GEOGRAPHIES OF MEDIA

Platform Urbanism

Negotiating Platform Ecosystems in Connected Cities

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Geographies of Media

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Media is always spatial: spaces extend from all kinds of media, from newspaper columns to Facebook profiles, from global destination branding to individually experienced environments, and from classroom methods to GIS measurement techniques. Crucially, the way information is produced in an increasingly globalised world has resulted in the bridging of space between various scalar terrains. Being and engaging with media means being linked to people and places both within and beyond traditional political borders. As a result, media shapes and facilitates the formation of new geographies and other space-constituting and place-based configurations. The *Geographies of Media* series serves as a forum to engage with the shape-shifting dimensions of mediascapes from an array of methodological, critical and analytical perspectives. The series welcomes proposals for monographs and edited volumes exploring the cultural and social impact of multi-modal media on the creation of space, place, and everyday life.

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Series Editors' Preface

Please Mind the Gap Between the Brain and the Platform

Before we board the train leading us into Sarah Barns' investigation into platform urbanism, let us linger in our train station's book store for a second. If we pick up Boos' Inhabiting Cyberspace and Emerging Cyberplaces, the first volume of our *Geographies of Media* series, from the shelves, we recall reading about how communities reinvented themselves digitally at the end of the 1990s. The related preface stated, that 'digital spaces can also be used to carry existing sociocultural offline boundaries into a Twenty first century society' (2017, vi).

Some twenty years later the offline-online divide seems to have vanished in many aspects. In highly digitalised urban environments it is nigh on impossible to detect where one ends and the other starts. Smartphone users have already become cyborgs, using the iPhone or similar devices as technological extensions to the human brain. If it were up to companies like Elon Musk's Neuralink, our bodies would soon obtain an internal interface to render many of today's manual

inputs redundant. In the words of Haraway (1991), our cyborg world is about 'the final imposition of a grid of control on the planet' (154).

Almost twenty years into the twenty-first century, communication methods are generally different. '[T]raditional "one to many" modes of media communication [have been replaced by] "many to many" forms of content sharing', as Sarah Barns elucidates. This is certainly true for contemporary podcasting productions, that have evolved from station-based radio, and that are characterised by social interaction and ubiquitous availability. Putting volume one of the series back on the shelf and turning towards our second volume, Peters' *Sound, Space and Society*, we learn about the impact of such 'one to many' media in the form of pirate radio stations. In predigital era fashion, Peters' revealed how content was transported via soundwaves, that, 'as a natural phenomenon, elude the grasp of geopolitical conformities' (2018, viii). The 'downside' of white noise and bad reception came with a freedom of transmission today's YouTube channels and internet radio can only dream of.

In Sarah Barns' *Platform Urbanism*, we depart from the future of urbanism and urbanisation, and explore the complex entanglements of consumer, government, society, big business and various relationalities. In her Introduction, Barns proposes a provocation in relation to the ubiquitous human practice of being inextricably linked to their rectangular devices: 'Is … a mass display of smartphone-addled attention in fact an emergent kind of urban observation, blending platform, context, algorithmically-finessed demographic?' The co-constitutive becomings of various elements that produce an urban experience aided by digital platforms create micro-cosmologies from engendering a 'city of bits' and 'Uberisation of everything' to urban apptivism and various configurations of 'crowd-based capitalism'.

If scientific research gets picked up not only by the media but finally political discourse, it gets transformed into a meme that is hard to overlook. Political campaigns in Europe and the 2020 US-presidential election have not only discovered climate change as one of those memes. The alleged need for digitalisation and 5G-networks, social media companies not paying taxes and threats of automation all point to an entanglement of digital and physical spaces as never seen before.

As Barns states: 'Quaint distinctions between the "built" and the "digital" are collapsing, just as software makers are literally becoming "city builders"'.

This last remark points to many of this book's case studies on how digital platforms like Facebook, Uber and Airbnb impact urban life and its social and physical structures. This is not only because of how people organise themselves and how they construct their own imagined geographies, but also because of the 'constant discursive struggles over [the urban terrain's] representation', as Chapter 3 asserts. The impact of corporations to shape the city to its needs using smart technology, is contrasted by the bottom-up potential of smart handheld devices, potentially enabling novel governance structures and a new maturity of urban dwellers.

It is not the mixture of both corporate and bottom-up approaches that make platforms so intriguing for urban development, but the potential of a third outlet, that is often being overlooked (or deliberately neglected). There are not only two elements, like buy and sell, or search and advertise, that constitute digital (social or economic) exchange. The platform itself consists of a much higher potential, and it is spreading into our real-life environment. Yet as much as platforms are increasingly intrinsic to urban living, one must recognise a multiplicity of urban experience and sense-making that exceed or resist the codification of our lives that question digital and technological governance of platforms.

Thus, we are very excited to present you with Sarah Barns' *Platform Urbanism* as the third instalment of the *Geographies of Media* series. Platform intermediation, data sovereignty and cooperative business models are trajectories already taken but still in need of further expansion. The future appears simultaneously knowable and unpredictable, volatile and impermeable. So, let's now leave the station and jump on the *Platform Urbanism* train. Or, as Bruce Springsteen puts it: 'The light from the oncoming train focuses the mind'.

Torsten Wissmann
Joseph Palis

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Haraway, D. (1991). *Simians, Cyborgs and Women*. New York: Routledge.

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Introduction: A Scene on a Train

In which I introduce the broad terrain we shall be navigating, and some of the ways we will traverse this field of platform urbanism. This will include momentary, fleeting encounters with city scenes, refracting different ambiences of platform logics, design tactics and interfaces.

A Scene on a Train, Somewhere

Picture the scene. You're on your daily commute, standing room only in the train carriage. Your head is slightly bowed, eyes cast downwards at your phone. It gleams brightly, revealing a cavalcade of news stories, friends' holiday snaps and algorithmically-selected promotions, proceeding down your social media feed. You idly push these along, in search of something *fresh*. You glance up. Everyone else seems to be doing what you're doing. Looking at their phones: swiping, tapping and watching. Or listening to the sounds of far-away. Despite all these clustered bodies, there's an eerie silence, save for the rattle of the train carriage and the muted, tinny noise of music playing through someone else's headphones. No one talks. Your

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friend's holiday snaps are marginally more interesting than this, so you cast your eyes back down to the feed, and roll on.

It's a scene that could take place across any number of cities across the world. Though this experience has its own place-based peculiarities—the language of the station announcers, the particular advertisements pasted throughout the carriage, the social etiquette of passengers—this scene is also very much a global phenomenon, one we may experience wherever we find large volumes of commuters with access to smartphones. The smartphone interface—whether that of Apple's iPhone, or the Android operating system—constructs a certain uniformity of experience across time, place, culture and disposition. *Head oriented towards screen in palm as a mode of contemporary urban encounter; swipe for idle people-watching; tap for active engagement.*

Commuting itself is a daily ritual for many. As the distances between jobs and home have increased across many of the world's major cities—a function of the seemingly unstoppable expansion of the world's urban footprint—time spent commuting has, for many, continued to grow. For those who find themselves in train carriages going to and fro to work, the smartphone is likely to be a vital part of the trip. This daily commute, so often thought of as liminal, interstitial or even 'wasted' time (Bisell 2018), is a time many now spend completely absorbed in their smartphones. Confined within the space of a speeding train carriage, eyes cast downwards at our glowing rectangle screens, as digitally-augmented commuters we are very much 'alone together', to use Sherry Turkle's (2011) phrase. We expect little interaction with our fellow commuters who, despite being crammed perhaps a little too close to our physical selves, are orienting their communicative selves somewhere entirely else. Somewhere quite different indeed to the train carriage you find yourself inhabiting for a duration of time, as it whisks you along the railway tracks, freed from the gridlock of traffic, and the pedantry of pedestrian space-time.

Familiar and pervasive as it is, this scene can also be seen as a rather peculiar way for large groups of people to actually *interact* in one place. As Turkle has put it, our digital devices help put '*real on the run*' (2011), meaning that they introduce substitutes for connecting with each other face to face. Whether or not we agree that 'face to face' communication is in fact more 'real', or less artificially-constructed, than digital modes

of communication, it's clear that the widespread attraction of glowing rectangle screens means commuters are, predominantly, in dialogue with those who are not *in the same space*. For the many who live in cities that are growing, this trend towards greater communicative displacement is happening at the same time that our physical spaces are becoming more and more dense. Our bodies are getting jammed together *ever closer*, as cities continue to absorb growing populations, and increased demand for networked transit, even as our news-feeds orient our social natures elsewhere.

Returning to this scene, your eyes cast downwards towards your personal device, it may or may not occur to you that you are, in fact, simultaneously embedded within three of the modern city's greatest inventions. The first of these, the railway network, is linked to the very formation of the modern metropolis. A nineteenth-century innovation, the advent of rail transformed people's everyday experience of space and time, enabling cities to expand rapidly in their geographical footprint (Glazebrook and Newman 2018; Mattelart 2002). Once established as a successful mode of large-scale transportation, railway networks were introduced almost universally in medium-sized or larger cities, with remarkably similar impacts. In particular, new rail networks allowed new housing developments to proliferate along their corridors, expanding urban populations at the same time, particularly across those cities whose economies were prospering as a result of the industrial revolution. New rail networks fueled the expansion of many cities' footprints, but at the same time they also helped reinforce the primacy of the centre as a 'central business district', allowing large numbers of people to be brought into city centres at regular intervals (Glazebrook and Newman 2018). At metropolitan scales, most rail systems adopted a radial network pattern, and were rolled out quite rapidly over the short space of a few decades, by urban entrepreneurs who entered into partnership with city governments (Newman et al. 2017). So, in a very practical sense, the train you're texting and swiping on during your daily commute is particular kind of network technology that has, quite likely, played a critical role in shaping the very structure and fabric of your city (Fig. 1.1).

The carriage you're in may, by now, be feeling rather airless. In Sydney, where I write from, you might be unlucky enough to find yourself on

Fig. 1.1 *Connected commuting*. Illustration by Elin Matilda Andersson, commissioned by Sarah Barns for the Cities Plus Data initiative, 2014

one of the notorious 'red rattlers'—old trains that lack air conditioning or heating, and somehow manage to feel too warm even in the cooler months. It's this very air that also happens to be a medium for the wireless transmission of all the messages and photos and emails and songs you and your fellow commuters are busily sending and receiving. Building on nineteenth- and twentieth-century innovations in radio-telegraphy and radio-communications, today's smartphones use parts of the electromagnetic spectrum devoted to radio frequencies, which make use of frequency

bands between 3 kHz and 300 GHz. These are otherwise known as 'radio waves'. The discovery of these radio waves, by pioneering physicists and engineers of the nineteenth century, happened to utterly transform the way we communicated in the twentieth century.[1]

Through wireless communications, our capacity to communicate instantly with those who were far removed from us physically would rapidly advance. As has been widely observed, it was as though human society had conquered or annihilated distances, not just by speeding up transport modes, but also, increasingly, by dematerialising our communicative spaces as well. The philosopher Martin Heidegger, responding to the significance of radio as a new medium of communication, described the modern spatiality of 'being-in-the-world' (*Dasein*) as being pushed 'towards the conquest of remoteness' (Heidegger 1962). Such technology shifts would come to embody a new cultural era, one accompanied by new intellectual frameworks through which to understand an increasingly globally-connected, yet radically-deterritorialised world. We emerged into 'the epoch of juxtaposition, the epoch of near and far, of the side-by-side, of the dispersed' (Foucault 1984)—a way of being that in turn became synonymous with the cultural logics of late capitalism (Jameson 1984; Castells 2000; Lunt and Livingstone 2011).

When we look back in time, to when today's old technologies were new (Marvin 1988), we notice how often emergent technologies are initially experienced as a *shock* or displacement to the senses. Watching people immersed in the brand new medium of radio, German sociologist Siegfried Kracauer bemoaned the way radio 'vaporises beings'. 'Silent and lifeless, people sit side by side as if their souls were wandering far away', attuned to the playground of broadcast noises from afar (Kracauer 1995). Being 'alone together', then, is not exactly a new phenomenon. As Scott McQuire

[1]While Guglielmo Marconi is often attributed as the inventor of radio technology, there are many other inventors, physicists and engineers who contributed to our understanding of radio communications. Nikolai Tesla is one inventor whose neglected role in its development is now being corrected. Another is Sir Ernest Rutherford, the New Zealand born physicist who built a magnetic detector capable of transmitting wireless signals while a student at the University of Canterbury, Christchurch, in 1896. For more on the history of radio, see Gardiol, F. (2011). About the beginnings of wireless. *International Journal of Microwave and Wireless Technologies*, 1–8, Marvin, C. (1988a). *When Old Technologies Were New: Thinking About Electric Communication in the Late Nineteenth Century*. New York and Oxford, Oxford University Press, and Sterne J. (2004). *The Audible Past: The Cultural Origins of Sound Reproduction*. Durham and London, Duke University Press. as examples.

(2008: 4) has noted, 'the widening of the gap between ways of life primarily grounded in place, and emergent ways of life in which spatial experience is increasingly opened to events occurring elsewhere, has been a primary characteristic since industrial modernity' (McQuire 2008).

Mass media platforms that bundled audiences into larger and larger groupings—of national and global scope—would become symptomatic of what Marc Augé called the growing 'placelessness' of contemporary, media-saturated society (Augé 1995). If society was less bounded to place, in the same way, defending the value of 'public space' would become more and more bound up with these wireless-activated communities of interest. Classical notions of the *agora*, connected to that of a physical public space, gave way to more abstracted or virtual notions of a communicative public sphere (Habermas 1989; Iveson 2007; Wilken 2011). In an era of broadcast media, diverse publics were constituted as much by their coming together around genres of storytelling, interaction and mediated performance, now accessible via the wireless spectrum, as by place-bound forms of public gathering or community.

A foundational concern for a great deal of scholarship across geographical, cultural and media studies domains for some decades now, the spatial implications of broadcast media were profound in radically transforming everyday experience of places and spaces. In Meyrowitz's words, 'we are physically no longer where and who we are socially' (1985). There was much to worry about with this shift. The concern, as Richard Sennett argued in *Flesh and Stone*, was that modern technologies were 'weakening the sense of tactile reality and pacifying the body', thus achieving a kind of 'disconnection from space' (1994). As a consequence of this shift, the importance of civic life, conceived as forums where ideas could be shared, where and communities drawn from diverse backgrounds and experience could come together, became much more closely linked to the forums of deliberation established through contemporary communications and media (Van Dijck 2013; Flew 2017).

Reflecting a broad consensus that broadcast media powerfully constitute the public sphere, regulatory frameworks were established by many democratic states in the mid-to-late twentieth century to govern the allocation of valuable and scarce broadcast spectrum. Regulatory instruments were informed by what became known as 'public interest obligations' (Lunt

and Livingstone 2011; Lefebvre Gonzalez 2013; Rowland 1997; Donders et al. 2012). Being able to utilise broadcast spectrum to connect with vast audiences across wide distances made broadcast media supremely powerful, not only in providing 'the information building blocks to structure views of the world' (Negrine 1994), but also, as 'mass media', to structure views held *in common*—which also meant broadcasters could charge high fees to connect brands with audiences at scale. If broadcast licences were, essentially, 'licenses to print money' (Barr 2000), it followed that, as a kind of quid pro quo, public interest obligations would require investment by broadcasters in diverse media 'voices' representative of civil society. This approach was fundamental to the emergence of relatively healthy and diverse media sectors in places like the UK, Australia and Canada. In Australia, for example, broadcast licence obligations stipulated investment in high-quality childrens' programming and minimum quotas for local content (Bosland 2008; Craik et al. 1995). The principles of spectrum regulation would, in this way, nurture the value of the public sphere in an era of mass broadcasting, and produce regulatory instruments through which to limit market power among companies which, by virtue of their access to valuable but scarce spectrum, could easily continue to scale.

If the advance of wireless communications and broadcast media dislocated people from their surroundings, and recalibrated notions of the public sphere, subsequent technology innovations would further complicate the relationship between media and place. The work of the Advanced Research Projects Agency Network, whose packet-switching network, which introduced the TCP/IP protocol, allowed the 'internetworking' of remote computers into a 'network of networks', may not initially have seemed the basis for a major economic and societal revolution. The invention known as 'the Internet' saw the idea of *virtual life* take hold, both set apart from 'real life' but also changing the productive relationships between cities. A wave of speculative ideas flowed forth about the potential for networked technologies to, yet again, fundamentally reshape our experiences of places. Place, in Castells' famous formulation, was being reconstituted in an era of networked technology as 'nodes of a network'; space transformed into 'spaces of flow' (Castells 2000). Subsequent notions of real-time cities, cyber cities, networked urbanism and sentient cities have each continued to grapple, in different ways, with the increasingly functional

integration of 'internet-worked' technologies as part of the vicissitudes of urban life. Diverse literatures have traversed this terrain, from architectural theory (Boyer 1996b; Vidler 2008; Mitchell 1996; Scott 2016; Graafland and Kavanagh 2006; Greenfield and Shepard 2007); urban studies and digital geographies (Kitchin 2014b; Rose 2015; Boyer 1996b; Graham 2005; Graham and Marvin 2001; Ash et al. 2016; Mattern 2008); infrastructure studies and financial geography (Sassen 2000; Mattelart 2002); studies of visual culture (Mannovich 2006; Halpern 2015; Conrad 1999) and urban media cultures (McQuire 2008; Krajina and Robertson 2019; Mattern 2008, 2017). The potent and peculiar natures of networked technologies, as they recalibrate urban experience, have continued to provoke new challenges in city making, urban design and contemporary urban politics.

To find ourselves more connected, via our devices, with distant selves rather than strangers on a train, is clearly nothing new. And yet, each of these waves of technological transformation can often be greeted as though they are without their own histories. Encoded to forget the past, technologies are 'always already' new (Mattelart 2002; Gitelman 2006). Resisting this tendency, media scholars and historians have come to think about the ways new media integrate histories of media transformation as a process of 'remediation' (Bolter and Grusin 2000). This concept seeks to attend more carefully to the ways in which new technologies don't simply *transform* but also *recombine* established practices—thus resisting the radical newness of every passing wave of innovation (Sterne 2004; Mattern 2017). Returning again to our crowded train carriage, we might therefore see the daily habit of smartphone-enabled commuting as both a relatively new phenomenon, but also one that recombines and remediates centuries of transportation, media and technology innovations, which have continuously acted to disrupt and transform the experience of living together in cities. As citizens of an increasingly urbanised world, we continue to negotiate multiple historic layers of media technologies and scenic devices that shape our interactions with the world and with each other (Mattern 2017; McCullough 2013; Boyer 1996a).

