecraft" (examples can be found on a website of the same name). In the context of communications or mobile media infrastructure, this theme is taken by critical engineer Julian Oliver's *Border Bumping* (2012) project. The project consists of, (amongst other outputs), a Border Bumping application that runs on a smartphone, collecting data on mobile masts and the location of the device as a user approaches, or crosses, national borders. Oliver was particularly interested in the moments of slippage, when a cellular device hops from one network to another, often crossing national borders before we do so ourselves. These moments of discrepancy, when one country's mobile network transgresses the national borders of neighbouring country are gleaned from the device and uploaded to a central "Border Bumping" server. The data sent by "agents" running the Border Bumping application was then used by Till Nagel and Christopher Pietsch to design and develop a map that plots redrawn national boundaries based on these moments of slippage between the national border and the borders of the mobile network (Figure: 7–9). In an early iteration of the project in the UK a caravan was re-purposed as a mobile cartography office with a touch screen interface inviting visitors to view the map as it is was updated with border deforming or bumping incidents. The on-going collection and rendering of these disparities results in a map that plots juxtaposed borders drawn by mobile networks and over those drawn by states.

<Figure 7, 8 and 9>

Although not comprehensive review of practice based projects in this subject area, I took the works by Arnall et al's (2014) and Oliver (2012) as an indication that a less well explored territory for addressing the visibility of technological infrastructures might be to pursue a more situated

account. That is, a study that focussed on a particular instantiation of the mobile media network, a specific mobile mast. This approach follows Parks' (2010) assertion that studies of infrastructure should adopt localised or "more node-centric and materialist approach" to open up the normally invisible fields of negotiation and the social-cultural and political issues enmeshed with these technological objects. As infrastructures tend to be innocuous and, on the surface at least, frankly rather boring, I began to trawl the internet for controversial pieces of infrastructure as a 'way in' to the project. This approach is informed by Madeline Akrich and Bruno Latour, two theorists that have concerned themselves with understanding or describing technical objects. As Latour (1987) puts it in his Rules of Method; "we either arrive before the facts and machines are black-boxed, or we follow the controversies that reopen them." (Latour, 1987, p.258). Or, as Akrich (1992, p.207) suggests, we need to find circumstances in which there is disagreement, negotiation and the potential for break down, so that adjustments between different actants are rendered visible. In the case of a technology such as the mobile phone mast, which would qualify as a "stabilized technology" Akrich (1992, p.211) points out it is vital that we study disputes, look at what happens when things go wrong. Fortunately I didn't have to look far for controversy, as my local town of Winchester played host to a lengthy 5 year dispute between the mobile operator and local residents concerning the siting of a mobile mast on Byron Avenue, which subsequently became the focus of my work.

Methodology and practice process

To approach the question of how to render visible the material, social and political issues that surround the mobile mast in Byron Road, my approach was a mix of practice and textual research. On the one hand I was keen to use design practice to get to grips with the affordances of mobile technology itself. On the other hand, I also utilised desk research to explore in more detail the relations enmeshed with the mobile infrastructure. The theoretical framework I used to guide my practice and understanding of this technical object was Bruno Latour's actor-network theory. As Law (1992, p.2) explains, actor-network developed as a theory to account for how scientific knowledge is produced from ordered networks of *both* social and technical 'bits and pieces' or actants. Of particular utility for this project, is Latour's (2005 p.114) definition of the actor-network as transforming a substance from a matter of fact to "matters of concern". From his perspective the network is a concept that recognizes dynamic interaction among actors, rather than a fixed organising structure and as methodological tool it should be seen as "a mode of inquiry that learns to list, at the occasion of a trial, the unexpected beings necessary for any entity to exist" (Latour's 2005, p.5). In other words, taking an actor-network perspective the mast represents a stable network of relations, my research process was then 'to follow the actors' or actants (Latour, 2005, p.12) and gather as much material as I could about the mast as an actant in a dynamic network of relations. To do this, I explored the dispute on Byron Avenue via news articles, planning regulations, and Government reports. Key to this research process was an extensive archive kept by local campaigner Karen Barratt, who also generously gave her time to be interviewed and discuss the protest. In this paper its not possible to cover the research process from beginning to end, instead I pull out a couple of interesting strands with most resonance for design / communication design. The first strand concerns how design was employed by the protesters against the siting of the mast and network operator. The second concerns the design of maps or the process of mapping

