

The Cyborg City: Re-thinking Urban Resilience Through Mobile Communications

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Abstract: How do we build urban resilience through key areas of critical infrastructure such as mobile communications? Mobile digital communication networks, encompassing commercial mobile and public wi-fi platforms, are ubiquitous in Australian cities, and digital inclusion has emerged as a major theme in metropolitan-level strategic planning (McShane, Wilson & Meredyth, 2014). However, while we have seen a dramatic uptake of internet-enabled mobile devices, to date little is understood about the politics, implementation and role of mobile communications in building resilient cities. This paper builds on the seminal work of Haraway (1985), Swygendouw (1996) and Gandy (2005) to extend the cyborg city lens to the context of Australian urban resilience. Using mobile communications as an example, the paper focuses on critically exploring the implications of our reliance on complex technological networks with reference to urban Australia.

Introduction

Australian cities have long embodied cyborg city attributes with their complex interplay of socio-political, technical, physical and digital infrastructures. Yet despite scholarly recognition of the fluid and constantly changing human-technology-space interface in 'big infrastructure' cyborg debates (smart grids, smart meters, public WiFi, national broadband networks and 'big data'), policy and industry commentary places clear demarcations between the social and the technical, and how this relation is shaped and changed over space and time. Bringing an understanding of this dynamism and tension to contemporary urban and infrastructure debates is important if we are to understand, prepare for and develop new relations and adaptations in the city, particularly when systems are threatened or break down. How do we mobilize a critical understanding of our reliance on complex technological and infrastructure networks for survival within the urban realm to build city-region resilience?

The work of Stephen Graham (2010) around critical urban infrastructure highlights that the dreams of modernity, mobility and circulation become fleetingly visible during shocks or disruptions. The sense of 'crisis' when infrastructure fails and our most basic vulnerabilities are exposed can forge new ideas/alternatives about what urban life might be, and what it might become. Often this is anticipatory and involves the fetishization of the potential for urban system failure precipitated by the destruction of critical infrastructure linked so intimately to the survival of capital flow and accumulation. Yet whilst the invisibility of infrastructure may rise to the surface and become exposed in the face of crisis (i.e. natural hazards, terrorism, GFC, climate change), an array of important considerations remain lurking in the shadows. These include the financial arrangements, decision-making processes and security discourses often imbued with statutory power, force and intent which powerfully work to inform and structure the experience of everyday urban life.

The point of departure for this paper is a focus on mobile communications as a key area of critical infrastructure in Australian cities. Mobile digital communication networks are ubiquitous in Australian cities, encompassing a range of platforms from commercial mobile through to public Wi-Fi (McShane, Wilson & Meredyth, 2014). By 'peering into' critical infrastructure such as mobile communications (see Graham 2010), our focus is exploring, with a view to re-imagining, the implications of our reliance on complex technological networks in Australian cities and for urban resilience more generally. For Yusoff and Gabrys (2011, p.517) the process of re-imagining is 'complex terrain'; a "site of interplay between material and perceptual worlds, where concepts cohere, forces pull and attract, and things, discourses, subjects, and objects are framed, contested, and brought into being". Like the human-technology-space nexus that complex critical infrastructures sit within, an equally complex dialectic takes place and which forges these new relationships and re-imaginings.

To this end the structure of the paper is three-fold. Firstly, we mobilize the 'cyborg city' (see Haraway 1985; Swyngedouw 1996; Gandy 2005) as a useful heuristic for going beyond mapping and describing technologically modified and enhanced urban environments, towards critically engaging with rapid unpredictability, innovation and adaptation at multiple scales and which exposes new ways of conceptualising the human-built form, city-citizen relationship. Secondly, we focus on the role of wireless and mobile communication technology as critical urban infrastructure within the Australian urban context. We have seen a dramatic uptake of internet-enabled mobile devices, yet to date little is understood about the politics, implementation and role of mobile communications in building resilient city-regions, and what questions this raises for citizenship and engagement with the city. Finally, we consider the implications of using a cyborg city imaginary as a critical lens in key areas of urban resilience such as mobile communications.