Keeping this history in mind, the ways in smartphones are recalibrating our cities today is certainly becoming a focus for considerable attention. But are we just living through yet another cycle of networked urbanism,

dissociated once again? Many would argue there are distinctive qualities of smartphone-oriented city populations worthy of particular focus. Some see smartphones as a different interface on the city; as such, they offer greater potential for multisensory recombinations that combine the augmented and real. In *Ambient Commons*, Malcolm McCullough (2013) reflected on how smartphones facilitate the embodiment of information, a condition he calls the 'ambient'. Noticing their sensory affects, McCullough sees the intensive ubiquity of more and more personalised media meaning that 'more and more in the sensory field comes from and refers to some place else'. These glowing interfaces sculpt our attention, built using the specialist data-driven insights and skills borne of vast industries of digital design and digital advertising, now integrated into a powerful 'attention economy' (Williams 2018). Its practitioners understand how digital attention can be bought and sold; this is why they are known as 'attention merchants' (Wu 2016).

But in our *attentiveness* to these devices, it is not simply the case that we are distracted from the spaces we are in, 'souls wandering far away' as Kracauer once imagined. Just as our cognitive focus is being trained to pay attention to the calamitous worlds of social media feeds and global news networks, or be calmed by online retail opportunities, streaming movies and the like, there are other things going on too. The smartphone's in-built GPS receiver *also* enables your location to be tracked as you move. Its camera allows you to document and share your surroundings instantaneously. Each app you interact with collects data on your movements, your interactions, your likes and even the sounds of the environment you're in. Sometimes we choose this, sometimes not. Many people use apps to monitor and collect data on how many footsteps they take, on their daily screen time. Your face may well have been mapped to your phone's security settings. And meanwhile, the microphone that records your telephone conversations is also being used to listen into your surroundings, picking up topics of your conversations, which you may find have made their way, via stealth adverts, into your newsfeed.

In other words, while you may be far away, in the world of your friend's Tokyo holiday, your smartphone is very attentively present; it is 'listening in' to the world around you (Crawford 2009; Barns 2019a). What's more, the data being collected on you, your environment, and the myriad kinds

of interactions you engage in, is also used to modify what information you are exposed to. Thought of as a kind of 'data exhaust' of urban life, the data created as a by-product of billions of daily interactions is being used to algorithmically fine-tune the kinds of stories you might be reading, the turn-by-turn navigations you might make once you leave the train station, or the particular kinds of bed-time slippers suitable for your demographic. And this data is also being used to shape decisions at larger scales too: decisions about how your transport network could be improved, or what potential new apps and services might be built to captivate your attention this time next year.

The data exhaust people generate daily is being further magnified by the information now generated by billions of tiny, distributed sensors embedded into the built environment, which enable the measurement and monitoring of basic urban infrastructures and services in real time. Your train is running along railway lines that may well be embedded with sensors whose job it is to monitor the stability of the tracks, ensuring any potential cracks are reported well before any major fault emerges. In this way, much of our cities' basic utilities and infrastructures are becoming more inextricably shaped by their data infrastructures; constituted by the information systems and protocols that determine how and where services should be located. As a consequence of this shift towards the integration of 'internet of things' (IoT) technologies in the built environment, the protocols and conditions governing the design and management of this data infrastructure now play an increasingly influential role in shaping the way our cities actually operate.

As a consequence, it is increasingly clear to many that, just as the railway networks of the nineteenth-century served as a platform for the expansion of housing along railway corridors, so the data infrastructures being built as a consequence of our intensively connected urban lives are playing a more significant role in the functional organisation and management of today's cities (Raetzsch et al. 2019; Kitchin 2014a; Crawford 2014). As Keller Esterling (2014) put it, spaces today are informational spaces, their production as much to do with the design and management of information systems as were the infrastructural services of previous centuries.

So, cities full of smartphones are also (still) full of fresh challenges for urban thought and practice. Not only for the way these phones recalibrate

our attention, in constantly partial ways, but also through the particular business and design tactics they enact, which in turn determine how the information we create, while our souls wander far away, is being used. Noticing what is happening to smartphone-oriented urban publics at a mass scale, questions about platform design, platform strategy and platform capitalism are, as a consequence, moving centre stage in discussions about the nature of digitalisation, the public sphere, the contemporary firm and the nature of work (Srnicek 2016; Van Dijck et al. 2018; Choudary 2015; Plantin et al. 2016). If platform capitalism challenges existing anti-trust regimes, platform-based public cultures are increasingly associated with conditions of surveillance (Wood and Monahan 2019; Andrejevic 2009), social discord (Tufekci and Wilson 2012; Tufekci 2017), labour exploitation (Van Doorn 2017; Graham et al. 2017; Pollio 2019), and political campaigning (Dommett and Temple 2018).

But what about the city? How do we navigate the urban implications of our platform era?

Beyond the Smart City

Cities are constantly being disrupted and rebuilt with every passing wave of technology innovation. The smart city is but one of the most recent examples. Taking advantage of new, data-driven modes of urban management and precinct design, smart city investments span everything from the creation of entirely new, digitally-connected cities, including the Modi Government of India's '100 smart cities challenge', to the masterplanning of smart city precincts, and implementation of data-driven urban management software such as urban dashboards, smart infrastructure initiatives and big data analytics programmes. Through the lens of the smart city, we can see today's distributed and ubiquitous technologies becoming critical informational infrastructures of urban life (Esterling 2014; Kitchin 2014b; Luque-Ayala and Marvin 2015). This intensification of informational infrastructures is a process imagined long before properly realised. William Mitchell, Australian urbanist and architect based for many years at MIT, wrote in 1996 of the coming 'city of bits' in which cities would be

powered more by software than by physical materials like stone and timber, 'connected by logical linkages rather than by doors, passageways, and streets' (Mitchell 1996). Imagined as the potential for a radical improvement to the way cities could be run, digital urbanists like Mitchell saw the potential for much more democratic, citizen-oriented ways of planning and governing urban spaces if they could be 'run on information'.

For a generation of digital urbanists inspired by Mitchell's ideas, the diffusion of networked, computational intelligence into everyday urban spaces was anticipated as a chance to enhance the civic potentials of the built environment—to decentralise decision-making methods, to reanimate public spaces and rethink built interfaces as interfaces of connection and conviviality (Townsend 2013; Hill 2008; Greenfield and Shepard 2007; Foth et al. 2008). Many of those who advocated for the potentials of urban technology would, however, become the most vocal critics of the smart city movement (Greenfield and Kim 2013). Instead of 'bottom up' tactical interventions using augmented reality, digital tagging and open data, the smart city movement represented a corporate takeover, designed simply to advance the agendas of the world's largest technology companies. In the wake of smart city initiatives such as IBM's Smarter Planet initiative and Cisco's Smart + Connected platform, critical smart cities scholarship has blossomed in recent years (Luque-Ayala and Marvin 2015; McNeill 2015; Kitchin et al. 2015). This critical literature has been attentive to the many risks associated with a technology-driven agenda to 'improve' cities in ways that ultimately privatise more and more services (Söderström et al. 2014; Shelton et al. 2015; Sadowski and Bendor 2019); advance techniques of mass surveillance (Greenfield and Kim 2013; Datta 2015; Leszczynski 2015), and inadvertently disadvantage minority groups (Pollio 2016; Kitchin 2015; Datta 2015, 2019). Despite these criticisms, smart cities have remained the focus for urban policy and decision-makers worldwide, as a broad rubric for the use of data-driven practices and initiatives oriented towards the management and governance of urban infrastructure and utilities.

There is, however, something of a mismatch between the scale at which a city government can influence and shape a technology strategy, and the particular scalar orientations of technology companies themselves. Put more bluntly, our daily interfacing with smartphones and attendant smart

devices are becoming far more influential in shaping the informational infrastructure of our cities than any particular smart city strategy. The collective intelligence generated by billions of daily interactions with global digital platforms—whether Google Maps, Gmail, Uber, Alipay, Airbnb, Didi, Amazon and so forth—means these companies are now equipped with vast, globally-integrated data assets that are now used to shape myriad urban behaviours in fundamental ways. If you are a user of any of these platforms, your urban decisions will be 'nudged' through intricate algorithms trained through sets of inferences arrived at via combinations of commercial, locational and personal data. In the space of a decade, the ride-sharing company Uber has rolled out a global, real-time data collection platform that delivers point-to-point transport 'at the touch of a button' (Choksi and Fujiu 2016). If digital services like Airbnb make renting out your home easier than joining a bed and breakfast network, or if Google makes email cheaper and smarter than other email software, it is because these companies have used their digital services as intelligent data curation and collection platforms, whose quality of service offering accelerates according to its volume of users. It just took awhile for these dynamics to seem to matter very much. Scale, in other words, begets urban intelligence. In this world, global digital platforms can easily outcompete locally-bound operators by virtue of the machine-learning intelligence they harvest and, ultimately, command.

What Kind of Cities Are Platform Cities?

Uber and Airbnb are but two of the better-known technology-based companies that are today seeking to alter the way we live and interact as urban citizens. When catching the train home from your day at work, you might be checking into any number of apps that form part of this ecosystem of urban platforms; to order a take-away meal; organise delivery of your laundry; plan your next holiday. These platforms are, increasingly, the platforms many urban lives are increasingly constituted *by*. We might think of our platform interactions as simply a commonplace and everyday way of dwelling in public places, whether in your crowded train carriage or waiting for a friend to arrive for a coffee. Outside the confines of an intimate

or shared conversation between known friends or colleagues, you may be likely to be tapping at and swiping your phone. We need to ask: Is this just filling-in time; is it anti-urban or anti-social? Or, is this mass display of smartphone-addled attention in fact an emergent kind of *urban observation*, blending platform, context, algorithmically-finessed demographic?

The influential urbanist Jane Jacobs once described the life of the street as a kind of 'sidewalk ballet'. Today, walking down a busy city street, you may well need to swerve away from someone who is looking down at their phones and could well barrel into you. Many people are likely to be looking at their phones, and 'wexting'(walking while texting). They may even have developed a non-visual way of detecting motion and obstruction that allows them to navigate without *actually looking up*. Today, observational urbanists like Jane Jacobs may not be sitting street-side, watching a sidewalk ballet in operation to better understand how a city is working. Instead, they are more likely to be watching, or generating, a data visualisation, which may be showing, in real time, the intricate activities of a precinct in play.

Many of us have now learned to navigate cities aided by the signals emitted by our smartphones, which tell us, with a blue dot, where we are, and tell us, with red lines, which streets have become congested. The penetration of Google into our daily lives, whether through Maps or Search or Email, is now such that Google's parent company, Alphabet, has launched an urban start-up that seeks to integrate the digital intelligence it's captured in order to reshape the physical fabric of cities. Sidewalk Labs, whose mission is to 'reimagine cities to improve quality of life', is prototyping and investing in new approaches to public realm design, transportation, sustainability, outdoor media and community development in ways that leverage its vast data assets and algorithms to build a cities 'from the internet up'. Just as Google epitomises the way platforms have utterly embedded themselves within our communications spaces, so Sidewalk Labs seeks to act as 'a platform' for the acceleration of urban innovation through data harvesting technologies and services. Its marketing positions the company well away from the smart cities movement.

As Sidewalk Labs tells us, digital platforms have not only become an everyday part of our experience of the city—whether occupying our minds during our daily commute, helping us navigate streets, familiar or strange,

connecting us with anonymous drivers, or feeding our desires to roam cities in far-flung destinations—they are also seeking to reshape the built fabric. You might not even need to look up at your traffic signals anymore; they may be embedded into the footpath, to save you from looking up from your phone. But, perhaps more significantly, the companies that have designed the platforms that you, or many others you know, use on a regular basis, are extending their services into domains of urban management and design. Quaint distinctions between the 'built' and the 'digital' are collapsing, just as software makers are literally becoming 'city builders'.

With big tech platforms continuing to evolve into new service domains, so the tactics used by these companies are now being adopted as a mainstream business strategy. 'How will you make your technology a core of an ecosystem?' is a critical question any start-up is taught to ask (Church 2017). The 'Uber model' isn't just for Uber, it's for any utility or infrastructure to try (*try*) to adopt. Platform strategy is increasingly urban strategy, an approach to building digital services in ways that ensure end users are also producers of sorts. It is an approach to service design that has gone by different names, including 'sharing economy' companies, in recognition that platform users will always be sharing, trading or 'co-producing' value. But what the sharing economy label missed was the critical role played by data architecture—a set of protocols and standards— in ensuring platform companies continuously learn from, extract, and commodify the informational outputs of all 'sharing' they facilitate. As attention has turned more and more to the way digital behaviours are increasingly governed by algorithmic inputs, nudges and biases, so too has attention pivoted towards the significance of the platform itself, and its role in governing ecosystems of users, interactions and experiences (Plantin et al. 2016).

What kinds of cities does this platformed condition create? Once futuristic ideals of the 'real time city', cities enlivened with information richness, capable of revealing the complex natures of urban interactions, have now rapidly resolved into vast proprietary data holdings. Companies that structure our digital interactions now see cities as opportunities for platform intermediation. In a very real way, our cities are being imagined, experienced and even designed to function in ways that resemble the ecosystems of interaction that are built when a colourful app becomes popular. To

paraphrase Geert Lovink, we are no longer living in Castell's network society but in 'platform capitalism', oriented around the data harvesting capabilities of large digital platforms who leverage data capital to support ongoing acquisitions and services (Vecchi and Numerico 2016). Technology strategists now refer to the city being run 'as a platform', and even whole nations, or city-states, adopting 'platform strategy' to accelerate their global influence (Choudary 2019). This platform age means negotiating new tactics, new players, new governance models and new data-driven business strategies, and new interfaces for everyday interaction.

This is platform urbanism. Try as we might jump off this train, we may well be on it for the long haul.

Why I Write This Book

Just as our extended train scene reminds us how many eras of networked technologies remain 'co-present' as an everyday experience of cities today, so we need to remember that platforms themselves are not without their histories. This era of platform businesses and platform societies emerged from an important set of practices, imaginaries and expectations that looked to digital technologies as tools with which to change the world. As naïve as this attitude may now seem, there remains much about this more hopeful era that still remains present, and with us today.

As Mattelart and Mattelart have put it: 'The age of the so-called information society is also that of the production of mental states' (1998). My interest in writing this book is to try to capture a sense of the historical emergence of our platform*ed* condition, and the way its emergence has been shaped by particular ideas and imaginaries as much as technologies and business practices. The intent here is to offer a way of thinking about the implications of platform services not only as contemporary companies achieving particular spatial or political economy impacts, but as part of dynamic socio-spatial processes of urban transformation. This recalls the words Tarlton Gillespie and Mike Ananny, who have emphasised that 'to understand the power and invisibility of platforms […] we must study how they change' (2016). To return to the language of the cultural geographer Doreen Massey, I'm interested in thinking through a contemporary

platform condition not only as a set of datafied spatial indices or extractive algorithms, but also as a 'simultaneity of stories-so-far' (2005: 109). The idea here is to allow for the co-existence of difference, and of many different narratives that have helped give shape to the kinds of interface technologies and data-driven services that structure and intervene to increasingly shape the way we know and experience cities today.

This orientation is not intended to underplay how significant is the nature of power exerted by global platform companies, and their capacity for data extraction and commodification. However, as urban technologies, platforms institute relational ecosystems that extend beyond (but certainly also depend on) conditions of data extraction and use. To try to understand how platforms 'make themselves urban' is to consider, as one piece of the puzzle, how platforms were imagined into spaces of radical potentiality, shaped by an enduring belief in the power of information to set citizens free. Platforms like Facebook and Google were not borne as data agglomerates but as software experiments, and their rapid scaling over the decade between 2008 and 2018 was one of the greatest examples of crowdsourced intelligence the world has seen. Engaging with platform services is today an integral part of being an urban citizen and as such involves many different kinds of value-sharing, not only the value extracted by technology companies.

This has been the challenge of platform studies, a field that has grown up in response to the explosion of social media: to address platform influence in ways that avoid painting them as either all powerful or merely instrumental (Gillespie in Clark et al. 2014: 1447). While it is clear that platforms play an increasingly significant role not only as digital actors but major economic actors in their own right, shaping key dynamics of urban life, how we understand the nature of their *influence* of platforms remains a complicated affair. Those who have contributed to the formation of platform studies have recounted several reasons for this. In part, there is a challenge of ubiquity. As Mike Ananny reflected: 'As social media platforms inseparably embed themselves in social life, a paradox emerges: they become both more powerful and harder to see'. In conversation with fellow scholars, Van Dijck described the manifold problems associated with examining the influence of social media platforms when they operate with invisible back ends and entangled data streams—but also when

there remain unstable and often unknowable relations between platforms and their owners (Van Dijck in Clark et al. 2014: 1448). Such challenges are fundamental to an emerging body of work around platforms and cities, too.

Defining Platform Urbanism

With cities and their informational infrastructures now increasingly framed as dense landscapes for platform intermediation, 'platform urbanism' is fast becoming a burgeoning field of urban studies literature. Where I was initially exploring the terrain of platform urbanism through the lens of open data platforms, urban informatics and citywide digital strategies (Barns 2014, 2016), the nascent field of platform urbanism more recently began to attract considerably more interest in the wake of influential works on platform capitalism (Srnicek 2016; Olma 2014; Vecchi and Numerico 2016; Langley and Leyshon 2017). This critical digital economy scholarship has been accompanied by growing attention towards the increasingly infrastructural nature of platforms. As global platforms have evolved from spaces of connection and socialisation to become major infrastructures upon which much of modern life depends, their dominance has provoked myriad calls to 'think infrastructurally' about the contemporary nature of platforms and their influence (Plantin et al. 2016; Gillespie and Ananny 2016).

Drawing on insights from infrastructure studies has allowed platform theorists to consider the influence of platforms in terms of what Bowker and Star have called the 'scaffolding in the conduct of modern life' (in Gillespie and Ananny 2016); the largely unseen social and technological forces governing public action. Platforms, as infrastructures, operate as increasingly 'embedded, transparent, taken-for-granted, ruled by unquestioned standards, and visible only when seen as failing' (Star and Ruhleder 1996). Calls for a theoretical 'bifocal' between infrastructure studies and platform studies, as made by Plantin et al. (2016), have also provoked new lines of enquiry about the 'platforming' of diverse urban infrastructures and economies, whether housing, transportation, accommodation or labour markets, as examples (Van der Graaf and Ballon 2018; Scholz 2016).

This pivot towards a platform-*ed* urbanism has marked a shift in focus away from the qualities of 'sharing', denoted by the sharing economy, and the logics of 'smartness' or 'real time' connectivity in shaping digital urbanism. The focus has shifted towards the extractive dynamics of platform companies and the productive natures of their machine-learning algorithms (Kim et al. 2019; Crommelin et al. 2018; Wachsmuth and Weisler 2018; Barns 2019b). Thus for Rodgers and Moore (2018: para 7), in an online roundtable hosted on the web journal *Mediapolis*, 'platform urbanism invokes for us a twist on the notion of "platform capitalism", foregrounding the possibility that there are emergent, irreducible, co-generative dynamics between platforms and the urban'.