as an attempt to grasp the relations enmeshed with the mast and as an approach to understanding infrastructure in general.

DIY Tactics

An intriguing photograph in Lisa Gittelman's (2014) Holding Electronic Networks by The Wrong End shows a weathered wooden telephone pole punched with densely packed metal staples. As Gittelman describes, these rusting staples are all that is left of countless notices posted up by local residents to advertise yard sales, missing pets, election posters, advertisements for language lessons and laundry services. Notices with the bottom edge of the page cut like a fringe allow passers-by to tear off contact details. The leaflets, she explains, are rather like graffiti, a sort of trespass, "communications smuggled into public". The comparison is apposite, as Gittelman points out, fly-posting leaflets on telephone poles in the US is actually illegal under an anti-littering ordinance, so part of what is interesting about this image, is that the leaflets highlight a contrast between owners and others, the prescribed structural conditions of the urban environment and the array of "DIY tactics of everyday life by which people respond".

On reading the Gittelman (2014) article it became clear that a similar set of contrasts and tactics were operating at the site of the mast and subsequent protest on Byron Avenue. The residents and campaigners also adopted DIY tactics to oppose the siting of the infrastructure, putting up posters on the mast to draw attention to their campaign and communicate with each other. In contrast to its conventional role as an inconspicuous bit of communications infrastructure designed to blend into the environment, with its concealed radio equipment and dark green coloured paint. The campaigners turned the mast into an object of display, and in doing so, the mast itself became a form of communication. Also, the site of the mast itself became a gathering point for the residents, a place for vigils and a focus for protest practices, that included forming a human chain from the mast to the local primary school (Figures 10–13).

<Figure 10,11,12 and 13>

What I felt was interesting about the residents alternative uses for the site of the mast and their graphic interventions pinned to the mast itself, is that they raised the question of how these infrastructure sites and objects are articulated, or not. How should these technical objects in our environments be treated? Pretending they don't exist, or disguising them seemed to be at one end of a spectrum — and the protesters interventions pointed a way toward the other end, which would concern innovative ways to promote an understanding of these technologies and inform people about what they do and how they work. Taking Gittelman's (2014) article and the activities of the residents as a cue, I started to question through design practice how the infrastructure itself could become, as Parks (2010) puts it, a site for generating public knowledge about these systems and dialogue. In an attempt to start to materialize this question I produced a quick prototype mobile web application using cut and paste bits of jQuery Mobile code, far from a polished piece of design work this quite rudimentary sketch (Figure 14) served as a thought experiment to consider how mobile masts could become objects of display that demystify themselves. Very much in the spirit of the DIY tactics used by the residents a poster was put up near the mast and this would point mobile users to a web application that one could access via a smartphone to find out information about the

mast.

<Figure 14>

Although the outcome of this attempt to give form to the idea of infrastructure literacy and raise the visibility of the mast was very basic, I was able to draw insights from the design practice process about the technology. For example, the actual process of making a mobile application made apparent how different proprietary software and hardware infrastructures make for an incredible complex and difficult terrain to negotiate. Before arriving at the solution to produce an HTML based application and a simple URL posted on the mast, I had ploughed a lot of time into trying to use the location sensors and Near Field Communication stickers via MIT's App Inventor. However, in the end, I adopted a slightly more straight-forward approach as the non-compatible software and devices, proprietary operating systems and the constant tyranny of little or no backward compatibility began to hinder progress and energy. This practical experience of working with mobile media seemed to have resonances with Beer's (2013, p.24) account of Graham and Marvin's (2001) work on urbanism that identifies the city as a place increasingly reliant on complex, competing and at times incompatible infrastructures. In this sense the practice of design was useful in calling forth some of the issues concerning infrastructures that I perhaps wouldn't have reached without this practical engagement.