Cyborg cities

How can we engage with the city as a cyborg – the situated knowledge, practices and ideas that are located at the nexus of body-technology-space? When new digital technologies enter our cities, our homes and workplaces, we are never entirely sure what will follow and how humans (and technologies) will adapt to the new (unknown) challenges that lurk or make good of the innovation introduced (e.g. ostensibly a more efficient workplace, allowing more time for leisure). While we might argue that our relation to technology was once contained and controlled we now see more technologies performing human practices (e.g. the recent debates around the killer robot phenomenon), and more human practices thoroughly dependent on technologies and digital infrastructures. This changes both the nature of humans as well as technologies and other material arrangements making both utopian and dystopian urban futures equally possible. Reimagining the human-technology-space nexus in the context of also imagining urban futures and its potentialities is a political project.

In his seminal paper *Cyborg Urbanization: Complexity and Monstrosity in the Contemporary City*, Matthew Gandy (2005) describes the cyborg as both 'an ontological and epistemological strategy for stretching the limits to human knowledge' as well as 'exploring social and material practices in ways that uncover the anomalies, fractures and tensions within the dominant modes of urban / architectural thinking'. While 'potent fusions, dangerous possibilities and fractured identities' are how Donna Haraway (1985) renders the cyborg in the *Cyborg Manifesto* - a political and intellectual project designed to challenge dualistic bodies of situated knowledge and practice at the nexus of social reality and fantasy. In the interplay between machine and organism, the dynamics of nature and culture are reworked.

The cyborg as a spatial concept is the experience of both the real and the virtual and this has been expanded to focus on the post-industrial growth and development of (global) cities. The invisibility or taken-for-granted everyday nature of urban infrastructure is located amidst the interplay of the body and the disembodied subjectivities of the digital realm (Leach 2002). As a hybrid of machine and organism urban infrastructure becomes a set of cybernetic creations serving as human life-support systems. This has manifested in metaphors for the cyborg city such as:

- 1) An integrated body with identifiable organs in response to the 19th century industrial city; an anatomical conception of space as an assemblage of individual organs founded on a clear separation between mind and body that enabled the city to be conceptualized as a coherent entity to be acted upon, disciplined, regulated and shaped according to human will; and
- 2) Or the idea of urban space as a prosthetic extension to the human body; a diffuse and interconnected realm of human interaction founded on the blurring of boundaries rather than their delineation (i.e. the cyborg city) (see Gandy 2006).

Eric Swyngedouw (1996) envisages cyborg urbanization as the reorganization of territory through infrastructure; the urbanization of nature which is socially mediated by patterns and processes of property ownership, distribution and consumption resulting in socio-ecological change and transformation. As a heuristic tool the cyborg city works creatively to extend our ways of seeing the world, whilst simultaneously threatening our very understanding of what it means to be human. The 'cyborg citizen' for example emphasizes the role of digital code and wireless infrastructures "with virtually every sphere of human activity" (Mitchell, 2003). The need to re-materialize the resilient Australian city amidst the various

manifestations of the virtual city raises political questions about the shifting nature/role of the public sphere and its governmentality in key areas of urban infrastructure such as wireless and mobile communication technology. Is the cyborg city increasing or decreasing vulnerability, or is it leading to the potential for a new species of disaster and/or responsiveness?

Wireless and Mobile Communications Technology

Cyborg cities – the relationship between bodies, technologies and space – are increasingly shaped by developments in wireless and mobile communication technologies. The International Telecommunications Union (2014) estimates that the number of active mobile phone accounts now roughly matches the global population. This is a remarkable indicator of the spread of this technology, but it also illuminates the surveillance regime that produced that figure. Technology and regulation intersect to give each mobile phone and each account an individual identity, rendering conventional notions of privacy meaningless for mobile users. Aspirations for countries to achieve 100% mobile ‘penetration’ amongst populations, against the backdrop of seamless roaming across 3g/4g and Wi-Fi networks, which South Korea recently claimed to have done, calls up uncritical development narratives, and may mask pockets of deprivation. “This is an important milestone in our progress towards providing users with an ideal environment for convenient wireless accessibility” said the Korean Communications Commission (Kwon 2012).