At the time of writing, platform urbanism therefore speaks to a set of burgeoning ideas about the how the increasing ubiquity of platform ecosystems is reshaping urban conditions, institutions and actors. The term is used to capture how the particular dynamics of platform ecosystems entangle private and public organisations as well as citizens (Van der Graaf and Ballon 2018). Platform urbanism is also increasingly understood as the manifestation of digital or platform governance for cities (Van Doorn 2019; Gorwa 2019). This lens addresses the layers of governance relationships that structure interactions between different platform participants, which increasingly extend to urban institutions and citizens, as much as 'traditional' platform users like online users, advertisers, media organisations and software providers.

And yet, when we consider the space of the urban as a kind of *platformed* condition, increasingly constituted by the protocols and conditions peculiar to platform architectures, we start to confront a set of familiar challenges. The relational ecosystems of platforms certainly implicate questions of governance, behaviour nudging and value extraction associated with algorithmic governance (Leszczynski 2016; Ford and Graham 2016; Kitchin 2017; Pasquale 2015; Gillespie 2014; Kwan 2016; Sadowski 2019). They also highlight the growing and necessary politicisation of code in the production and mediation of geographical knowledge and practice (Ash et al. 2018). For this reason, the 'invisible back ends' of platforms have been subject to increasingly critical scrutiny, as forms of algorithmic control and the 'datafication' of the everyday (Van Dijck 2014;

Sumartojo et al. 2016). At the same time, these 'back ends' also implicate a range of different sensibilities and modes of urban experience.

Drawing on many decades of engagement with the potent influence of *technics* over the discursive representations of technologically-subsumed urban space, geographers have done much to advance how it is that we "think the digital" as not simply *set apart* from the urban, but deeply implicated in its ongoing reproduction. Today, geography may indeed be in the midst of a 'digital turn' (Ash et al. 2018), as increasing numbers of scholars turn their attention to the multiple ways in which geographical knowledge is becoming intensely inflected by digital practices. In this sense, geographers are well-positioned to understand the relational and productive dynamics of digital transformations, attentive to the ways in which new technologies are intimately involved in the transformation of place- and space-based social worlds (Graham 2005; Crang and Graham 2007; Amin and Thrift 2002). To understand the place-based practices of the material world through the logics of 'the virtual' and of computational dynamics has necessitated a significant conceptual shift, responsive to the changing technical parameters of digital technologies, and the computational means by which spatial configurations, experiences and flows are enacted (Dodge and Kitchin 2004; Ash et al. 2018).

As more and more scholars now adopt a 'platform studies' lens to the study of cities, we can draw from diverse relational approaches to mapping platform dynamics across diverse urban contexts and conditions. The risk for burgeoning studies of platform urbanism is that the space of the urban is seen to be simply coopted and subsumed by globalised platform infrastructures and algorithms (Leszczynski 2019). How we see platforms shaping or implicating cities depends, fundamentally, on how we conceptualise the nature of the urban: through labour markets, housing conditions, transit environments or perhaps places to (no longer) get lost in. As a historical geographer of sorts, I am interested in capturing dynamics of urban transformation that are not only spatially mapped in *datafied* forms, but also embody fluid temporalities and encounters. As such, I continue to infer, from Lefebvre (1991: 38–39), the need for diverse epistemological strategies through which to interpret urban life, in ways that remain alert to different registers of socio-spatial experience, encompassing but also extending beyond ontologies of control and appropriation.

One such epistemological strategy is that of retrieval—to find and piece together the historical narratives and hopeful ideas that led us here—as a kind of resistance to the foreclosure of alternate possible futures.

In this book I consider platform urbanism as a relational process; and try to pay attention to the co-constitutive natures of urban institutions, actors, governing tactics, modes of expertise, training data and ways of knowing and designing cities. A key focus is on the reproductive conditions of platforms, set in play through methods of platform intermediation that intervene within the fabric of cities to render diverse urban sites and relationships as 'platform ecosystems'. Under conditions of platform intermediation, the urban scene becomes a platform ecosystem, subjected to the deepening recombinatory conditions of platform governance and its proprietary opacities. How we think through conditions of relationality as structured within platform ecosystems is, in turn, critical to the formulation of critical alternative responses to platform urbanism.

The Structure of the Book

This book is loosely structured as a series of reflections on how platforms, and 'platform thinking', is implicating thought and practice today about cities. It is not intended as empirical work, but more a set of expositions about the challenges provoked by processes associated with platform intermediation: the altered states engineered and imagined as platform ecosystems. A set of key concepts are designed to contribute to lively and emergent debates about the nature of platform urbanism: its historical emergence, and key challenges for urban theory, practice and politics. Reflecting primarily on the particular imaginaries and ways of thinking associated with the development of platform ecosystems, the book is, unfortunately, largely focused on initiatives, companies, interventions and ideas that emerged from United States and the UK. This is not intended to reinforce an overly Anglo-centric account, particularly as platform urbanism is manifest in diverse cities of the world. As such, the ways in which relational ecosystems of value are mapped and conceptualised across diverse urban contexts and political environments matter a

great deal, and it is clear that a set of radically different data architectures are now shaping alternate platformed cities across the world.

Key concepts

The key concepts covered in this book are summarised in Table 1.1.

In Chapter 2 I discuss the development of platform studies as a field formed during a critical decade that would, in effect, redefine the terms and conditions of our 'always on' age. If the early years of global 'dotcommania' were characterised by a wild abundance of hyper-textual formations, giving rise to chat forums, 'weblogs', forums and list-serves, the short, mind-bending decade of 2008–2018 witnessed the extreme *gravitational pull* exercised by major proprietary platforms. Drawing on concepts of media ecologies, platform studies established a way of thinking about conditions of a connected society which combined a focus on methods of computational design and architecture with forms of expression and communication. The insights of platform studies scholars also help us to remain sensitive to the interplay between the discursive and technical, when we look back on how platform-based approaches to information and data governance came to be so readily adopted.

In Chapter 3 I situate platform urbanism within the context of ideas and historical approaches to 'computing the city', including the emergence of urban informatics and smart cities. In this chapter I discuss the politics of urban technology as historically oscillating between a hopeful orientation towards the potentials of participatory, networked governance, and fears of a centralised, hierarchical system of urban control. The recent decade that created our platform age, 2008–2018, witnessed the proliferation of distributed and ubiquitous technology into everyday urban spaces, facilitated by the increasingly miniturised and dematerialised nature of computing. But this process of technological transformation was also accompanied by a set of aspirations that looked to the space of the city as a space of *political potential*—specifically, where the distribution of mobile, wireless computing could be used to advance a more participatory approach to smart city planning approaches. Just as the participatory potentials of an 'open web' were coopted to support the platform architectures of social media, so the 'platforming' of urban computing benefitted from its alignment to a broadly democratic or progressive urban politics, embodied through notions of the 'City 2.0' and, later, the 'sharing' economy.

Table 1.1 Key concepts

Platform intermediation	A key concept in this book is that of platform intermediation. This term captures how platforms act to 'produce' platform ecosystems that depend on platform-based data infrastructure. Intermediation as a process must always change and evolve, and is critical to understanding how platforms change, grow, scale and evolve so rapidly. This concept is critical to emerging understandings of urban governance in an era of platform scale
Platform ecosystems	Platform ecosystems describe the relationships established by platforms when they 'intermediate' a marketplace or set of existing relationships. The term captures the way platforms tactically reconvene diverse relationships and, by so doing, create dependencies on platform infrastructure
Value-sharing	Platforms intermediate conditions of value-sharing between participants or users. Platform economists call these 'two sided markets'. Value is also shared between participant users and platform owners, however, attention towards this value is neglected when too much emphasis is placed on the 'sharing' of value between platform users, to the exclusion of other kinds of value generated by platform participants
Recombinatory platform governance	The process of orchestrating and engineering diverse platform ecosystems in ways that mimic broader conditions of open innovation. In this book I describe this as a form of recombinatory governance, capturing dynamics of information sharing that are at once 'open' through interfaces and mechanisms of value-sharing and intimate encounter between participants, but also 'closed' through the proprietary opacities of API infrastructure and machine-learning algorithms
Intimate publics	Platform interfaces and relationalities engender intimate publics as much as they extract data value and promote surveillance. Modes of affective and multisensory interaction via platforms remain critical to the embedded nature of platform ecosystems in everyday urban lives and to developing accounts of platform urbanism

Chapter 4 is a momentary interlude: a personal reflection on life as a smartphone-dependent urban subject, habitually interacting with platform ecosystems as ingrained interfaces of urban life.

In Chapter 5 I explore the twin movements of open data activism and the sharing economy as fields of ostensibly progressive urbanism, whose expansion from fringe to mainstream reflected the extension of the platform business model into public policy and urban domains. As examples of emergent platform ecosystems, the app economy helped accelerate the 'opening up' of government data, via 'Government as a Platform' frameworks, shifting a focus on government transparency previously attached to the open government movement to the needs and opportunities of the data economy and of data-driven urban services. The rise of the sharing economy is also discussed as one that usurped more collectivist notions of collaborative consumption around the business models of the platform economy.

In Chapter 6 I turn to the field of platform economics, which has established a different set of conceptual methods with which to understand the relational dynamics of platforms and their ecosystems. A field of microeconomics that emerged in the early 2000s in response to the dot-com era, platform economics examines the art of platform design as the orchestration of multi-sided markets, replete with diverse 'steering' tactics designed to bring both sides of a marketplace on board. This process of market orchestration helps capture the dynamic of platform intermediation as an active but always unstable set of relational tactics. As such, we can see the dynamics of platform intermediation seeking to engineer urban relationships around 'ecosystems' that are orchestrated around a particular model of computational architecture. Fueled through processes of data commodification and financialisation that congeal around this architecture, such intermediations facilitate the production of platform scale.

In Chapter 7 I address some key principles associated with the 'platforming' of urban contexts, bringing together some of the different conceptual insights discussed thus far. I extend the concept of proprietary opacity to explore how platforms institute a kind of recombinatory urban governance, a Janus-faced way of governing that is 'open yet closed'. While there is today increasing attention on platform governance as a *relatively*

new imposition, my focus in this chapter also turns to how contemporary principles of platform governance are quite consistent with previous generations of commercial software innovation, and also link us back to cybernetic imaginaries. As such, we can see how cybernetic dreams of self-learning systems are being instrumented through conditions of engineered platform intermediation, through a short discussion about ride-sharing company Uber.

In Chapter 8 I address the experiential and performative natures of platform ecosystems as being critical to future engagement with platform urbanism. Drawing on the idea of 'digital intimacies' I discuss the need to affirm, as part of an emergent terrain of platform urbanism, performative entanglements between code, commerce and corporeality, lively to our enduring passions for connection and personal encounter. This chapter also examines how these platform entanglements are becoming interwoven into the fabric of the city, through platform-oriented destination marketing and urban brand-scaping by cities, evident in the growth of urban light festivals and public art programming.

Chapter 9 addresses the recent civic responses to platform intermediation through the lens of urban data governance. This chapter highlights a range of different data governance models currently in play, and how these define different roles for city authorities acting as custodians of their city's data assets. The development of urban dashboards, urban data marketplaces, and civic data trusts represent examples of cities acting as proactive champions of urban data as public infrastructure, supported by increasingly sophisticated approaches to data sovereignty and data commons. The data governance challenges associated with attempts to build a city 'from the internet up' by Sidewalk Labs in Quayside, Toronto highlight the growing politicisation of urban data and platform ecosystems. At the same time, the data governance conditions enabled via global platform intermediation, in the case of a company like Uber, continue to evidence powerful asymmetries of data access and use between global platform providers and place-bound civic authorities.

I conclude by reflecting on the need to think through different relations of value enacted through platform ecosystems. Cities, I argue, are well-positioned to advance new regulatory approaches to platform governance, underpinned by an ethics of public value. Widespread recognition of the

value of platform ecosystems in the acceleration of machine-learning tools, artificial intelligence and digital surveillance signals growing demand for new regulatory models that respond to asymmetries of market power and data governance. In this context, cities will play a vital role in expanding alternate designs and infrastructures of platform ecosystems, in ways that rearticulate the values of our public sphere in shaping—the 'digital public spaces' of our intensely-connected lives.

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2

When the Web Became Platform

In which I discuss the way new media scholars have come to approach the 'platforming' of the web, a process that has seen the discursive and technical logic of platforms come to shape the very infrastructure of digital connectivity and creativity.

Introduction

Let's begin with some definitions. We have, after all, had platforms for a long time, and as such the meaning of this term has had many opportunities to mutate. We've known train platforms, political platforms and publishing platforms. We tend to build platforms as the basis for other, more interesting things, to happen—or, in the political domain, as the basis for policies to pursue. We get on and off platforms. According to the *Dictionary of Cambridge*, the word 'platform' can be defined in three

S. Barns, *Platform Urbanism*, Geographies of Media,
https://doi.org/10.1007/978-981-32-9725-8_2

ways.[1] Firstly, platforms are defined in terms of structure, as in a 'raised level surface'; secondly, in terms of ideas, as in the position declared by a political party; and finally, in a computational sense as in the specific programmes you can use on your computer or smartphone. This third definition, most relevant to our discussion, captures the integrative properties of platforms as they are constituted in the digital age, capable of linking hardware and software through designated standards.

When it was first adopted by the computer industry in the mid 1990s, the word 'platform' wasn't quite the focal point it is today. Microsoft would describe Windows as a platform; Netscape established a 'cross-platform' strategy for its web browser (Plantin et al. 2016). The platform was something like software; software was computing; computers sat rather bulkily on our desktops. Use of the word 'platform' seemed almost intentionally designed to deflect attention *away from itself*, towards the applications and services enabled by software. Indeed, it was the services generated *beyond* the platform itself that appeared to be most important. As put by the platform economists Evans, Hagiu and Schmalensee, a software platform can be defined as simply one that 'makes services available to other software programs' (quoted in Helmond 2015: 4).

The lens would begin to shift in the mid-to-late 2000s. At this time, websites had started to experiment with novel uses of 'user generated content' (UGC), which would in turn morph into what became known as 'social media' (Bogost and Montfort 2009b; Gillespie 2010; Plantin et al. 2016). This was when Mark Andreessen, a founder of Netscape and co-author of the Mosaic browser, expressed his frustration about how slippery the term platform had become, quipping: 'If you can program it, it's a platform. If you can't, it's not' (Andreessen 2007, quoted in Bogost and Montfort 2009a: 3). The frustration here stemmed from the fact that platforms were being framed in terms of the level of *communication* they promoted, not necessarily their *programmability* (Gillespie 2010: 358).

This was the dawning of the era of Web 2.0. The potential for new, more active modes of digital participation promised a bright future of

[1] Gillespie's 2010 discussion of the politics of platforms reviewed different definitions of the platform based on the Oxford English Dictionary, Gillespie, T. (2010). The Politics of Platforms. *New Media and Society,* 12, 347–364. The Cambridge English Dictionary definitions of platform can be found at https://dictionary.cambridge.org/dictionary/english/platform.

decentralised power and expanded political possibilities (O'Reilly 2009). As such, surrounded by Web 2.0 hype, many of us were introduced to the notion of the platform as an *intensely social space*. We may have been buoyed by newfound connections with old school friends (Facebook)—'gosh I *wondered* what happened to you!'—or new ways to infuse your personal 'down time' with the stream of consciousness reflections from a distant professor you'll likely never meet (Twitter). Platforms were about liberating you from the stuff you didn't want anymore (eBay); they helped you find the apartment you needed when you skipped town (Craigslist).

A defining characteristic of these new platforms was, at the time, their capacity to blur the lines between 'makers' and 'consumers' of digital content. A *Pew Internet* report from this time described the advent of Web 2.0 as 'the ability of people to use a range of information and communication technology as a platform to express themselves online and participate in the commons of cyberspace' (quoted in Gillespie 2010: 351). Charles Leadbeater described an era of 'Wethink' in which the internet was emerging as a platform for mass creativity and innovation—which, in turn, was giving rise to a society no longer based on mass consumption but on mass participation (Leadbeater and Powell 2008). To O'Reilly (2005), Web 2.0 was when *the web became platform*, no longer a medium for the publication of information, but an infrastructure to build applications on (Gillespie 2010: 352; Helmond 2015: 3). The proliferation of new spaces for digital social interaction, facilitated through newly dreamt-up social media platforms like YouTube and Facebook, was embraced by many media scholars as evidence of the interactive and collaborative capabilities of the internet (Munster and Murphie 2009; Ang and Pothen 2009; Bruns 2008).

The flourishing of digital culture in the early 2000s embodied the potentials of distributed web forums to enliven spaces of cultural and creative possibility. Many were also hopeful that these more networked and participatory forms of organisation and communication might topple existing power structures, and promote radically better conditions in which participatory democracy might thrive. New media advocates such as Pierre Levy (2001), Henry Jenkins (2006, 2009) and Howard Rheingold (2002), for example, saw the networked experience of online interaction as indicative of new kinds of social coordination. Through exponentially increasing network links, once-passive consumers of media could be transformed

into active producers and creators. Rheingold's *SmartMobs* (2002) captured the radical potential of spontaneous interaction, when groups of people, connected through newly enabled mobile technology, were able to coordinate their actions, clustering together at particular places and times, resulting in spontaneous public protests or expressions of coordinated play. Clay Shirky, writing in an essay for *Foreign Affairs*, explained that as the communications landscape gets denser, more complex and more participatory, the networked population would gain more access to information, and with it, more opportunities to engage in public speech, and an enhanced ability to engage in collective action (Shirky 2011). In regions controlled by authoritarian political regimes, including Egypt, the rise of social media helped fuel a newfound information abundance, and increased citizens' ability to document and share what they were seeing and experiencing, with significant political consequences (Tufekci and Wilson 2012).

In advanced western countries, the notion of a 'participatory culture' was used by Jenkins (2009: 3) to describe a radical cultural shift taking place, as online users adopted new practices of media consumption and communication which contrasted dramatically with older notions of passive media spectatorship. The rise of the 'produser'—a hybrid of the producer and the consumer—pointed to the potential not only for content creation but also for wider conditions of production to become far more collectivised (Bruns 2008; Beer 2009). To Bruns, a wider societal shift towards conditions of 'produsage' would entail more fluid, flexible, 'heter-archical', and evolutionary modes of production, which would ultimately replace more 'top-down', pre-determined and rigid structures of the corporate sphere of media production (2008: 70). These were conditions embodying what Internet pioneer Pierre Levy described as a 'collective intelligence' (1997), harnessing the collective, connected intelligence of all participants to direct their contributions where they are best able to make a positive impact (Levy 2010). To Levy, this was the basis for a real time, direct democracy of the 'virtual agora' (1997).

It was an era when the growing abundance of information, produced through the proliferation of platforms, was closely linked to conditions of emancipation, creativity and democratic potential. Underpinning the

hopes of this era were a set of Habermasian assumptions about the relationship between a 'free press'—specifically, the growth in print culture and literacy as made manifest in the spread of books and pamphlets from the late eighteenth-century onwards—and that of a thriving public sphere (Habermas 1989). Acts of assembly and dialogue were, in this conceptualisation of the public sphere, fundamental to the legitimation of democracy. In a nutshell, as Craig Calhoun summarised, 'a public sphere adequate to a democratic polity depends on both quality of discourse and *quantity of participation*' (italics added [1992]). An outpouring of participation via digital platforms in this formulation could facilitate more distributed forums for deliberation, which were less dependent on traditional institutional forms (Shirky 2009). Not only were user generated and 'social' forums highly distributed, they were also associated with a history of subversive activism, embodied in hacker culture, which saw the computer as a revolutionary tool (Brand 1968; Levy 1984).