Mapping

The second strand I want to pull from the project concerns my attempt to map the infrastructure and the role that design could play in this endeavour. A key challenge to the mapping process is that access to communication infrastructure is not easy, as these systems are often tucked away, hidden from view and hard to reach. In this sense they are not entirely dissimilar to orbital space, the subject of Park's (2013) discussion of mapping, in which she points out that the communication networks that we are reliant upon have become quite remote both physically and intellectually. Therefore Parks (2013, p.62) suggests that struggles over these sorts of domains, such as networks, that are inaccessible and imperceptible to most people, must take place in the symbolic economy. Through processes of mapping and visualization techniques, she argues, we can begin to render these places intelligible within discourse.

Initially I approached the process of mapping the mast, via a listing of the assortment of 'things' or actants I had discovered through the resident's printed archive of press-cutting concerning the protest. This listing process follows Shannon Mattern's (2013a) description of Ian Bogost's text Alien Phenomenology and his discussion of "ontographs". Bogost (2012) defines ontographs as a way of describing the world, or general inscriptive strategy similar to that performed by a registrar, a way of cataloguing object relationships without necessarily offering clarification or description of any kind. He suggests the simplest approach to this task of "cataloguing things" and "the couplings of and chasms between them" (Bogost, 2012, p.50) is the composition of verbal and visual lists. Importantly, this simple ontographical method brings to attention that "things exist not only for us, but also for themselves and one another". In "a group of items loosely joined not by logic or power or use but by the gentle knot of the comma" (Bogost, 2012, p.51). My initial ontograph of the Byron Avenue mast is included below (Figure 16), along with a photographic record of the mast (Figure 17) and visual listings (Figure 15) of the various actors involved in the mast, which is also compiled on a

blog: byronavenue.wordpress.com/.

<Figure 15>

...Hampshire Constabulary,
Electro-magnetic radiation,
TimesOnline,
Winchester City Council,
Environmental Health News,
Charger,
Mast Sanity,
The Liberal Democrats,
Action Against Byron Avenue Mast,
Mobile Phone,
National Radiological Protection Board,
Caroline St.Leger Davey,
Orange Personal Communication Services Ltd.,
Office of Communication,
Diane Harrison,
Radio spectrum,
Battery,
Numbers,
Independent Expert Group on Mobile Phones,
Pulse,
Department of Health,
Voice,
Texts,
Health,
Microcell mast,
Contacts,
Wire,
The Town and Country Planning Act 1990,
Office of the Deputy Prime Minister,
Signal,
Julie Walters,
The Mid Hampshire Observer,
All Party Mobile Group,
Cell, Minutes,
The Planning Inspectorate,
Leigh Day and Co.,
Dr G Y Hyland,
Hampshire County Council,
The Court of Appeal,
McNicholas Construction Services,
Smartphone,
Calls,
Billing,
Microphone,
Microwave,
House prices,
Adam Homes Associates Limited,
Planning Inspector Martin Pike,
Deloitte and Touche,

Electricity,
Daily Echo,
MP Mark Oaten,
Karen Barratt,
Speaker,
Western Primary School,
Handset...

<Figure 16 and 17>

Once the mobile mast became the subject of a dispute, portions of the vast network of relations that it was a part of, became visible. As my attempts to map the mobile mast reveal, all kinds of people, objects and regulations and relations came into view at this point. Whereas before the dispute, all of these actants were the invisible parts of the "black-box" or mobile mast. In this regard, choosing a local site and protest was quite an effective approach. In particular, the fieldwork or primary research, I conducted that involved a process of engaging with the 'local' community, council and planning on one hand and the 'global' networks, operators and systems on the other hand - and looking at how they came together in the specific site and protest was potentially rich.