For urban managers, the combination of computing and communications features, which lead Cunningham and Potts (2009) to conclude that mobile phones are better understood as increasingly important components of innovation systems rather than simply a telecommunications technology, opens new horizons for the management of critical situations, for directing flows of energy and people, and for undertaking the mundane work of repair and maintenance. For example, Luque-Ayala and Graham (2015) instance the intriguing mobile app *Streetbump* – which uses the mobile phone’s accelerometer and geo-location to enable automobile drivers to automatically report road surface condition to road managers – as an example. Yet, these authors continue, such programs may implicitly favour affluent parts of cities, an instance of data bias to which big data analytics is vulnerable.

At the centre of utopian visions for the mobile-enabled cyborg city is a surprisingly conventional view of the cyborg citizen as a rational utility maximizer, albeit a tech-savvy one, who consciously trades off privacy and convenience in daily mobile phone usage. The normative figure of the ‘smart’ citizen has a seemingly irrational doppelgänger¹ in the form of campaigners against wireless propagation, opponents of mobile phone or wireless broadband towers, or advocates for Wi-Fi free zones in schools². Such campaigners are easily ridiculed as demotic versions of King Canute (Knut) standing on the shore commanding the (radio spectrum) waves to cease. However, the protests raise wider questions about who regulates, controls and has access to radio spectrum, the basic infrastructure of the wireless city.

Critical analysis of the mobile-enabled cyborg city benefits from a clear understanding of this invisible and highly valuable resource. The argument we advance here is that the ideological and institutional settings that structure its use may have a significant bearing on urban resilience. Like all urban infrastructures, spectrum is subject to overuse and degradation. Three main policy approaches to spectrum use have coexisted for the past half a century, broadly embraced by International Telecommunications Union member countries, the multilateral body that brokers communications standards globally. The *first* sanctions direct control of spectrum by nation states, based on the initial premise that unregulated spectrum was a danger to military and emergency communications, as well as economically and socially inefficient, and its universal nature required international cooperation. A *second* approach characterizes the spectrum as a commons, where researchers and hackers seek to experiment and innovate in an open source environment, governed by loosely defined rules set by the user ‘community’. The *third* approach is the neoliberal approach of regulated markets, through which prime blocks of spectrum in

¹ There’s an app for that: Doppelgänger - “Take a picture of your face and find your doppelgänger in the world.” <https://itunes.apple.com/au/app/doppelganger/id427446869?mt=8>

² <http://www.wifi-in-schools-australia.org/p/what-you-can-do.html> ; Rylko, A. 2014 ‘NBN tower fight looms’, Tweed Daily News 25 August, <http://www.tweeddailynews.com.au/news/nbn-tower-fight-looms/2360678/>

broadcast and mobile telecommunications bands are licensed and auctioned, as an efficient way of utilizing the resource.

The sums that mobile network operators have paid for spectrum have given both those companies and government vendors an interest in protecting investment risk. The first forays by local authorities and community groups into public Wi-Fi network development, in the early 2000s, was viewed with some alarm by the market and higher governments, as a threat to the commercial mobile market. While limitations were placed on local network development through litigation and legislation, especially in the US and Europe, theorists such as Benkler (2002) argued that regarding wireless spectrum as a commons would encourage local innovation and democratic communication. While the conflict between market and public use of spectrum in urban settings has moderated (congestion on premium 3g and 4g networks has seen commercial mobile operators partner with local authorities to 'offload' data traffic onto public wireless networks), there are fundamental questions to debate over whether encouraging public and community access to spectrum and experimentation with wireless networks is a building block of urban resilience. Perhaps the clearest insight to this matter is offered by the much-cited example that public Wi-Fi networks were the only form of network communications that survived in parts of the cities impacted by Hurricane Katrina (New Orleans, 2005) and Hurricane Sandy (New York, 2012) (Open Technology Institute 2013).