Today's major platforms, including YouTube, Facebook and Twitter, rode the wave of optimism towards the potentials of a participatory web, both in enhancing personal creativity and supporting a more deliberative democracy. From a media perspective, the rise of platforms embodied the disruption of highly centralised content distribution models, allowing for lower barriers to entry to enable more niche genres and content offerings to reach highly distributed, global audiences—known as the 'long tail' thesis as espoused by technology advocate Chris Anderson (2007). Platforms were emblematic of a major shift away from traditional 'one to many' modes of media communication towards 'many to many' forms of content sharing and public participation (Butt et al. 2016; Rheingold 2002; Ang and Pothen 2009; Beer 2009; Beyea et al. 2008). The optimism associated with participatory media benefitted platform companies in important ways. In particular, it allowed major platforms to position themselves as essentially *neutral* intermediaries of information and content sharing (Gillespie 2010: 357). They were, to refer back to the Habermasian conception, de facto public spheres, spaces that encouraged discourse between free citizens and enhanced the *quantity of information* accessible in democratic societies. As programmable software, in the Andreessen sense, their function was simply to 'pass any and all content without discrimination'. In this way, a social media site like Facebook was able to evolve in a

short space of time from its role as a 'social utility', or 'social directory', as it described itself in 2006, to that of a 'platform' in 2007 (Helmond 2015: 3).

As defacto public spheres, however, the operations of these platforms would come under increasingly critical scrutiny, particularly from media and internet scholars sensitive to the ways in which media, perceived through the lens of 'media ecologies', shape fundamental perceptions and relationships with the world—best encapsulated by McLuhan's formulation that 'the medium is the message' (1964; Bogost and Montfort 2009a). By paying attention less to the particular content or information being shared freely across new digital platforms, and more to the way in which the particular software environments of platforms shaped the content and creativity they facilitated, media studies scholars Ian Bogost and Nick Mountfort would call for a 'platform studies' approach to investigate the underlying computer systems that supported creative work. Their work *Racing the Beam: The Atari Video Computer System* (Bogost and Montfort 2009b) took this approach to video games, but the authors would subsequently articulate the case for a 'platform studies' approach to any 'computational or computing system that allow developers to work creatively on them' (Bogost and Montfort 2009a). In more recent years, this platform-focused perspective has attracted more and more interest, not only across diverse scholarly literatures but in business strategy and policy contexts as well.

Here Comes Platform Studies

When they first advocated for a 'platform studies' approach to digital media, Bogost and Montfort (2009a) argued that the computational infrastructures of platforms needed to be taken seriously by scholars of new media, not kept in the background. Doing this, they argued, necessitated a combination of 'technical rigour and in-depth investigation of how computing technologies work' (vii). Importantly, platform studies would use such analyses to better understand how the *technical design* of platform infrastructures played an increasingly influential role in shaping

cultures of networked participation. In this way, the specific technical affordances of platforms would come to be understood not only in a narrow, computational sense, but as actively shaping the conditions of networked interaction and sociality that emerged (Van Dijck 2013).

Platform studies in this regard can be seen to have emerged out of what Meyrowitz (1994) called 'medium theory', in reference to works that focus upon 'the potential influences of communication technologies in addition to and apart from the content they convey' (Meyrowitz 1994). In line with Mannovich's call for a 'language of new media', this approach looked more closely at the operations and categories of computer science that allowed new media to be made 'programmable'. This turn to software informed a closer recognition that, beyond the outpouring of creativity and content sharing enabled by platforms such as YouTube and Facebook, there was a need to understand the particular *performativities of code* and the structural dynamics of software systems, if scholars were to understand the kinds of communicative environments they produced (Gillespie 2010; Butt et al. 2016; Nieborg and Helmond 2016; Bogost and Montfort 2009b)

Taking up the challenge, Tarlton Gillespie, writing in 2010, provided an influential account of how 'platforms were political' by examining the tactics used by YouTube to position itself as a content sharing resource. In this piece, Gillespie wrote of finding a change on the YouTube website after Google purchased it in 2007. A paragraph describing YouTube, he found, was amended so that its service was no longer described as a website or community but 'a distribution platform for original content creators and advertisers large and small' (YouTube 2007 in Gillespie 2010: 348). While this point could not easily be disputed, Gillespie argued that YouTube's platform role had moved far beyond that of a 'facilitator' of content distribution. In fact, the extent to which it was able to dominate the video sharing experience meant that, ultimately, YouTube had become, seemingly inadvertently, one of 'the primary keepers of cultural discussion on the Internet' (348). And yet, he argued, public dialogue around YouTube's role, and regulatory responses to its influence, *did* perceive the platform to have particular influence over the content being distributed and shared. Unlike major media conglomerates, who had become tightly regulated in recognition of the influential role they played in shaping public discourse, YouTube was being treated differently. But as Gillespie pointed out, its role

was hardly neutral: '[C]hoices about what can appear, how it is organized, how it is monetized, what can be removed and why, and what the technical architecture allows and prohibits, are all real and substantive interventions into the contours of public discourse' (Gillespie 2010).

For Gillespie, the concept of 'platform' needed to be recognised as playing a highly *discursive* role for YouTube, in serving to detract attention away from its public influence. 'Platform', he argued, performed strategically as what Bazerman had called a 'discursive restive point' (in Gillespie 2010: 348). For Gillespie, discursive tactics such as these marked out the platform as a *key site for the political* (Gillespie 2010). While platforms facilitated the flourishing of online social media interactions—an increasing in the quantity of public information being shared—by positioning themselves as neutral intermediaries they were simultaneously able to distance their owners from the actual content being produced. Importantly, this has allowed platform owners to deliberately claim limited liability for any information shared by their users. As I will be discussing, this tactic was later extended to 'sharing economy' platforms who have continued to assert their roles as technology companies rather than, in the case of Uber, transportation companies, in a bid to reduce regulatory exposure and the rights of Uber Drivers.

Platform scholars would come to understand the political nature of social media platforms through the notion of 'disaggregation', described as an approach that involved 'taking them apart and understanding their constituent parts' (Langlois et al. 2009; Helmond 2015). Not only was the platform acting as a 'discursive resting point'; the computational infrastructure of the platform was also highly active in the way it structured the particular conditions of networked sociality. In an article discussing how Facebook was able to 'platformise' the web, Helmond (2015) used this disaggregation approach to tease out the functional significance of the Facebook Developer Platform and its Application Programming Interface (API). As she described, the Facebook platform was an example of the ways in which the 'web as platform' was actively executed *as software development strategy*. This process of 'platformisation' (2015: 2), Helmond argued, had radical implications for the management and flow of informational resources online. We can see how this process has worked through a closer look at Facebook's early evolution as a platform.

Facebook remains the most iconic and contested of global platforms, whose influence over the structures and conditions of networked sociality has been most profound. Today, the company aims to achieve a kind of equivalence between Facebook as platform and the experience of the Internet for its billions of global users, via the Internet.org initiative. A company whose founder and creator, Mark Zuckerberg, has maintained significant control, Facebook was designed by Zuckerberg to re-create in digital settings what he called the 'social graph', or the web of people's real-world relationships. Instead of information spreading 'hub-and-spoke' like from major media outlets, Zuckerberg aimed to facilitate the flow of information 'the way it does at a dinner party, through people they know and trust'. This strategy aimed to disrupt the way media companies influenced forms of content distribution. To Zuckerberg: 'it may no longer be optimal to have a few big media companies in the center controlling the flow of information' (Vogelstein 2007). But to achieve this, Facebook needed a specific technical architecture, one capable of essentially replicating the conditions of the open web, but within a proprietary Facebook operating system. Rather than bundling this operating system to a single, standalone piece of hardware, Facebook instead used the infrastructure of the open web.

Embedded as an expression of the social networks of Facebook users, the Facebook 'social graph' was a metaphor for using real-world social networks as a tool for programmability, which allowed a person's dense network of social connections to be replicated an online environment. As a *Wired* journalist observed in 2007: '[Zuckerberg's] company suggests a new model for how connection, communication, and commerce can work online — a radical and ambitious rethinking of the Internet's potential' (Vogelstein 2007).

Facebook's Developer Platform was introduced in May 2007, and drew on elements of Zuckerberg's earlier work undertaken through a project called 'the Wire Hog'. The concept behind this project was to create something called 'thefacebook' as 'a platform for other types of applications' (Kirkpatrick 2010 in Helmond 2015: 4; Vogelstein 2007). Building on this earlier work, the Facebook Developer Platform functioned in a way that allowed developers to create third party 'apps' (applications) that were built to integrate into Facebook users' profiles, friends, photos, and

events. The growing network of Facebook users was itself an incentive for developers to build apps using the Developer Platform, whose new software creations in turn enhanced the experience of Facebook for its users. The first three days after the platform was launched, 100,000 users had downloaded the programme (Vogelstein 2007). As Vogelstein wrote at this time: 'Facebook now gave even the most modest developer the opportunity to win instant and mammoth distribution through its word-of-mouth engine'. The tactic proved persistently influential. According to Mackenzie, Facebook's continued dominance of platform programmability is evidenced on the social coding site Github, bought by Microsoft in 2018, where Facebook-oriented programmes and code feature highly among the most popular repositories of code (Mackenzie 2018).

As was widely recognised when the Facebook Developer Platform launched, the critical infrastructure enabling this 'match making' of Facebook users and software developers was the API. Widely used as a tool for the development of software systems, the API acts as data exchange or 'data pour' (Liu 2004 in Helmond 2015: 1) between different applications and services, ensuring developers gain structured access to the data and functionality of different applications. APIs are, in short, a foundation upon which others build on. For Facebook, the launch of the Developer Platform, underpinned by its API, would allow the social media website to evolve into a highly sophisticated marketplace for advertisers and software developers. As one of the first companies to successfully evolve from social media site to fully fledged platform, the Facebook Developer Platform underscored how important an API was to the functionality of a website in an era of 'Web 2.0' services.

As is now widely understood, the API acts in a strategic way to enable platforms to essentially 'open' their software to third-party developers for extension into new service domains (Kitchin 2014; Mackenzie 2018). They are what enable software to be extended and developed 'from the outside' by external developers—allowing platform companies themselves to remain relatively 'lean'. For Facebook, rather than relying on a large internal software development capability, the platform could be extended and built upon by a rapidly growing 'ecosystem' of users and developers, incentivised by growing numbers of users to create and share software. Through the language of the API, engagement in the platform could be

framed as a process of 'co-creation', not only by users posting profiles of themselves and their daily activities, but also by software developers extending the functionality of Facebook's overall software ecology.

The API became an essential platform infrastructure. Not only did it facilitate the extension of a platform's reach in ways perceived as a form of 'open innovation' it also ensured standardised principles of programmability could be maintained across a distributed network. This strategic approach to computational design allowed Facebook to, initially at least, remain explicitly aligned to the 'hacking' cultures espoused by the open-source software movement—while at the same time pursuing highly predatory and monopolistic business practices (Baack 2016; Barns 2016; Goldstein 2013; Kitchin 2014). Indeed, the company continues to espouse its hacking culture and relies on open-source software such as the Linux operating system, Apache Web server, MySQL relational database and PHP programming scripts (Mackenzie 2018: 3).

Just as the web was becoming a space for networked participation and co-creation by users, the advent of Facebook and other platform services concurrently showed how companies and organisations could leverage wider software ecosystems to accelerate their own growth objectives. Business websites, government websites, social media websites: all were to become 'platforms' powered by an API, bundled within 'Software Development Kits' (SDKs). The shift supported an outpouring of cultural creativity. Writing on the Digital Public Library of America (DPLA) 'as a platform' in 2013, Australian-based digital humanities developer Tim Sherratt explained that 'portals are for visiting, platforms are for building on'. Where design decisions—how a user can interact with content, what they can do with it—are pre-determined in more traditional websites, platforms deliberately open up these decisions for their users to answer. As he wrote in a blog post:

> Platforms put those design decisions back into the hands of users. Instead of a single interface, there are innumerable ways of interacting with the data. Instead of a single website, the data is free to be displayed anywhere on the web. (Sherratt 2013)

To Sherratt, the API underpinning a platform allows the data that is made available, by a website or digital service, to have value not simply 'because of what it describes, but because of what it *might become*' (Sherratt 2013, italics added). For a large-scale website such as the DPLA, pairing the possibilities of platform design with large-scale aggregation provided phenomenal opportunities to scale how underlying data—in the DPLA instance, a national cultural collection—could be used, adapted, annotated and experienced in ways that exceeded the imaginations of the relatively small number of employees who work at the organisation. In this way, Sherratt (2013) argued that APIs 'help aggregators position themselves as something more than discovery services – as information infrastructure – key components in a broader landscape of access, democracy, creativity, research, and economic development'.

The process of 'platforming', crucially dependent on the infrastructure of the API, could therefore facilitate an outpouring of cultural creativity, while at the same time the distribution of more and more of the world's digital information was essentially being privatised. Both content and software were 'open' for remixing. For libraries who opened up their collections to users, new experiences of historical documentation and resources could be created; mashups reflected the cultural possibilities of empowered 'produsers' who didn't just consume content but tweaked, reworked, rereleased in altered states. Just as cultural collections could be re-imagined as sites for cultural creation and participation, so major aggregators hosting the content being created, such as YouTube, were able to extend their market reach. Using the platform API, content published to YouTube video could easily be embedded and 'widgetised' on a personal website. YouTube was no longer its own individual URL, it could be experienced, via standardised widgets, across any website capable of interfacing directly with the YouTube database. Other services such as the Facebook 'Open Graph' would also allow Facebook to not only distribute information published on its platform to external sites, but to also allow software developers to create external apps that also fed external data back into the Facebook development ecosystem (Helmond 2015: 7).

The API-enabled platform was embraced as a tool not only for cultural creativity and networked sociality, but also organisational change. In 2010 Tim O'Reilly advocated for the potentials of 'Government as a Platform',

or 'Gov 2.0', whereby government agencies were rethought as platforms, designed to attract software developers to build and extend key government services using underlying data made available through government websites (O'Reilly 2010). This approach, O'Reilly argued, could radically transform the way governments procured technology services, by allowing digital companies to essentially 'co-design' software services in partnership with government, rather than this design process happening prior to the procurement of a new software service (Barns 2016). For O'Reilly, such principles could be extended to the very nature of public policy itself. 'Government as a Platform' he argued, could allow software innovators to access and recombine public data to drive new and innovative services for citizens, and to 'better solve collective problems at a city, state, national, and international level' (O'Reilly 2010).

Platform scholars have continued to emphasise the *infrastructural significance* of the API in architecting what were essentially new conditions of digitally networked sociality in a flourishing culture of connectivity (Van Dijck 2013: 142). In her study of Facebook, Anne Helmond recognised the API's role in at once extending the social experience enabled by Facebook apps across diverse websites, while also ensuring the pre-formatting of website data in terms that were consistent with protocols established by Facebook's central databases (2015: 7). In this way, Helmond argued that the 'work platforms do' is not only rhetorical or discursive, but also computational. Though platforms may be infinitely programmable by others, they also establish highly structured and standardised protocols that ensure both external innovation, or *decentralisation*, but also, through pre-formatting requirements, *recentralisation*. Mackenzie has described this ambiguity as a kind of 'proprietary opacity' (Mackenzie 2018).

For platform scholars, while the participatory web had been celebrated for its potential to decentralise and distribute flows of information and creative content, it was increasingly clear that the particular computational architecture established by platforms was ensuring these distributed informational flows were being subjected to controls at various levels of architecture, protocol and interface (Van Dijck 2013: 152; Van Dijck et al. 2018). Platforms could therefore be *seen* to 'engage the flexibility and mutability of programming and programmability to modulate interfaces, devices, protocols and, increasingly, infrastructures, in the interests

of connectivity' (Mackenzie 2018: 4). As platform scholars were quick to recognise, the tools used to 'platform the web' were hardly benign in their influence, but were used in a way that represented a significant departure from the democratic and participatory imaginary of the Internet that platform companies ostensibly espoused. Just as the conditions of networked sociality were being wildly embraced, the key intervention for platform studies was to see how platform design was essentially reconstituting the conditions of networked sociality and the digital public sphere in ways that were both *powerful but also obscure*, reflective as they were of the particular commercial imperatives of platform owners and their 'invisible back ends' of databases, protocols and standards.

To understand that the web was being 'platformed' before our eyes was to pay attention to software design as communicative media, capable of subtly transforming the communicative environments in which humans act and interact (Flew 2017). Platform studies was software studies rearticulated in an era when software had extended its reach into the realms of online participation and content distribution, as infrastructure for the flourishing of digital creativity and culture. As Lev Mannovich argued, in *The Language of New Media*: 'To understand the logic of new medias, we need to turn to computer science. It is there that we may expect to find the new terms, categories and operations that characterise media that became programmable. From media studies, we move to something that can be called "software studies"—from media theory to software theory' (2001). As with software studies, platform studies paid attention to 'what lies beneath' the discursive work of platforms as neutral intermediaries of a Web 2.0 world.

The particular discursive work of the platform was to ensure a highly centralised and coordinated model of data governance could *appear* as a form of networked connectivity, almost autonomously achieved by billions of autonomous, self-directed and highly expressive user-participants. And yet, while the process of 'platforming' represented a departure from the ideals of the internet as a defacto public sphere, it is important to also underline the consistencies demonstrated with previous generations of software development.

As I discuss later in this book, the emergence of digital platform architecture was not something invented by companies like Facebook; it was in

fact entirely consistent with previous generations of commercial software innovation. Indeed, though today's platforms are castigated 'as particular comings together of code and commerce' (Langley and Leyshon 2017), this integration is highly characteristic of the software industry throughout its history—in tandem with the persistent and passionate 'open source' movement. The tactics of Facebook and Google, as emphasised by platform scholars, can be seen to have radically reshaped the architecture of the open internet, but at the same time, they are also consistent with earlier generations of software innovation. Their tactics have also crucially depended on both computational and discursive strategies associated with networked imaginaries, which can be seen to have been essentially 'remediated' through the API-enabled infrastructure of the platform. When the internet transformed from 'sites to platforms' this process built on previous strategies and tactics of software design, cybernetics and internetworking, that likewise remain central to the contemporary effectiveness of platforms today. We need to remember it is not only computational tools like APIs but also social imaginaries embedded in the work of 'internetworking' that helped facilitate the rapid scaling of platform companies we live with today.

Conclusion

In this chapter, I have explored how a 'platform studies' approach developed as a way of understanding digital sociality, in ways that combined a critical focus on computational design in shaping conditions of creativity and connectivity. As I've discussed, recognition among new media scholars that the technical affordances of code, software design and interface shape the conditions of networked sociality in vital ways has led to focused attention on the particular 'work platforms do', both discursively and computationally, to alter how the internet actually worked.