Returning to the actor-network theorists that initially guided my work, they understand power to be the product of a set of (strategy-dependent) relations rather than a possession (Wajcman, 2000, p.452). A key part of Latour's ANT thesis is the notion that actants become weaker or stronger as a result of their alliances, however in my verbal and visual mappings of the mast I found that it was more difficult to express those alliances or relations between the different actors. A feature of the Wordpress platform I was using to build the website was the requirement to split content into discrete fields of content and pages. In retrospect I question how I could have found a way to make these links or alliances between the different actants more explicit within the map, so that the relations were prioritised.

Conclusions

Beer (2013, p.23) drawing on Benjamin's (1999) The Arcades Project suggests that infrastructures can be viewed as material instantiations of wider social and political movements. This is a perception echoed by Dourish and Bell (2007, p.413), but they also highlight a second "experiential perspective" that calls to attention how embedded infrastructures shape individual actions and experience. Taking this as a cue, the central question this project asked was how to render visible that shaping, or to draw on actor network theory, how to account for the material artefacts of mobile media infrastructure and social, political economic issues alike (Lievrouw, 2014 p.27)? As discussed, this attempt to address the materiality of mobile media infrastructure is apposite when their status as infrastructure, the "technologization" of communication (Cubbitt, 2014, p1), myth of immateriality (Arnall, 2013) and commercial narratives seek to diminish the visibility of these material infrastructures.

In thinking about the role of design in promoting the visibility of communication infrastructures, the project highlights an opportunity for communication design in the mapping of these complex systems to make them legible to citizens. Also, the DIY approach taken by the residents and evidenced in the work of Arnall et al (2014) highlights the need for designers to work

with these seemingly immaterial aspects of technologies/infrastructures to playfully expose and demystify them. In terms of an approach to research, this seems to chime with Ratto's (2011, p.254) description of critical making, in which the emphasis is not on the outcome so much, as the shared construction activity as site for "enhancing and extending conceptual understandings of critical socio-technical issues". I would frame my own engagement with designing a mobile application about the mast on Byron Avenue in this way and point to the value of using practice-led research (Smith and Dean, 2012) to gain literacy not only of the technology, but also to test or explore the critical or theoretical components of a project.

In closing, the importance of thinking about infrastructure is underlined by Graham and Marvin (2001) when they suggest that the networked character of modern urbanism is perhaps its single dominant characteristic. Technological networks, such as the mobile phone network, form part of what Beer (2013) describes as a vision of the city as a place reliant on an increasing dense and complex infrastructure and infrastructure related processes. For Graham and Marvin (2001, p.8) the key question in this digital city context is; how do we imagine these massive technical systems that interlace, infuse and underpin cities and urban life? This project sought to map a small fraction of a technical system or infrastructure by focussing on fissure or break, when "normal service" was disrupted, a moment when the invisible infrastructure became visible. I wanted to use that instance to describe some of the actors that comprise the network. The value of the localised perspective adopted, is that it highlighted how we experience infrastructure as being something highly contingent and that infrastructure and technologies "don't have simple, definitive, and universal urban impacts in isolation" (Graham and Marvin (2001, p.11). As Lievrouw (2014, p.30) points out, technological forms develop in highly situation-dependent ways. The human actors, ideas and symbols associated with them, as well as material artefacts considered by ANT as interlinking webs of relations are dynamic, meaning that technical systems evolve, stabilise, breakdown or reorganize in unexpected ways (Lievrouw 2014, p.30). As was made apparent by the protest on Byron Avenue the mast eventually being chopped up and hauled away. Not because of residents concern, but because it was deemed no longer required after the merger of two mobile networks to form Everything Everywhere.

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