The first telecommunications legislation passed by the Australian Parliament, the *Wireless Telegraphy Act 1905*, made explicit provision for experimentation in this arena. The reservation of spectrum blocks for open access and experimentation has produced some remarkable developments such as Wi-Fi, Bluetooth and ZigBee. The participation of diverse groups of enthusiasts, hackers, social entrepreneurs and so on in the development, use and provision of urban wireless infrastructure has produced enormous economic and social benefits. It also declares in favour of diverse and decentralised modes of infrastructure management. Diverse systems are less constrained by path-dependent decision-making, more open to innovation and tolerant of experimentation. As digital networked communications underpin an increasing array of urban processes, we need to argue for policy settings in this area that promote institutional diversity as a bulwark against the risk of systemic failure.

Resilient cities in a digital world: Making the invisible, visible

If we are all cyborgs now (see Haraway 1985) this involves a combination of imagination and reality – border wars between what is natural and what is artificial. Importantly Haraway points to the ubiquity and invisibility of the cyborg which makes them hard to see politically. The cyborg can be utopian or dystopian (e.g. grid control of the planet or lived fusions and hybridity can both be seen as sites of domination and/or possibility and offer in their way different vantage points as a result). As Gandy (2005, p.36) highlights cyborg cities intersect with bifurcated urban geographies that increasingly involve “global citadels of [digital/virtual] connectivity encased within a wider landscape of [material/urban] neglect and social polarization”.

...The idea of cyborg urbanization is characterized as a way of conceptualizing the body- technology nexus that underpins the contemporary city, but also as a corrective to those perspectives that seek to privilege the digital or virtual realm over material spaces (p.36-37).

The development and evolution of the body-technology-space nexus is a political project of resistance (as demonstrated above by the concerned parents) and accumulation. By the manner in which technology infuses our daily practice rendering itself invisible, there are still questions of access and impact. Questions around distribution and access, regulation and control, and utopian and dystopian futures are complicated to address. Perversely, the Cyborg City and the emergence of a Cyborg Citizen lends itself to a new politics – or rather offers new ways in which the political occurs and is manifested in cities. Can the Cyborg City then exhibit new forms of democratic participation mediated by new ways to access (and control) knowledge and information.

Is the Cyborg City a democratic city? How is the Cyborg City governed? How does the human-technology-space nexus alter and reconstitute political participation? Should there be a Cyborg Bill of

Rights, asks Gray (2003)? Indeed, what does it mean to be a citizen in the Cyborg City? A Cyborg Citizen? How has/could the Cyborg Citizen and Cyborg City (re)shape democracy? Does cyborgization of the city also support a democratisation of the city? Or does it further perpetuate inequity and opportunity in ways yet to be fully understood? What is yet to be known about the human-technology-political nexus?

In the book *Cyborg Citizen: Politics in the Posthuman Age* speaks to the *cyborgisation* of citizenship. Gray argues for a new epistemology of knowing and understanding the cyborg as a political entity within the cyborg city. Commentary arising from the human geography literature, critically explores the cyborg as a conceptual manifestation of an ontological and epistemological hybridity: "The cyborg...a simultaneous being/becoming and knowing/seeing conduit" (Wilson, 2009: 500).

By creatively extending the multiple ways in which to see, experience and engage the world, the Cyborg City is a political project. Empirically focused research into eDemocracy, deliberative polling, Wikis, online blogs illustrates how technology can – at least in theory - broaden civic participation (see Hindman 2008 for a counter-argument). The Cyborg City together with the Cyborg Citizen offers new ways to participate and engage with government decision-making processes. Technology enables access to information, new communication mediums, and also new ways to extend participation into a broader public sphere (e.g. the use of Twitter in organising large public demonstrations). It also offers an effective way to engage large numbers of people on difficult public policy issues. As Ferguson (2012) argues, it allows diverse publics the opportunity to 'share democracy'.

However, does the Cyborg City and the Cyborg Citizen introduce anonymity to the political process, and to public debates and discussion? And is this OK? Cyborgization of the citizen and city is viewed as an evolutionary phenomenon by Koch (2005); a progression? However, Koch (2005) in his critique of the 'Cyborg Citizen', warns of the limits to cyborg citizenship and the reduction of humans to passive participants in democracy: "Virtual identity is not real identity. Virtual democracy is not the exchange of ideas, a discourse on policy, or real engagement" (Koch, 173). Koch is emphatically critical of a turn to an era of political unaccountability and a lost sense of civic responsibility to community and to ideas. McFarlane (2008) goes further. Reflecting on the cyborgization of Bombay City and with an interest in infrastructure and its roll-out to address issues of public health, McFarlane writes of a 'dysfunctional' and 'struggling' cyborg city that is 'splintered', 'unequal' and 'congested'; unable to deliver equitable cities and directed by contested urban imaginaries in a "politicised cyborg city". McFarlane's work raises further questions about access and distribution: who benefits from the Cyborg City? Who determines the extent of cyborgization?