In the following chapter, I want to address the historical context of an emergent platform urbanism. Through the concept of 'city reverberations' I explore how platform urbanism has emerged within a set of ideas about

the digital as a space of urban transformation, which has looked to the potentials of distributed technologies for a more 'bottom up', networked and participatory ways in which people can engage in the co-creation of their urban environments.

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3

City Reverberations

In which I discuss the urban terrain as being historically shaped by constant discursive struggles over its representation—and are therefore intimately shaped by technologies of representation. More recent interest in digital urbanism and the place of 'smart technologies', 'smart urbanism' and 'smart citizens' are situated here as part of longer-term debates about the politics of urban space as an embodiment of underlying ideas about the public sphere, and its constitution as a deliberative space for participatory democracy.

Introduction

As a field whose origins lie in media and software studies, platform studies has taken as axiomatic the central role of media technologies in shaping the conditions or 'ecologies' of the public sphere (Bogost and Montfort 2009; Livingstone and Lunt 2013; Flew 2017). By contrast, urbanism, on the other hand, takes as its central focus the critical importance of *urban spatiality* in shaping the conditions of social and collective life. Both 'hard' and 'soft' infrastructures of urban life—spanning everyday materialities,

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spatial design practices, functional utilities and both distributed and local networks—constitute the conditions of urban life. As such, these conditions are at once technical but also inherently political. Hence architecture will assert its role as inherently political (Scott 2007; Boyer 1996a; Vidler 2008).

Likewise, methods and techniques of urban planning and design have been infused by particular idealised conceptions about the purpose of the city, and its connection to underlying normative questions about the nature of 'the good' and appropriate conditions of justice (Iveson 2007; Pinder 2005; Hall 1988). As Ash Amin and Nigel Thrift described in their classic text, *Reimagining the Urban* (Amin and Thrift 2002), cities are 'agitations of thought and practice'; they are 'brimful of different kinds of political space'. For planning theorist Leonie Sandercock, cities are 'built thought', planning an 'unfinished social project' (Sandercock 2001). Indeed, much of modernism's attraction to the space of the city throughout the twentieth century has reflected its centrality to discourses of activist utopianism, whereby an idealised conception of 'the city' presents itself as what Jameson called a 'fundamental form of the utopian image' (Jameson 2005).

Framed in this way, the politics of the urban is as much to do with political debates over questions of land use or transport, for example, as it is about how particular social imaginaries symbolically enrol particular visions or idealised representations of urban spaces at the expense of others (Ranciere, quoted in Iveson 2007: 41). Different articulations of *urbanism,* whether tactical urbanism, smart urbanism, green urbanism, or a multitude of others, establish a set of normative frameworks and modes of praxis, themselves informed by particular representations of both *how a city should be*, and the role of those who intervene in ways to bring that normative vision into being. Urbanism, in other words, presents itself as necessarily reformist, propelled by a newfound image or conceptual rendering of the ideal workings of the city. This idealised conception also produces, in its own way, the most appropriate role of the reformer, and their necessary mode of intervention—whether as master planner, urban philosopher, street-level tinkerer or interventionist architect. Extending this line of thought, the urban philosopher and sociologist Henri Lefebvre called urbanism an 'ideology' (2003/1970), in which space is made

to appear deceptively neutral and apolitical, but always the 'object' of any seriously purposeful, reformist intervention (164). 'The urban', he argued, is not some pre-given, metaphysical entity, but rather *a 'unit based on practice'* (108, italics added). As a consequence, urban reality itself, with its problematic and practice, is always hidden; 'replaced by representations (ideological and institutional) that bear the name "urbanism". The name plugs the hole, fills the in-between' (40).

This Lefebvrian way of thinking about the production of the urban helps to frame successive waves of urban technological change—extending beyond deterministic impact narratives, by interlinking spatial form, its representations, and social process (Harvey 2000). The tumultuous history of urban modernisation is rendered not only as a set of radical incursions into and changes to the functional properties of city spaces—the laying down of railway tracks, the ripping up of tight-knit suburbs to make way for expressways, the laying down of fibre cables—but as consistent attempts to refashion the very potentialities of urban space as a political project. Indeed, planning historian Peter Hall once described the work of influential urban planners and architects, among them Ebenezer Howard, Patrick Geddes, and Le Corbusier, as being 'utopian, even millenarian' in their natures: their plans for the cities they sought to reform 'resembled nothing so much as secular versions of the seventeenth century Puritans' (1988).

Urban historians, and historians of urban media, have helped illuminate the critical role played by new technologies of representation in the formulation of such utopian visions. Cartographic, aerial, photographic or computational modes of representation have each played integral roles in shaping successive waves of urban transformation and change (Campanella 2001; Barns 2019, forthcoming; Thompson 2005; Mattern 2008). The Scottish urban planner Patrick Geddes needed the 'tools' of scientific calculation and mapping, borrowed from evolutionary biology, to begin to classify cities according to different functional elements like 'place', 'folk' and work' (Welter 2002; Geddes 1915). Likewise Le Corbusier's visions of a well ordered city of machinic circulation depended on the particular perspective afforded by an age of flight (Le Corbusier 1935). The changes these visions necessitate in order to bring about more 'rational' conditions of flow and habitation have not been without trauma. 'No human heart

changes so fast as a city's face' lamented Charles Baudelaire in *The Swan* (Baudelaire 1982/1860), pained as he was by the rapid destruction of his old Paris, as Haussmann's radical plans for his beloved city were made real, accelerated by new technologies of cartographic and photographic representation (Boyer 1996a: 185).

A history of tactical interventions into spaces crafted as replicas of modernist abstractions has even seen the act of walking—whether purposefully or as a rather slow and aimless *derive*—elevated as a political act, in its capacity to resist what de Certeau called 'the scopic drive' and totalising eye of the 'panorama city' (De Certeau 1984). Such acts perceive the operation of power through the miniscule and quotidian technical procedures of everyday life. In their performativity, enacted as movement through space, they speak out against dominant strategies to discipline or contain urban spaces and their subjects (De Certeau 1984; Debord 1958).

A central argument of this book is that platforms, too, govern our spaces—not only by 'hacking' existing regulatory conditions governing the spatial contexts in which populations live and work, in the way that a company like Airbnb won't ask for permission before it reshapes a city's housing landscape, for example (Wachsmuth and Weisler 2018; Sanyal and Ferreri 2018). The nature of platform governance also acts powerfully to reshape perceptions and representations of mobility, connection, transaction and spatial awareness. Just as media scholars have understood 'platforming' as a particular discursive and computational intervention into the currents of digital culture, so too we must take stock of how the spaces of urban computing and sensing have come to be 'platformed'. This, too, is how platforms govern cities: by reconstituting not only what transactions or interactions happen *in space*, but by reconstituting the perceptual fabric *of space,* a fabric that knits socio-spatial practices into something we have come to think of as 'the urban' (Stehlin 2018; Krivy 2018a).

Following this approach, in this chapter I introduce how technologies of ubiquitous media have been advanced within the context of a critical and progressive urbanism over the past decade. As I have discussed, the decade of 2008–2018 proved a short but transformative one, critical to the formation of globalised data infrastructure of vast reach and influence. Likewise, this decade also witnessed the proliferation of distributed

and ubiquitous technology into everyday urban spaces, facilitated by the increasingly miniturised and dematerialised nature of computing. As I discuss, this process of technological transformation was accompanied by a set of aspirations that looked, once again, to the space of the city as a space of *political potential*—specifically, one in which the distribution of mobile, wireless computing might enable a more participatory approach to urban politics and decision-making. Just as the participatory potentials of an 'open web' were co-opted to facilitate the platform architectures of social media, so the 'platforming' of urban computing has benefitted from its alignment to a broadly democratic or progressive urban politics, embodied through notions of the 'City 2.0' and, later, the 'sharing' economy.

Across a number of accounts I will discuss, the 'smart citizen' has been pitted against the 'smart city'. The citizen is empowered through technology to act in ways that support a more fluid, and ultimately deliberative, public sphere; whereas the smart city embodies the cooptation of urban space by large consortia of government and business, acting in concert. The smart city 'disciplines' space in ways consistent with previous generations of technologically-mediated urban reformism. By demarcating bottom-up, citizen-led smartness *against* top-down smart city approaches, the smartphone initially appeared as an emancipatory and empowering technology for citizens. Though recent years have seen much more critical attention towards the capacity for smartphone-enabled surveillance and control, the agendas of urban computing and participatory politics were, for many years, closely aligned.

Smart Citizens vs Smart Cities

Just as social media platforms emerged during 2008–2018 as significant infrastructures for the platforming of digital culture, this decade likewise witnessed the growth of the smart city movement as a particular way of rendering the relationship between information technology and urban management. Broadly embracing the use of information and communications technologies (ICTs) in the management of cities (Kitchin et al. 2015), smart cities not only implicate the activities of city governments, but also represent a shift in the fundamental role and purpose of city

governance in the information age. In particular, smart city visions have incorporated the idea of the city being run as a kind of 'operating system', in much the same way as a computer itself (Saunders and Baeck 2015). The operating system, as envisaged by companies such as IBM and Cisco, renders the diverse 'informational inputs' of urban interaction as capable of being better and more efficiently 'managed' through more integrated modes of urban management (Sadowski and Bendor 2019).

Critical engagement with the smart city across much urban scholarship in recent years has paid attention to how these visions of 'smartness' progress narrow, technologically determinist ways of rendering urban complexity (Luque-Ayala and Marvin 2015a; Wiig 2015; Shelton et al. 2015; McNeill 2015; Kitchin et al. 2015; Leszczynski 2016; Barns 2012; Gabrys 2014). Recognising the potency of 'smartmentality' (Vanolo 2014) and 'smart urbanism' (Luque-Ayala and Marvin 2015a) as lenses through which to diagnose and improve urban conditions, critical urban studies scholars highlight how these renderings of cities, crafted through data-driven methods of smart city governance, will so often be positioned as *necessary prerequisites* for reform (Luque-Ayala and Marvin 2015a; McNeill 2015; Söderström et al. 2014). Critical scholarship has also highlighted the particular influence of the global IT firm, with particular attention towards IBM (McNeill 2015; Wiig 2015; Söderström et al. 2014; Sadowski and Bendor 2019) and other major technology vendors such as Cisco, Siemens and Intel; companies that spent much of the decade pursuing smart city agendas across multiple locations simultaneously (Kitchin 2015; Townsend 2013; Greenfield and Kim 2013; Gabrys 2014).

The Rio de Janeiro intelligent operations centre, called the Rio Operations Centre (ROC), has perhaps proved most emblematic of this approach. Developed at Cidade Nova in partnership between IBM and the City of Rio de Janeiro, the ROC was designed to support the city in its hosting of two major global events, the FIFA World Cup of 2014 and the 2016 Olympic Games. Designed to integrate government data from across 30 different city agencies into a single 'nerve centre', the ROC aimed to provide a holistic view of how the city was functioning, 24 hours a day. The ROC also applied analytical models developed by IBM to more effectively coordinate responses to emergency incidents. Iconic images of

the its 'wonder wall' screens would, in turn, become emblematic of contemporary smart city infrastructure, provoking widespread concern about growing government surveillance, the loss of privacy of urban citizens and the potential for misuse by city authorities or others (Luque-Ayala and Marvin 2015b).

These vendor-backed visions of the smart city have come under intense scrutiny for their failure to address the specificities and complexities of distinctive urban contexts. Here, the representational tactics of smart city enthusiasts—to advocate for a vision of the city as one more capable of being efficiently managed and governed through embedded computational networks—are seen to act politically, by enrolling particular actors in certain ways. As Luque-Ayala and Marvin (2015b: 8) have argued:

> An emerging set of detailed conceptual work is needed to illustrate how smart technologies – data analysis, software systems, networked infrastructure and new digital systems such as sophisticated control and pricing technologies – are used to more intensively unbundle and rebundle users, space, services and networks.

A vision of 'smart urbanism' also resurfaces much that has previously been considered 'tragic' in the history of modern planning (Boyer 1996b). In particular, the idea that cities could ever be managed as a kind of centralised database, an *urban mainframe*, brings to the fore long-held fears of panoptic urban surveillance by the state (Krivy 2018b). But it also mimics many previous waves of technological innovation, which have tended to produce new visions of the city that serve to discipline existing cities by rendering them sites of disorder, in need of 'improvement' through new calculative endeavours (Gabrys 2014). Anthony Vidler (2000), for example, charted the rise of 'photourbanism' as a new kind of urban imaginary afforded by the birth of the aerial perspective as rendered by modern flight. To modernist architect Le Corbusier, flying over Manhattan for the first time in the 1930s, the aerial view ratified his conviction that the architectural past was bankrupt: the city needed a new form. Clearly, as Le Corbusier could see, 'the airplane eye … now looks with alarm at the places where we live, the cities where it is our lot to be. And the spectacle is frightening, overwhelming. The airplane eye reveals a spectacle of collapse'

(1935). The vision of *La Ville Radieuse* ('The Radiant City') borne of the architect's flight over Moscow, created space for 'machines of circulation' (the automobile) that could create fluidity and reduce stagnation.

Like other urban blueprints that came before, the *Radiant City* was both a plan for the city—one designed to sustain attack from their air—but also a project of radical social reform. As architectural theorist M. Christine Boyer has argued in relation to another era of technocratically-charged urban revisionism: '[B]y following the path of scientific methodology and assuming their role to be that of social engineering, [planners] sought an absolute correspondence between the exterior city reality and its truthful and purified representation' (Boyer 1996a). *Dreaming the Rational City*, Boyer's (1987) study of the rise of planning as a professional discipline of urban improvement in America, has underscored the centrality of an abstraction of the city to the 'disciplinary order' of planning. Drawing on Foucault, Boyer recounts:

> [D]isciplinary order […] begins with a fear of darkened places in the city, the shadowy spaces were light and vision are blocked. […] Discipline proceeds from the distribution of individuals in space, it requires an enclosed area, a space divided into intricate partitions where everything has its place, and every place in the order of things. (33)

The systematic rationalisation of urban space, accompanied by the presumed objectivity of successive technologies of representation, has provoked, in turn, a series of resistant political *urbanisms*. Urban activists, most famously Jane Jacobs (1965), would lead activist campaigns that proclaimed the ignorance of the master planner in favour of street-level smarts and 'unexpected treasure hunts' capable of better understanding the complexity of the 'street ballet'. American geographer Ed Soja described the 1960s as one that experienced a breakdown in rationalist, 'systems-level' analyses of city life across the cities of the Western world (1996). Inspired by the emerging logics of cybernetics and feedback, architects and urbanists such as Archigram would seek new conceptual renderings of the city as a 'kit of parts' which could be 'playfully deployed according to the dictates of individual desires' (Scott 2007; Gabrys 2014). Likewise, in this era, a more tactical urbanism was borne, influenced by the

ideas of Lefebvre, Debord and others such as Harvey, Jacobs and Sennett, which advocated the importance of a more embedded kind of urban intelligence—alive to the ways urban complexity could also be expressed performatively on the sidewalk, through the archaeology of material artefacts and in 'everyday' spatial interventions, *derives*, and walks (Mattern 2017; Sennett 2018; Leach 2002; Debord 1958).

Against this historical backdrop, the spectre of the smart city has restaged former battles, through the imposition of a new, 'comprehensive' urban vision—this time empowered by big data, the techniques of machine learning, data visualisation and algorithmic intelligence (Kitchin 2014), which seek to 'govern' the unruly spaces of cities beset by issues of crime, congestion, waste and other maladies. A new 'science of cities' has been in the ascendant (Townsend 2015; Mattern 2013; Thakuriah et al. 2017): data mining, sensing and analytics are tools used to understand cities as complex sites of interaction. In the quest to build 'smarter' cities, big data is used to expose the relationships between discrete realms of urban management and planning, with a view to integrating the management and provision of utilities, transportation, and housing in more 'responsive' ways (Crawford and Goldsmith 2014; Leszczynski 2015; Kitchin 2014). This (re)turn to the quantitative, granular insights afforded by big data has, in turn, seen the resurgence of biological or evolutionary metaphors used to describe the city (Batty 2013; Townsend 2015; Mattern 2013), and a return to the universal laws of physics as a way of understanding complexity (West 2018; Krivy 2018b).

At the same time, the smart city project has itself continued to evolve, morphing from 'smart city 1.0' versions to subsequent incarnations, whether 'smart cities 1.0' or 'smart cities 2.0', '3.0' and beyond (Cohen 2015; Barns 2017). More recent chapters in the history of smart cities reflect, broadly, a move away from a centralised operating model for smart cities, encapsulated in an IBM style set of urban dashboards, towards much more embedded and distributed uses of urban technology by diverse technology players, incorporating 'internet of things' (IoT) technology and accompanied by two-way forums for data sharing, co-creation and participation (Barns 2017). In this second generation of smart city initiatives, platforms for co-innovation and wider participation have become much more central. As a consequence, the emergence of the platform—rolled

out through smartphone interfaces—found itself affiliated with 'bottom up' style of defence against technocratic visions of corporate-backed smart cities.

Critics of smart city programmes working within industry settings, including most prominently Rick Robinson, whose blog *The Urban Technologist* has traced the failures of smart city investments, and Dan Hill, designer and writer of the influential *City of Sound* blog, have each pointed to the inability of many first-generation smart city initiatives to scale or build impact beyond their pilot phases (Robinson 2016; Hill 2013). Advocating for a new approach to smart cities, Robinson advocates for 'bottom-up innovation through investment in open technology infrastructures, and to put the interests of people at the heart of the policies that drive and shape that [smart cities] investment' (para 34). Dan Hill produced a manifesto of sorts called *'On the Smart City: Or, a manifesto for smart citizens instead'* (Hill 2013) in which he implored readers to beware of the 'Urban Intelligence Industrial Complex' dressed up as smart, sustainable urbanism. Against this, Hill called for a renewed focus on 'smart citizens', via the computational capacities of social media and smartphones. Hill was positive about the potentials not of smart cities but of smart citizens powered by social media: 'We see social media-driven activism finding a foothold in the essentially ancient urban form of the square – the two work together, with the dynamics of social media manifesting themselves in these relatively open urban forms' (2013: para 25). Social media dynamics enable both self-organisation and efficient ecosystems, he wrote, reducing the need for 'traditional governance'. As a consequence, the smart citizens movement seemed to be moving faster than that of the more vendor-led smart cities movement, because it 'it relies on loosely joined internet infrastructure overlaid onto the city, and the fact that the city has become the organising principle for humanity' (para 29). Anthony Townsend is another notable advocate who has advanced the role of the smartphone in usurping top-down, technocratic visions of smart cities. Smartphones were, he wrote, 'a platform for reinventing cities from the bottom up':

> You are part of the mind of the smart city itself. And that gives you power to shape the future. Look in your pocket. You already own a smart-city construction kit. The democratization of computing power that started

> with the PC in the 1970s and leaped onto the Internet in the 1990s is now spilling out into the streets. (xi)

In the following section, I explore the backdrop of this hopeful orientation towards the adoption of smartphones, as a tool for the empowerment of 'smart citizens' through more 'bottom up' urban technology. I'm interested here in retrieving some of the anticipatory orientations of urban technologists, whose progressive agendas for urban democracies were inspired and fueled by the potentials of an open internet that was becoming increasingly mobile, distributed and ubiquitous. In an era of platform capitalism and platform urbanism, this time feels different; a time of expectation that saw in ubiquitous technology the capacity to visualise and make real previously invisible currents of disadvantage and power, retrieving, as Hill saw it, relatively open urban forms not dissimilar to that of the ancient piazza or square. At this time, 'the street as platform' was a space of hope.

Imagining the Street as a Platform

The idea of the 'street as a platform', as rendered so eloquently by Dan Hill, held within it the expectations of a more hopeful era of urban computing, when Habermasian ideals of deliberative dialogue fused with ubiquitous computing technologies to render the infrastructures through which urban life was managed as more porous, more open to change. In his iconic essay 'The Street as Platform' (Hill 2008), Hill wrote perceptively of the street of the 'not too distant future', sketching out a series of everyday episodes and localised interactions occurring in a nameless street. He paid close attention to the kinds of invisible data these interactions produced, perceiving a 'new kind of data' in evidence, one that could log the street's real-time behaviour, via smart computing devices embedded in everyday objects.

In this street people used their iPhones to lodge a complaint about a pothole they might trip on, walked under streetlights that were lit only in response to their presence, logged their speed and heart rates on evening jogs via their *Nike* +runners and updated their Last FM music profile

while listening to their iPods. Meanwhile, CCTV cameras, traffic lights, solar panels, sensors and EFTPOS machines were also logging the street's behaviour, monitoring traffic flows, energy consumption and the health of the street trees.

By using the scale of the typical high street as an interpretive lens through which to portray the integrative data processing capacity of urban computing, Hill sought to reshape the contours of an urban space through recourse to an emergent data that was at once 'collective and individual, aggregated and discrete, open and closed' (2008: para 4). This street-level data evidenced a number of different forms of human-computer interaction (HCI) in operation: the sensor web devices embedded in trees, the CCTV cameras and the use of RFID tags enabled local behaviours, human and non-human, to be monitored from external sites. But a passer-by logging into fixmystreet.com via his iPhone to report a pothole to the local council, or joggers logging performance data via their *Nike* running shoes, constituted more direct, individual acts of data creation, initiated by users' own decision to record detailed information about that street and their experience or behaviour within it for future use.

At this time of writing, the dynamic information models which represented these diverse kinds of data-driven interactions—what Hill called a 'drizzle of light persistent data'—were envisaged as mutating and reforming the very fabric of the 'urban interface' itself.[1] Hill's writing helped to pioneer an emergent field of practice, then loosely captured under the name 'urban informatics', which set forth an approach to urban design engaged as much with its 'soft' informational layers as with its more traditional or 'hard' infrastructures. As I have previously written, this is a field that, in its earliest incarnations, used the tools of mobile, ubiquitous computing to advance the need for a more progressive urbanism (Barns 2016). This orientation towards the smartphone as a tool for 'bottom up' urban activism can be seen as a critical phase in the history of an emergent platform urbanism. Urban informatics, at least initially, gave us a very different reading of the nature of ubiquitous urban technology—less 'top

[1]The 'drizzle of light persistent data' comes from Hill's reflective piece on the original essay published in 2015 called *The Street as Platform 2050: How Digital Dynamics Shape the Physical City.* Hill, D. (2015). The Street as Platform 2050: How Digital Dynamics Shape the Physical City. In C. Luebkeman (Ed.), *2050: Designing Our Tomorrow.* New York: Wiley.

down' surveillance and technocratic visions of control, and more fluid, mobile and networked imaginaries of citizen-oriented interventions.

Early champions urban informatics included those such as Townsend (2000, 2009), Hill (2008), Foth et al. (2011), Greenfield and Shepard (2007), Greenfield (2006) and others such as Carlo Ratti of the MIT SENSEable City Lab (Ratti and Claudel 2015). They are a generation inspired by the work of William Mitchell at MIT, who saw in the potentials of distributed computing technologies a revolution in the arts city making. In *City of Bits*, one of Mitchell's most infamous texts (1996), Mitchell noticed the way that more and more of the instruments of human interaction were becoming *miniaturised*, *dematerialised* and *cut loose* from fixed locations. He perceived this shift as decisive a reform to the urban fabric as the construction of Haussmann's nineteenth-century Parisian boulevards (3). Famously, unlike Haussmann's grid, the 'invisible city' of the twenty-first century would, Mitchell argued, be shaped more by the a-spatial logic of networked data, which would 'turn classical categories inside out, and [would] reconstruct the discourse in which architects have engaged from classical times until now' (24). This 'city of bits' would be 'constructed virtually by software instead of physically from stones and timbers, and they will be connected by logical linkages rather than by doors, passageways, and streets' (ibid.). For Mitchell, the spatial syntax of networked information therefore disclosed a new spatiality—one that invited us to proactively 'imagine the kinds of places we will want to create and the sorts of communities we want to have' (ibid.).

Mitchell focused many minds on the radicalness of software and the 'info-bahn' as tools for city making, provoking a radical rethink of classical urban models—indeed, he argued, a rethink of the whole profession of architecture. Streets could be thought of as 'urban interfaces', or even 'platforms', software was infrastructure, pipes. Thinking about streets as 'urban interfaces' also reflected the influence of HCI, a cognate field focusing not only on how people interact with computers through fine-grained observations, but also designs and advances technologies that encourage people to interact with computers in novel ways (see Foth et al. 2014). HCI researchers and designers, working within and beyond the realms of the computer sciences, actively pursued new interaction design opportunities that pay close attention towards the social and psychological contexts

of computing (see Dourish 2001: 61; also Suchman 1987: 10). Arguing for a 'more profound basis for the relative sociability of computer-based artifacts', HCI proponents such as Suchman advanced the notion of the computer as a social object. Drawing from the observational techniques and practices of HCI, urban informatics in turn advanced the need for new interface design possibilities, taking on the scales of streets, masterplans, mobile devices, sensor and Bluetooth technologies and everyday wayfinding as necessarily integrated fields of design practice.

As an emerging field, urban informatics oriented itself to the possibilities of tactical interventions in everyday urban contexts. As Foth put it, the field aims to allow the 'more human elements of communication and information exchange' to come into focus, not simply 'specific technologies or devices' (Foth 2009), but their *contexts of use*. Here we see evidence, via of ubiquitous computing, or 'ubi-comp', of the influence of Mark Weiser, who led a team of computer scientists at Xerox Palo Alto Research Centre (PARC) in the late 1980s. Weiser's influential 1991 paper, published in *Scientific American* as 'The Computer for the 21st Century' outlined a new 'ubiquitous' or 'pervasive' model for personal computing that would place the computer in the foreground of our attention (Weiser 1991). Describing the potentials of 'experimental embodied virtuality' (81) that would 'take into account the natural human environment and allow the computers themselves to vanish into the background' (Weiser 1991; Galloway 2008), Weiser anticipated a shift away from solitary, immersive computing interactions and their 'centripedal forces', to much more socially integrated contexts (1991: 89). This orientation towards social context within ubi-comp provided a conceptual scaffold for urban informatics, and set up conditions for active interdisciplinary exchange. As Weiser advised: 'Start from arts and humanities: philosophy, phenomenology, anthropology, psychology, postmodernism, sociology of science, feminist criticism, your own experience'. In other words, place ubi-comp within a broader disciplinary conversation with science and technology studies, socio-cultural anthropology and media and cultural studies (see Bell and Dourish 2011: 45). To 'get computing out of the way', is not only to make computing physically invisible but rather to let it play a role in agendas that originate elsewhere.

Taking on this stance, practitioners of urban informatics have embraced the role of urban activists, seeking to reshape the urban fabric. A hopeful orientation toward change has echoed architecture's fascination with the emerging discipline of cybernetics in the 1960s and 1970s, as exemplified within the work of studios such as Archizoom, Archigram and Superstudio (see Scott 2007). These studios drew from the logic of cybernetic feedback loops to identify ways for citizens to play an active role in shaping the space they inhabit using 'non-plan' material architecture, proposing material interventions that were open, extendable and adaptable to changing patterns of use and activity. Towards a new informational design praxis of the present, urban informatics has championed the potentials of participatory media to reclaim 'traditional' urban spaces, and to reconstitute city contexts with the more exciting spaces of digital connectivity. Where non-networked spaces may have been subjected to 'traditional', 'top down' planning, digital spaces of urban interaction could, through the use of mobile devices, become much more 'buzzing and exciting' (Foth et al. 2011: 1).

Honing in on street-level data thus offered the potential to reform the very fabric of the 'urban interface' itself (Hill 2008). The SENSEable City Lab, located at the Massachusetts Institute of Technology (MIT), was established as one of the first institutes to champion the tools of urban informatics through 'lab-style' interventions and technology experiments. Its leader, Carlo Ratti, advocated the tools of urban informatics as capable of radically transforming the way we describe and understand cities. In early work, the Lab critically engaged with graphic representations of 'real-time cities' by demonstrating how dynamic data flows could help illuminate complex urban behaviours (MIT, n.d.). These data visualisations would help to establish a visual palette through which to capture today's highly informationalised urban spaces as porous, networked and globalised. One of its first projects, *New York Talk Exchange*, illustrated the global exchange of information in real time by visualising volumes of long distance telephone and IP (Internet Protocol) data flowing between New York and other cities around the world. As the project site noted: 'In an information age, telecommunications such as the Internet and the telephone bind people across space by eviscerating the constraints of distance' (MIT 2008a). Another early SENSEable City Lab project, *Real Time*

Copenhagen (MIT 2008b), used mobile devices to track people's movements through the city, displaying the pulse of Copenhagen's *Kulturnatten* (culture night) as it unfolded in real time. These early projects encouraged users to think of themselves as actively 'participating' in the production of new, porous urban interfaces: interfaces not of physical surfaces, but of informational use. The appeal of using crowd-sourced data via mobile devices and apps lay in their capacity to reveal the proximate 'soft infrastructures' of the city: the rich patterns of everyday urban behaviours, and the complex, multi-layered networks reflective of the many different socio-cultural, material and environmental natures of urban space. Through enhanced powers of observation, allowed through illuminations of networked GPS devices and sensors, practitioners looked to reveal that which was previously unseen. In this view of the urban scene, real-time cities were to be celebrated as objects of data flow and analysis, allowing for new affordances of urban change. As the Lab founder Carlo Ratti once pointed out, in discussion with Hill (2009):

> [W]e're hardly going to change or destroy all these existing buildings and spaces anytime soon – urban form just doesn't change that quickly – but *the profound changes in the way cities feel and function may be in this internet-enabled informational layer*. (my emphasis)

Ubiquitous technologies and sensors were, at this time, championed as a new kind of 'architecture of participation' (Williams et al. 2009: 4); supporting a burgeoning field of 'read/write urbanism' (Greenfield and Shepard 2007) in which traditional urban, social structures and governance methods could be radically reconstituted according to the 'techno-social assemblages' associated with the participatory cultures of networked mobile use. To Madera (quoted in Bettencourt 2013: 10):

> What's different about the information age that has been ushered in by personal computers, mobile phones and the Internet is its ability to reshape the social organization of cities and empower everyday citizens with the knowledge and tools to actively participate in the policy, planning and management of cities.

Conclusion

Cities are constantly being imagined, redrawn and rebuilt through rapidly evolving technologies of urban representation. If we understand 'computing' in the broadest sense—to 'compute', make sense of, and organise the city into constituent parts that can be managed, programmed and ultimately ridden of disorder—it is clear that each passing era of transformational urban computing raises critical questions about the role of the state, the place of the citizen, and the importance of the public sphere, often expressed through recourse to the 'everyday' and 'the street' as sites of resistance to disciplinary power. Against this backdrop, the increasing diffusion of computational technologies into the everyday spaces of the city has provoked the spectre of disciplinary planning through the logic of the smart city (Krivy 2018b; Kitchin et al. 2015; Luque-Ayala and Marvin 2015a). A fear of 'top down' visions of technocratic control has been countered by widespread interest, particularly through the burgeoning field of urban informatics, in the potential for more citizen-oriented, 'bottom up' urbanism, facilitated by distributed mobile technologies. In this context, the arrival of the smartphone was embraced as *a platform for reclaiming cities from the bottom up*, offering the potential for a new agora inflected through social media.

This historical context remains critical to the way we understand the emergence of smartphone-enabled urban platforms, among them the digital giants such as Uber and Airbnb. As I discuss in the following chapter, these platforms have been discursively positioned, in their early stages of growth, as tactical interventions into the city, supporting the potential for urban citizens to 'disrupt' the disciplinary efforts of city governments who had failed to support more innovative forms of urban management.

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4

A Momentary Interlude

A Personal Encounter

It's time to fly. There's the usual flurry of minor catastrophes, there to remind you that you're vulnerable to any kind of mishap whatsoever. This time, a phone misbehaving, shutting itself down randomly. Gosh! Just an object, one of many, this phone, but it has become the centre of my life. *It is the basis from which my life, and, being as I am a mother, the life of my family, has come to be organised*. Being on the go a lot I tend to do my work through my phone—emails on the fly, calendar appointments, tethering its data to show presentations in meetings, to catch up on writing in coffee shops. I'm an information worker, not confined to a single place of work, and so the phone supplies me with the basic infrastructures I require to do my work.

When I travel, this dependency only increases. It's only *through my phone* that I know where I am, where I need to go, and how it is that I should best get there. I can access any number of real-time apps to tell me what's on offer at any given time, for any given route, bus, metro, walk time, maybe even cycle hire options if I'm lucky. The phone also helps me not feel too lonely when I'm away on work trips. I can call my husband, speak to my children, anywhere, just so long as we're all awake.

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> This object, just another one of the objects in my handbag, only this one is slightly weighter, certainly more expensive, has become, I know too well, the primary means through which I connect and interact with the world around me. Is that ok?

The phone, its many functions—its apps, its memory, its microchips, its global positioning service and its processing power—has made redundant so many other things. The wall calendars, the address book, the portable music player, the home phone, the Filofax, the street directory, the compass, the travel guide and the flashlight. For some (not me), the record collection. It is the Swiss Army knife of the modern urban traveller. When your phone breaks, or in my case, when it randomly malfunctions and shuts down at a crucial moment—the moment before boarding a long haul flight—you become suddenly conscious that you have become vulnerable in a way you might not have noticed, or minded so much. The capabilities of today's smartphones so far exceed what I ever imagined possible in 1998, when I bought my first mobile phone, they so very seamlessly meet the many needs of a busy working mother who travels a lot, that it is easy to forget they can *just not work* sometimes.

We are not, however, meant to think this way. As Agnieszka Leszczynski reminds us (2019) we are not supposed to think about *the glitch*, the ever-present possibility of malfunction. But of course, software dies. Your phone drops out of your pocket and is left in a taxi. Phone drops out of pocket while riding a bike and is smashed by semi-trailer. If any of these things happen when you're in a city unfamiliar to you, perhaps even when you're by yourself, I imagine the kindness of strangers will need to come in handy fairly quickly.

But what would happen if a whole city became dependent on *the phone*? Not simply a city's population, which may indeed own more mobile phones than cars. What if the kind of *interfaces* we use to navigate our phones—the apps that we interact with to go about our daily lives—became more and more interwoven with the services we make use of as we go about our lives? What's more, what if the companies that make those apps were to become not just digital companies, but serious players in the

building of cities, and in the management of infrastructure? Of course, this isn't just a speculative question…

Reference

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5

The Uberisation of Everything

In which I discuss the way the extension of digital platforms has been discursively aligned to the urban innovation movement, allowing some of the more troubling implications of platforms to remain hidden from view.

Introduction

Apple's release of the iPhone is widely recognised a watershed moment in the history of computing. Of course, this technology product was not itself a unique innovation but a 'bundling' of many existing innovations, many of them supported by large amounts of public investment (Mazzucato 2018). The iPhone essentially reintroduced the 'bundling' tactic adopted by IBM in the 1960s—and that of the Apple Computer—but this time also bundled a proprietary operating system (iOS) with a new software marketplace called the App Store. Though initially Apple did not intend for independent developers to utilise its software environment, this changed in July 2008, when Apple 'opened up' the App Store by releasing a 'Software Development Kit' or SDK for external developers. The App

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Store was more tightly controlled than the previous Macintosh platform, which would allow anyone to download apps from anywhere and run them on their Mac. But at the same time it also provided the tools for others to build apps using a proprietary, licensed iOS common source code (in the case of iOS this has been Objective-C and later, Swift).

This move had the effect of encouraging mobile software developers to sell their products through the iPhone marketplace. In essence, what the iOS created was a set of common (proprietary) standards and protocols for mobile content development, which in turn re-oriented a large part of the mobile applications market around the Apple operating system. Competitors like Nokia and Blackberry, who had previously dominated the smartphone market, would as a result struggle to compete, because they lacked the size of the software ecosystem Apple had just created. After its launch, Apple was able to attract the talents of some 200,000 external developers who were, essentially, working to enhance not only the abundance of apps on the App Store but also, by extension, the appeal of the iPhone (Wingfield 2018). They weren't doing this for the love of Apple, but because it benefitted them.

The launch of the App Store was a huge success for Apple, cementing its role as one of the world's most successful companies. It would take just six years for this strategy to result in Apple achieving the highest quarterly earnings by any company in history (Abe 2015). At the same time, it also generated a better pathway-to-market for software developers. Apple continued to dominate the App Store platforms with more than 1 million apps. Despite taking sizeable 30 per cent cut of app store sales, Apple in 2019 remained the largest income generator for developers among all players in the App Store space. The App Store generated billions of dollars in revenue for both software developers and Apple—while also extending the functionality of the iPhone for all users (Wingfield 2018).

While the Android, the Google competitor smartphone, has introduced its own app marketplace, Apple has continued to dominate App Store platform with more than one million apps, and in 2018 its App Store revenues were 93 per cent higher than those of its competitor, Google Play. In this sense, even if the Blackberry or Nokia product was a superior product at the time, Apple's wide network of external innovators gave it

a competitive advantage in terms of the quality of its interface and user experience (Tiwana 2013: Section 1.2 para 1).

The launching of the iPhone era saw smartphone users able to access more and more sophisticated digital services in the palms of their hands. Equipped with Global Positioning Satellite (GPS) receivers, smartphones and the apps they featured, leveraged a valuable new data source, that of location-based data. Everyday urban interactions of digitally-connected citizens were now a 'platform opportunity', in which diverse informational inputs—talking, walking, emailing, sharing, liking and driving—could be intermediated by the language and functionality of software. The familiar joke that 'there's an app for that' expressed the buoyancy of a global app marketplace, and the delight of consumers in how easy it was to download and reap the benefits of well-designed, and location-aware computing power in the palm of one's hand—and for just a couple of dollars, if that.