Contesting the view of cyborg cities as splintered and unequal, from the perspective of mobile communications, is an array of community wireless activists seeking to counter market failure or the non-provision or communication services in disadvantaged urban and regional districts. While high-profile, ostensibly public interest projects such as Google Fiber entrench existing patterns of exclusion (Halegoua 2015), community wireless networks such as Canada's K-Net initiative, or the USA not-for-profit One Economy, provide connectivity and training in areas considered to be unviable by the market and neglected by the state.

Conclusion

Australian cities have long embodied cyborg attributes with their complex infrastructures. What then, is different about the cyborg city of today? Is it the sheer scale and entanglement of the digital and technological with our everyday lives? Perhaps, but we have seen similar scales and entanglements through other significant technological changes, such as the industrialisation of the home (Schwarz Cowan 1999), the electrification of cities and homes (Hughes 1983), and even through the advancement of some modern appliances/ systems fundamental to modern cities, such as air-conditioning (Cooper 1998). We may experience a form of productive 'messiness' (Dourish & Bell 2011) or an emergent performativity that changes the nature of humans as well as technologies and other material arrangements (Law & Lien 2012). Bringing an understanding of this dynamism to contemporary city and

infrastructure debates is critical if we are to understand, prepare for and develop new relations and adaptations in the cyborg city.

The cyborg city lens places emphasis on the role and nature of urban infrastructures, the body-virtual interface or relationality, the practical and political aspects of urban broadband, the idea of cyborg cities as resilient cities, and the utopianism of most smart concepts and the possibility that there will be mess rather than order when new smart technologies are introduced. Contemporary cities have these established features, and in addition house the less obvious and often hidden, networks and connectivities that are the hallmark of today's cyborg city. However, cities are very much places of imagination and invisibility – in that people wherever they are, construct their own cities in their minds. An ability to vividly imagine cities, or spaces within them, supports Haraway's rejection of rigid boundaries and her call to embrace uncertainties. This is now much easier as the new continuous instant connectivity makes it simple to reconfigure, and perhaps to ignore key features of, cities in our imaginations.

These are cities that exist mainly within our minds, and the contemporary cyborg city is more than this. Now, it seems we have outsourced some of our memory and capacity – and also security - to machines, or perhaps more accurately to an electronic cloud. The extraordinary monitoring and management capabilities these information flows support, allow removal of almost all margins in 'just in time' management. This may have many advantages – but in the case of food and possibly energy, system failure would likely enormously increase our vulnerabilities. Similarly, the rapid expansion of mobile and computer warning and alert systems could keep us all more aware of risks, but also create dependencies and reliance on external powers for things we now manage for ourselves.

In reflecting on these vulnerabilities we should acknowledge that the information is gathered and used by multiple sources, and so can have the appearance of enhancing democracy. While we all participate in the cyborg cities, a case can be made that the information collection, analysis and use is highly asymmetric. Possibly because these are invisible we imbue them with wildly different attributes and potential; from those who see them as harbingers of a resurgence in local participatory democracy, to those who see them as powerful symbols of state and corporate control. Of course it is clear that those whose voices are normally quiet participate – especially children and youth, people socially and physically isolated. However, while this is to be celebrated, the form of participation allows close scrutiny by parents, governments, police, marketers, trolls and others, and it may have led to a "surveillance state" as governments and their manifestation through large multinationals, engage in near total monitoring - possible now only through the characteristics of a cyborg city, or perhaps more appropriately a cyborg landscape, with its detailed monitoring of the movement and connections of people, commerce and travel. This situation, which continues to strengthen as governments increase their surveillance powers, appears to be almost the complete opposite of what is articulated in government rhetoric about a resilient society.

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