Emerging from well beyond the domains of urban planning, apps such as Airbnb, Uber, Lyft and Google Maps were launched shortly afterwards as new services for connected urban citizens. Uber was launched in 2009 as a service to connect passengers to local drivers more efficiently, 'with the touch of a button' (Choksi and Fujiu 2016). Airbnb released 'latent space' within existing buildings, helping homeowners and businesses augment their incomes, and helping tourists to 'live like a local' (Gurran and Phibbs 2017). These platforms saw rapid uptake by consumers, and set the scene for a more widespread embrace of the 'app economy', otherwise known as the 'sharing economy', and more recently the 'platform economy'. As an article in the *Wall Street Journal* put it, in 2015, '[t]here's an Uber for everything now', with apps available to 'do your chores, shopping, parking, cooking, cleaning, packing, shipping and more' (Fowler 2015). The 'Uberisation of everything' in this way became a catch-cry for the potent impact of apps in our daily lives.

As I discuss in this chapter, these apps were initially positioned as disruptive change agents, designed to address 'laggard' planning systems that had failed to address issues such as congestion and crime but also, more fundamentally, usher in more 'collaborative' forms of consumerism and peer-to-peer exchange. Their discursive alignment with progressive urban politics allowed major digital platform companies to emerge as significant urban intermediaries, seeking to operate beyond the state but with

significant consumer uptake. As such, they are critical to the emergence of platform urbanism as narrative of urban innovation and progress in a digital age (Barns 2014b). In this chapter I explore the foundational narratives of these platform interventions, before moving on to examine more critically the implications of platform intermediation. Key to the rise of urban apptivism, I argue, were the twin movements of open data innovation and the sharing economy. I discuss each, in turn, below.

The Rise of Urban Apptivism: Digital Urbanism After the iPhone

The launch of the iPhone significantly grew the marketplace for mobile services, creating not only a simplified gateway through which to access apps but also incentives for developers to use the platform. During an era in which social media platforms were being promoted as part of a new era of 'Web 2.0' services, the potential to extend the 'platform model' of digital entrepreneurship and innovation into broader service domains seemed endless. Tim O'Reilly (2010), who had advocated the potentials of 'web as platform' and advanced concepts of 'Government as a Platform', saw the potential for city services to be redesigned as 'City 2.0' services. During this era, circa 2008–2009, the innovation potentials associated with 'opening up' government information for use by external innovators began to be embraced. This open data movement has played an important part in supporting the proliferation of new smartphone services by app developers. It's worth discussing briefly the origins of this movement, and how it came to support a more activist orientation towards the digitalisation of city services.

Open Data: The Value Is There to Share

At its most basic, open data refers to data—public or private—that is published in a 'machine-readable' format and can be used without restriction. This definition incorporates both technical and legal understandings

of 'openness'. From a technical perspective, publishing data in machine-readable format ensures that computer applications can retrieve the data in a structured way. From a legal perspective, data that are made 'open' are licensed in a way that allows for both commercial and non-commercial use without restriction. While open data need not necessarily be government data, there is a focus on public data as data that have been created and gathered through public investment. In many instances, the term 'open data' is used interchangeably with the term 'open government data'. However, it is worth noting where the distinctions lie. The OECD has defined open government data as 'a philosophy— and increasingly a set of policies— that promotes transparency, accountability and value creation by making government data accessible to all' (Ubaldi 2013). This definition recognises the distinct values of open government in championing transparency, accountability and the RTI, alongside the value of publishing public service information (PSI) in a way that can be more readily incorporated into useful services for citizens (Yu and Robinson 2012).

Initial efforts to promote the importance of open data were advanced by leading advocates of the Internet as a knowledge commons. The first champions, most notably Tim O'Reilly (2005), Lawrence Lessig (2004) and inventor of hypertext Tim Berners Lee (2017), advanced the need for an 'open source' ethic to inform the design of systems for information dissemination and distribution in an age of the Internet. For Lessig (2001), this agenda has been advanced through creation of the 'Creative Commons' licence framework he established in 2001, allowing copyright owners to elect which rights they reserve or waive for the benefit of other creators or users (Lessig 2001). Berners Lee (2009) re-iterated the importance of open data at a TED Talk in 2009 when he called for 'raw data now'— highlighting the need for governments, scientists and institutions to make their data openly available in 'machine-readable' or 'raw' formats. This directive was focused on the software innovations made possible when data are released in structured formats readable by machine-to-machine interfaces or application programming interfaces (APIs).

Advocates of open data found a natural alliance with those championing the need for open government through the goals of transparency and political accountability, including legislative frameworks that guarantee the right of access to information, through 'Freedom of Information'

and/or 'RTI' instruments (Ubaldi 2013; Yu and Robinson 2012). The open government movement made significant headway in 2009 when the newly elected Obama Administration launched its Open Government Directive requiring US government agencies to take 'specific actions to implement the principles of transparency, participation and collaboration' including the publication of government information online in open (machine-readable) formats (Orszag 2009). Shortly afterwards, the multilateral Open Government Partnership Declaration (OGPD) was signed by the United States and seven other countries in September 2011, and participating countries continued to grow. The OGPD outlines four key components of what is involved in 'changing the culture of government' (OGPD 2011) including: Accountability, Technology and Innovation, Citizen Participation and Transparency.

Support for open data is one part of a wider set of values and instruments associated with the open government movement. As well as taking advantage of innovation in data sciences and innovation, these values are also committed to 'changing the relationship between state and citizen', to ensure governance structures are made more effective and legitimate (GovLabResearch 2013). The inclusion of open data within this Directive, providing a practical means or set of tools to ensure citizens have ready access to information, thus helped to position the aspirations of open data squarely within the context of political accountability (Yu and Robinson 2012).

The technical innovations associated with publication of government information in machine-readable formats, along with high-level support for open government from administrations like the Obama government and, later, the UK Government, helped to spur a great deal of momentum around the possibilities of open data in promoting citizen engagement and government transparency (Gray 2014; Barns 2016). Such opportunities can be described as 'facilitating the two-way conversation' that 'breaks down the walls between government bureaucracies and local communities' (Socrata 2013). However, as one commentator observed: 'Open data has come in two waves: the "open" wave and the "data" wave' (Solazo 2015). As momentum around open data has grown, an increasing focus has been on the integration of government or 'public sector information' (PSI) into big data value chains, through the applications of data analytics

to improve organisational and institutional processes (Ubaldi 2013). As noted by Tapscott in his foreword to *Open Government* in 2010: 'It is the next wave of innovation [based on data services] that presents an historic occasion to fundamentally redesign how government operates; how and what the public sector provide provides; and ultimately, how governments interact and engage with their citizens' (Lathrop and Ruma 2010). In 2010 O'Reilly (2010) called this next wave of innovation 'Government as a Platform', whereby government establishes a 'platform' for software innovators to access and recombine public data to drive new and innovative services for citizens, and to 'better solve collective problems at a city, state, national, and international level'.

The launch of the iPhone played a critical role in advancing open data for urban innovation. In one instance, a Sydney-based app developer was able to essentially 'scrape' transport timetable data from a government website and turn it into an app that vastly improved the user experience for commuters seeking to know what time their train arrived. The developer launched the 'Trip View' app without even talking to anyone in the transport department, and it was wildly successful. For advocates like Tim O'Reilly, this was exactly the benefit of a 'Government as Platform' approach. Government employees were not as likely to even conceive of, let alone procure or design, an app such as the one initiated by the Sydney developer. Without open innovation, O'Reilly quipped, we would be left with lots of Friendsters, rather than Facebook (5).

Following the creation of the OGPD, a number of national governments subsequently adopted 'Government as a Platform' (GaaP) policy frameworks explicitly referencing O'Reilly's original formulation. These frameworks were driven primarily by digital technology officers appointed within government agencies. In the United Kingdom this took the form of the Government Digital Service, an agency tasked with 'leading the digital transformation within government', to be led by a 'Chief Data Officer'. GaaP in the United Kingdom focused on the creation of a single or 'core' data infrastructure from which multiple software services can be built for citizens. This aimed to remove the justification for separate IT procurement of software services by different agencies, and ensures agencies have data-driven tools and services built around common functionality. It also sees concerted recruitment of data scientists and programmers internally

within government, and empowering new roles, such as the Chief Data Officer, to lead cross-agency approaches to roll out of new digital services.

As the UK Department of Business Innovation and Skills (BIS) would describe it: 'Policy frameworks and standards shaping governance models for cities run on information are now rapidly taking shape' (BIS 2013). Government data, or 'public sector information' was recognised as an important strategic asset to the wider development of the digital economy more generally (Barns 2014a). The OECD estimated much of the value from open data deriving from 'new organisational and management approaches which [are] significantly improving existing practices' (Ubaldi 2013). In this context, there was a growing appreciation of the value of data as a wider *input* into other digital service applications—which ultimately saw the value of open data increasingly framed in terms of its value to digital entrepreneurs, rather than as a tool for promoting greater accountability and transparency. Tim Berners-Lee, in a comment to *The Guardian* newspaper, has noted this shift away from an emphasis on transparency towards economic benefits:

> Lots of people said: "Open data, this is about government transparency; we can track who is committing expense fraud." Well, yes, a world where I have to reveal how I spend public money is better, but more importantly, that data can be used elsewhere to run a better economy. (Hern 2014)

A number of developed world cities at this time launched organisational-wide digital strategies to promote better use of their data (Barns 2016). Where there has been a lot of academic and industry attention towards the risks of proprietary-based smart cities, as demonstrated by technology vendors such as IBM and Cisco, open data was at the same time central to industry and policy frameworks for investment in smart cities. Listing the key enablers of a smart city, consulting firm Accenture identified open data platforms as fundamental to the success of smart city investments (Accenture 2011), with "open intelligent infrastructure" identified as being of critical importance to the future of cities' (Accenture 2011). While originally linked to notions of citizen engagement and government transparency through alignment with the open government movement, momentum around the 'app-ification' of open data saw

many of the engagement practices associated with open data programmes and found them to be heavily skewed towards the interests of software entrepreneurs (Morozov 2013). According to Robinson and Yu, the co-optation of open government as a technology- or data-driven transformation in fact served to diminished the capacity for policymakers to articulate clear open government priorities. 'A regime can call itself open', Robinson and Yu observe, simply if it builds 'the right kind of website— even if it does not become more accountable or transparent'. The authors argue that this shift in vocabulary— the alignment of technical "openness" with political transparency— 'has made it harder for policymakers and activists to articulate clear priorities and make cogent demands' (2012: 201).

For many city governments, the value of open data acted as what Soderstrom et al. called an 'obligatory passage point' in the transformation of cities into smarter ones (2014). As these authors have argued, along with others such as Morozov (2013) and Marvin and Luque-Ayala (2015), urban solutions are increasingly channelled to address the priorities of ICT investments, amounting to what they call 'a technocratic fiction: one where data and software seem to suffice and where, as a consequence, knowledge, interpretation and specific thematic expertise appear as superfluous' (ibid.).

What's Mine Is Yours: Collaborative Consumption and the Sharing Economy

If the participatory web pointed to the potential for less centralised forms of decision-making, a web that was increasingly integrated within the everyday infrastructures of the city was also widely embraced as a tool to facilitate all kinds of 'sharing' of physical assets and experiences between urban citizens. As I have discussed, a broader urban innovation movement, focused around the potential to 'open' urban data up for integration by software developers into consumer-focused apps, also helped to shift attention towards more 'peer to peer', and decentralised forms of urban service provision. In this context, many major urban platforms were launched as part of a broader 'sharing economy' movement, aligned to the widespread digitalisation and the *app-ification* of urban data but

also focused on rethinking the fundamentals of contemporary consumption. As a consequence, the sharing economy movement has provided another important discursive narrative for major platforms, providing the language of urban engagement by platform companies in their early years of establishment.

Riding a wave of buoyant speculation about the participatory potentials of digital disruption, platforms such as Airbnb, Lyft and Uber were launched as smartphone apps designed to facilitate more distributed 'sharing' of key urban services such as transport and accommodation. Such platforms were seen as evidence of a worldwide shift towards a new economy based on more collaborative modes of consumption (Russo and Stasi 2016; Nestor et al. 2016; Hirshon et al. 2015). For many sharing economy advocates, the potentials of more direct, peer to peer exchange facilitated by smartphone apps were indicative of a shift towards more 'collaborative' business models (Pettersen 2017; Russo and Stasi 2016; Nestor et al. 2016; Hirshon et al. 2015).

Rachel Botsman and Roo Rodgers would come to prominence in 2010 writing about the power of 'collaborative consumption', and the potential for a new economic trading order made possible by the participatory capabilities of the Internet. The success of platforms like eBay and Craigslist, they argued, demonstrated the disruptive potential of the digital age in changing not only how we were communicating but also how we exchanged goods and services. These advocates identified a new economic model, in which 'assets could be shared directly by stakeholders, after coordination has been conducted over the Internet' (Botsman and Rodger 2010). Here, the direct forms of networking facilitated by digital communications were translated as a new mode of economic exchange.

The ideas they espoused drew from the work of Yochai Benkler (2004), who had previously written on the emergence of 'sharing' as a modality of economic production. Benkler (2004) observing the rise of a networked information economy saw social sharing and exchange as increasingly 'at the very core of the most advanced economies—in information, culture, education, computation, and communications sectors'. In particular, these sharing practices were clearly evidenced in the form of 'free software, distributed computing, ad hoc mesh wireless networks, and other forms of

peer production offer clear examples of such large scale, measurably effective sharing practices' (ibid.). For Benkler, this did not mean that we live in some unique moment of humanistic sharing but was, rather, a reflection of our current *technological state*. In particular, this technological state was one in which 'individual agents can engage in efficacious production activities with material resources under their individual control, affects the opportunities for, and hence the comparative prevalence and salience of, social, market (both price based and managerial), and state production modalities' (279). Benkler was at pains to emphasise that our sharing capacity was not *determined* by technology, but that technology does set 'threshold constraints' on the effectiveness of sharing as a modality of economic production.

Similarly, the work of Jeremy Rifkin helped to frame the benefits of a shift towards an Internet of Things towards a 'zero marginal cost' society, essentially allowing for goods and services to become free, and no longer subject to market forces. Extending Bruns' notion of the prosumer to that of everyday exchange, Rifkin argued that 'prosumers are plugging into the fledgling IoT and making and sharing their own information, entertainment, green energy, and 3D-printed products at near zero marginal cost' (Rifkin 2014).

As Rowe (2017) and others have also noted, ideas about collaborative consumption are not themselves new, demonstrated by long-standing interest in alternative economies, or those that operate outside of more traditional, capitalistic modes of exchange (Gibson-Graham 2008). Nevertheless, the capacity for digital networks and open data platforms to allow for more peer to peer networking not only of information and content but also goods and services reflects the deepening penetration of digital devices into daily life. No longer tethered to desktops, the capacity to connect digitally through location-aware smartphones equipped with well-designed apps would rapidly grow the market for the more direct sharing of goods and services. Growing markets for apps in a post-iPhone era thus helped to propel Benkler's ideas about sharing into the mainstream.

Botsman and Rodgers would celebrate, in their book *What's Mine Is Yours: The Rise of Collaborative Consumption* (2010) the nature of Airbnb as a sharing platform. Launched in 2008, the company was developed by two designers to help fellow conference delegates in San Francisco find places

to stay when hotels were booked out. The two founders, Brian Chesky and Joe Gebbia, resolved to address this problem by renting out access to spare bedrooms—and they happened to have three spare air mattresses in their house. From this simple concept, the pair decided to create a company around the 'Air Bed and Breakfast', later shortened to Airbnb. After some initial success on the conference circuit, the business stalled in its first years of operation, but would eventually gain more users when the founders began to personally assist those who were renting rooms by providing professional photographers to improve the way listings actually looked, and also by leveraging the database of existing US accommodation service Craigslist (Brown 2016). After this point, Airbnb would quickly gain worldwide take-up, with listings rapidly growing around the world. For the founders, in discussion with Botsman and Rodgers, the take up was 'a surprise', and seemed to have unearthed a 'latent desire' among strangers to share their spare lounge rooms and beds with other strangers for extra cash.

Airbnb call those who use the platform 'guests' and 'hosts', and have continued to grow based on a company philosophy built around the sharing of latent assets that enhances the capacity for guests to experience new cities 'like a local'. Adopting the language of urbanism, including the values of 'liveability', the open city and the 'sharable city', the company sought to be aligned with a progressive movement for urban change (Hugill and Slee 2016). As Airbnb has said in a statement: 'Homesharing puts money into the pockets of regular people and spreads guests and benefits to more communities and businesses' (Hickey and Cookney 2016). Framed in this way, the 'Airbnb movement' experienced rapid growth: By the close of 2017, the company boasted over four million listings around the world and was valued at $31 billion—more than the Hilton and Marriot international hotel chains (Wachsmuth and Weisler 2018).

Other sharing economy platforms that have witnessed similar levels of meteoric growth include the ride hailing service Uber, which launched in 2009 to connect passengers to drivers more efficiently, 'with the touch of a button' (Choksi and Fujiu 2016). These sharing platforms are, however, only the largest and best known among many other platforms that address diverse forms of exchange in communities, from car pooling initiatives like 'Car Next Door', to massage exchange services such as Blys,

meal delivery services such as Deliveroo, to initiatives focused on directly sharing or donating unwanted items within local communities (TuShare and Freecycle), sharing goods such as tools, which might otherwise only be used sporadically (OpenShed), or even connecting those wanting to grow vegetables with people who have spare land (Landshare) (Rowe 2017).

Arun Sundararajan, another major advocate of the sharing economy, has captured the sense in which internet-based modes of peer to peer exchange has been conceived as a new kind of economic model:

> Part of the promise I have always sensed in Airbnb's business model is the huge economic efficiency it seems to represent. People have accommodation space they aren't always using. Other people sometimes need space for a short period of time. If an Internet-based platform can connect the people with space with the people who need it, won't the economic gains have to arrive at some point? Rather than making billions of dollars of capital investment into constructing dedicated units for short-term accommodation—hotels—why not tap into the millions of sometimes-empty apartments and spare rooms around the world? (2016)

Sharing economy advocates have tended to emphasise the societal benefits of value-sharing between individuals acting as micro-entrepreneurs. Thus Botsman has defined the sharing economy as 'an economic system based on sharing underused assets or services, for free or for a fee, directly from individuals'. As Botsman goes on to explain:

> It is largely based on based on peer-to-peer marketplaces that depend on the social glue of trust between strangers. The 'providers' in these marketplaces are often referred to as 'micro-entrepreneurs'. (Botsman, n.d.)

For Robin Chase, the co-founder of car sharing platform Zipcar, building a platform was not simply starting a business but accelerating the transition to a collaborative economy, an economy she describes as 'Peers Inc' (Chase 2017). Sundararajan has put the rise of the sharing economy in the context of a more generalised shift towards 'experience' over ownership. As he writes: 'The stuff that matters in life is no longer stuff. It's other people. It's relationships. It's experience'. This constitutes an 'asset-light' economy,

in which 'digital technologies seem to be taking us back to familiar sharing behaviors, self-employment, and forms of community-based exchange that existed in the past' (Sundararajan 2016). This approach envisaged the platform of exchange between peers as one that shifts the locus of exchange away from traditional, centralised corporations and towards a crowd of entrepreneurs located via a digital marketplace. 'It is for these reasons that I sometimes refer to [the sharing economy] as crowd-based capitalism', Sundararajan writes (237).

As these remarks make clear, sharing economy advocates will tend to focus primarily on the *networking of users* of a platform, read through the lens of peer to peer or networked exchange. In this particular analysis, the platform itself, its digital architecture and its orientations towards data use and access, remain largely invisible—because emphasis is on the new *forms of exchange* that are facilitated. What's more, the acts of connecting, sharing and trading facilitated through these forums are deliberately positioned as working *against* the centralising nature of traditional organisations. Thus Sundararajan calls traditional organisations 'corporate or state aggregates', while sharing platforms 'decentralise' and 'network' their peers of users. Importantly, these platforms are also read as blurring the lines between work and labour, public and professional activities. This blurring of the definition of labour has given rise to the notion of the 'gig economy' in which those who provide services via a platform are not considered full-time workers, but are simply realising the value of their latent time—giving rise to what Graham (2019) calls a 'planetary labour market' for digital work.

Much has been written in recent years on the politics of the sharing economy, particularly in response to the gentrification effects of Airbnb (Crommelin et al. 2018; Gurran and Phibbs 2017; Rowe 2017; van der Zee 2016; Wachsmuth and Weisler 2018; Sanyal and Ferreri 2018) and the labour politics associated with Uber and its displacement of existing taxi services in cities throughout the world (Graham et al. 2017; Isaac 2014; Rowe 2017; van Doorn 2017; Pollio 2019). Despite producing radically uneven impacts on city economies, including new forms of inequality, these platforms have actively sought discursive alignment with the notion of sharing as a positive experience of exchange, which has

been enhanced through the provision of networked, location-aware services, and the broader rise of an app economy. When we consider the hopes held by those who advanced distributed computing as a way for citizens to engage more proactively with their cities, it would appear the rise of the sharing economy movement has helped to further entrench the notion that conditions of digital connectivity, becoming more and more embedded into everyday 'things', environments and infrastructures, are *themselves* redistributive—helping their users to connect, share, trade and transact beyond the realms of existing institutional power. As Rifkin extolled, plugged into the world of IoT, 'social capital is as important as financial capital, access trumps ownership, […] and "exchange value" in the capitalist marketplace is increasingly replaced by "sharable value" on the Collaborative Commons' (Rifkin 2014).

Through the discursive framework of the sharing economy, enabled by a vibrant app economy, the 'everyday' experiences of ordinary citizens have been brought into the currents of digital circulation. Connecting with others as they seek recipes, breastfeeding advice, massage services, a lift home, a meal when tired, or a place to stay when in a foreign city, has acted as evidence of a worldwide, 'bottom up' disruptive urban movement of social change, taking place outside of established modes of exchange and institutional organisation. And while this narrative has been accelerated through the evolution and dissemination of computational networking into our daily lives, we need also to remain mindful of how these services have emerged to fill an institutional void resulting from the withdrawal of public services in the name of 'austerity' and narratives of neoliberalism (van Doorn 2017). Along these lines, Slee has described the narrative of the sharing economy as being 'anti-state' (Slee 2016).

Conclusion

As has become increasingly clear in recent years, a narrative interweaving of the sharing economy, combined with the allure of 'open cities of open data', urban apptivism and the possibilities of collaborative consumption, has missed critical aspects of platform-based intermediation. Just as pioneers of Web 2.0 celebrated the benefits of two-way participation rather than

the software commercialisation tactics of major social media companies, so sharing economy advocates have emphasised the quality of networking activity over the particular digital architectures being created to govern this activity. This neglect, I would argue, is not necessarily intentional. Many advocates are genuinely seeking progressive outcomes through new methods of digital exchange. Nevertheless, as Slee has argued, it is a narrative easily co-opted by those who have seen the opportunity to *intermediate* the diverse forms of sharing and trading that more distributed, location-aware technologies have allowed for. In so doing, they have been able to build powerful global digital infrastructures whose scale, reach and future ambitions far exceed the territorial boundaries of the nation state, and have facilitated significant assymetries of information access in a global digital economy.

As I discuss in the following chapter, while the sharing economy narrative has attracted widespread interest, it has nevertheless remained blind to the particular 'market-making' and intermediating practices established by these so-called share economy businesses. These practices have not, however, escaped the attention of platform economists, a somewhat more obscure field of microeconomic analysis, active since the early 2000s. Where the sharing economy literature has proclaimed a radical shift towards a more collaborative mode of consumption, platform economists have instead examined the nature of digitally-intermediated transactions through the lens of multi-sided markets. Though it predates the sharing economy by some years, it has probably lacked the promotional hype—and hopefulness—of the more media-savvy promoters attached to sharing economy start-ups.

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6

Making Sense of Platform Intermediation

In which I introduce ideas and concepts from the field of platform economics, which understands the process of intermediation as being central to the 'work platforms do' and provides a framework through which to think about platform governance challenges.

Introduction

Platform economics is a branch of micro-economics active since the early 2000s. The early development of the field was associated with the dot-com era, which saw the rapid growth of Internet companies whose vast (and, it turned out, over-valued) market valuations reflected growing recognition of the potency of market-based 'network effects'.[1] This platform economy perspective, unlike that of the sharing economy narrative, provides an important framework through which to understand diverse kinds of sharing/trading/transactions that are facilitated by digital platforms, whether

[1] Platform companies also underwent significant market devaluation in 2019.

S. Barns, *Platform Urbanism*, Geographies of Media,
https://doi.org/10.1007/978-981-32-9725-8_6

they are purely software-based or extend, via mobile apps and IoT devices, into the everyday lifeworlds of the digital consumer. The perspective also addresses the dynamics of 'market steering' and orchestration that are constantly enacted by platforms.

From a platform economy viewpoint, platforms increasingly operate as powerful intermediaries of digital connectivity—but the process of intermediation they enact is not itself unique to our hyper-connected age. Furthermore, as digital connectivity extends to more and more everyday 'things', and the value of data produced by connected environments and people continues to grow and extend, the process of platform intermediation is today no longer confined to experiences we might think of as 'app-tified', but impacts more broadly upon organisational forms and business development strategy. The insights of platform economics, which we might call 'Googlenomics' (Levy 2009) for its association with the kind of multi-sided market established by Google, help to clarify how platform intermediation seeks to significantly restructure contemporary urban infrastructures and economies.

In this discussion of platform economics, I discuss the way platform intermediation expands into the urban domain by re-imagining and restructuring urban relationships as a 'platform ecosystem'. Underpinned by processes of data commodification, the potential to re-engineer the urban as a platform ecosystem has attracted significant amounts of speculative financial capital, which seeks to extend the overall scale of a platform ecosystem and, in turn, its data-generating capacities. I explore how processes of platform intermediation, which seeks to extend more and more into the mainstream of urban life. The dynamics of platform intermediation are extending, I argue, in part as a way of imagining the urban as an 'ecosystem' of relationships that seek to restructure a wide range of existing urban relationships and connections. This process is also fuelled through processes of data commodification, which has been forms of financialisation and platform intermediation essentially coalesce, in the form of large-scale venture capital investments designed to facilitate the production of platform scale.

Platform economics provides an important lens through which to understand how platform-based organisations seek to enforce among their users over time. In this sense, it helps us understand how platforms *change*

and evolve. Platforms are never fixed entities; they are constantly, and necessarily, morphing. To take an example: Amazon began life as online platform for retail, but in fact now makes the majority of its profit from cloud hosting services (AWS), which itself helps fuel ongoing acquisitions, including the purchase of Whole Foods for $13bn in (Stevens and Haddon 2017). We need to remain focused on the evolving nature of the platform as a particular firm—in this case, the nature of Amazon—not just as a generalised condition of platform capitalism, but a set of strategic interventions on the part of a single company, based in the United States, that is able to exert power over less mobile, more place-bound settings, whether labour settings, regulatory settings, or the nature of the contemporary 'high street' as retail destination. Amazon, as a firm, is always active in seeking to deepen and extend its methods of platform intermediation, in order to accelerate its capacity for data accumulation and in turn, value creation, thus extending overall platform scale.

Much scholarly attention has focused in recent years on the privileged nature of data as a mode of representation or 'capture'—or what Kitchin and Dodge have delineated as 'capta' (Kitchin 2014a, b; Kitchin and Dodge 2011). Critical attention focuses on the datafication of diverse fields of relational activity, prioritised as an enhanced form of knowledge-making (Van Dijck 2014; Boyd and Crawford 2012). Much of this critical scholarly work has addressed the normative agendas entwined within the production of big data, rejecting the veneer of objectivity and neutrality, and instead addressing what Kitchin and Lauriault (2014) have called the "sociotechnical assemblages" that frame and produce data. A critical urban politics of big data and datafication also resists the reduction of diverse epistemologies of urban knowledge to that of quantified knowledge (Mattern 2013, 2016; Sumartojo et al. 2016). The politics of our increasingly algorithmic society, in which modes of filtering, decision-making and knowledge production are increasingly 'hidden' within impenetrable, 'black-boxed' machine-learning processes, also represents a major focus for critical enquiry, informed by concerns about the lack of transparency and accountability within increasingly influential modes of organisational decision-making (Pasquale 2015a, b; Kemper and Kolkman 2018; Ananny and Crawford 2016; Sadowski 2019a).

Insights from platform economics also highlight the governance implications of platform intermediation as a method of data capture or agglomeration, which sees data 'produced' as a positive externality of digitalised, multi-sided markets, which is internalised through the platform intermediary. As Srnicek and others have argued, through the lens of platform capitalism, the key advantage of the platform business model over others in an era of big data value chains is the capacity for the platform to occupy a privileged position as intermediary and therefore 'governor' of digital exchange and the data that result as a consequence (Srnicek 2016). Platform intermediation can thus be understood as a powerful mode of data commodification, value extraction and data governance (Sadowski 2019a; Langley and Leyshon 2017). The methods of market orchestration identified through platform economics can be understood as powerful governing methods, particularly in increasingly connected cities, as data becomes more and more central to the roll-out of intelligent urban services.

Understanding Platforms as Multi-sided Markets

Let's begin with some basic concepts in platform economics. The concept of a 'two sided market' addresses the nature of exchange between diverse market participants, developed by economists Jean-Charles Rochet and Jean Tirole in a paper first circulated in 2001, later published in 2003 (Rochet and Tirole 2003). The paper would essentially mark the emergence of platform economics as a field. Understood as a business whose role is to bring together two sets of users, the two-sided or multi-sided market was recognised at this time as an increasingly dominant kind of market actor. Operating well before the rise of the social media network, platforms operating as multi-sided markets included dating clubs, video game consoles, payment cards and operating systems (Evans 2003). Such platforms were recognised as being central to many key industries like computing and information technology, mobile telephone and payment systems.

As the platform economist David Evans would reflect: "[T]hink of two-sided platforms as arising in situations in which there are externalities and in which transactions costs, broadly considered, prevent the two sides from solving this externality directly" (2011: 4). Not all multi-sided markets were necessarily new, or 'born digital', though some were. The traditional newspaper provided a useful, pre-digital precedent of the multi-sided market in action. Understood as a platform, the newspaper acts as intermediary between discrete groups of users, in the form of readers and advertisers. The discrete group of readers is seen, from an economics perspective, to create a 'positive externality' that can be sold to another market. For newspapers (and later, social media platforms) it is the 'eyeballs', or user attention, that becomes a positive externality that can be sold to advertisers. The act of publishing journalism creates a readership market, which becomes available to advertisers to market their product or service. When a platform creates interactions between different groups of users, readers and advertisers in this case, it is able to 'internalise' the positive externalities generated for third parties such as advertisers, in the form of profit (Reider and Sire 2013). Rochet and Tirole observed that 'many if not most markets with network externalities are two-sided' (Rochet and Tirole 2003).

As these platform economists recognised, it is imperative for a platform to 'match-make' between the two (or more) user groups. Having only one set of users, such as advertisers, without readers, will cause the advertisers to flee, in search of more effective way to reach their consumers. The earliest work on multi-sided markets described this as a 'chicken and egg problem' that requires a platform company to work hard to get "both sides on board" (Rochet and Tirole 2003: 990). Rochet and Tirole would integrate this issue into their formal definition of the multi-sided market:

> A market is two-sided if the platform can affect the volume of transactions by charging more to one side of the market and reducing the price paid by the other side by an equal amount; in other words, the price structure matters, and platforms must design it so as to bring both sides on board. (2006)

While the concept of the multi-sided market, when first introduced, attracted attention, not all of it was positive. In particular, there was criticism of the concept because it seemed to have no limits. Weren't these economists simply describing market-based transactions—i.e. 'everything'? (Evans 2011). Ultimately, it was the *forms of tactical intervention* used by multi-sided platforms to 'solve' the chicken and egg problem—how the platform worked to affect the nature and volume of transactions taking place—that would come to define the study of platform economics. The ongoing *strategies and tactics* used by platform companies to matchmake between user groups was of fundamental importance.

This process of match-making has become central to the concept of 'intermediation' as studied by platform economists. For a newspaper, the process of newsgathering was as much about attracting 'the right' readership as it was about a lofty ideal of quality journalism, with the right readership market needed to maintain demand for advertisers (who in turn pay salaries for content). To maximise their readership, newspapers in a pre-digital era would heavily subsidise the actual cost of the paper—whose costs would ultimately be passed on to advertisers in the form of rate cards, who in turn saw the benefits the paper brought to their sales figures. We might think of newspapers as essentially using news and journalism to 'intermediate' the selling of advertisements to consumers, just as financiers, acting as brokers, intermediate the buying and selling of loans lenders and borrowers. For a multi-sided platform, the imperative of solving the chicken and egg problem shapes how they go about intermediating a particular set of user interactions or transactions. As David Evans identified, 'businesses in these [platform] industries will devise entry strategies to get multiple sides of the market on board, and devise pricing, product and other competitive strategies to keep multiple customer groups on a common platform that internalises externalities across members of these groups' (Evans 2003).

Having investigated the different pricing structures and governance models adopted by platforms, Rochet and Tirole noted that platforms can act as monopolies, for-profit competitors, or not-for-profit entities (Rochet and Tirole 2003). The presence of 'captive buyers' particularly in the presence of monopolies will, they noted, tend to increase pricing to the benefit of sellers; while the capacity for 'multi-homing' on the

buyer side will generate more 'steering' on the seller side. For Rochet and Tirole, the concept of multi-homing is a way of describing a process of 'horizontal differentiation', which results in customers choosing to join and use several platforms. In more recent times, ride-sharing has become a good example of an industry in which multi-homing can be prevalent, specifically within cities where it is easy for users to download and utilise more than one ride-sharing app, such as Uber, Didi or Ola. In cities where only one ride-sharing app is operating, multi-homing is more difficult.

Just as other multi-sided platforms had done, the development of ride-sharing apps, such as Uber and Lyft, used 'steering tactics' to bring both sides of the market in relation to each other. They did this by giving away their expensive software, artificially reducing the trip fares, and incentivising drivers. As was quickly made apparent, these nifty apps, which allowed people to hail a cab 'at the touch of a button' were also highly disruptive in the way they were able to effectively intermediate relatively routine kinds of urban interactions. We can see the 'touch of a button' as the process of platform intermediation that is created by the launch of the Uber app into receptive markets of smartphone users, and the concurrent launch of a fleet of Uber drivers equipped with high-quality vehicles. The rapid uptake of Uber by riders was consequently 'steered' through the subsidisation of end-user fees, and the creation of a reputation system that allowed drivers and riders to rate each other, thus promoting trust between market participants. Such tactics essentially helped solve the infamous 'chicken and egg' problem all platforms need to do to be successful. Additional steering tactics included interface design tactics such as the inflation of the number of drivers visualised on the map when a person requests a ride. Why wait for a taxi when you can Uber it?

In markets where the presence of multi-homing is high, platform sellers were recognised as emphasising 'steering' strategies that essentially limit or discourage users from moving away from their platform. If platforms are not charging end-user transaction fees—and many will not, to solve the 'chicken and egg problem'—then these steering tactics may be quite subtle. Rochet and Tirole described these steering strategies as operating through the 'effort of substitution'. Software platforms, they noted, will aim to offer better software development kits, as well as application

programming interfaces (APIs) that encourage developers to create applications optimised to the platform, thus inducing application developers away from rival platforms (Evans 2003). Clearly, the strategies adopted by Mark Zuckerberg to enhance his platform reach were known well before the launch of Facebook, put in place by software companies such as Netscape, who were able to coordinate large portions of the Internet search market through their own 'steering strategies'.

Just as media theorist Tarlton Gillespie (2010) raised concerns about the relative neutrality of the word 'platform' in relation to its spheres of media influence, so platform economists such as David Evans took issue with early uses of the term 'multi-sided market' (Evans 2011). For Evans, the term obscured the focus on particular business practices, rather than market operations per se. Emphasising platform as 'two sided markets' essentially allowed for business analysts to promote the diverse forms of 'value-creation' generated through platform-based intermediation, while shifting attention away from the influence particular businesses, acting as platforms, were able to exert over the market transactions they facilitated. As we have seen, this notion of the platform as a catalyst for value-creation across the economy would come to dominate interest in how platform companies were reshaping markets and industries, facilitated through the influential lens of 'sharing economy' perspectives. This focus on forms of 'catalytic value creation' (Evans 2011) was central to much of the business literature on platform strategy over the past decade. 'Value-sharing' is what was achieved by companies who adopted a platform model to 'open up' their business architectures to outside players. As I discuss below, this located the role of platforms as 'market creators' who enhanced and extended value to broad market sectors, with far less attention to the forms of value *extraction* these platforms achieved.

When the concept of the multi-sided market or platform was first being set out by economists in 2003, Netscape was a dominant software provider, and Mark Zuckerberg was in the early stages of establishing Facebook, which launched in February 2004 as 'a place to find some interesting information about people'.[2] If the emergent economics of multi-sided

[2]This was how Mark Zuckerberg described Facebook in 2004 interview with CNBC. See Huddlestone, T. 2018. Here's how 19-year-old Mark Zuckerberg described 'The Facebook' in his first

markets, as elaborated by economists such as Rochet and Tirole, recognised that a platform's subtle 'steering' tactics might include the adoption of APIs for software developers, nevertheless much of the world's market activity was not yet digitised. In this sense, the widespread digitisation of products, services and business processes was simply an acceleration of this process, which saw global markets re-imagined as 'platform opportunities' or 'platform ecosystems'. From a business perspective, this meant companies *in any market* could adopt the platform model as a business model.

While the platform opportunity seemed to loom large, it was clear that the growing success of major digital giants like Google, Apple and Facebook wasn't necessarily by accident or chance: tactics employed by these digital businesses were highly orchestrated. Before turning to the ways in which platforms have been theorised as 'value-extractors', I want to turn now to how platform strategy came to be embraced as an entrepreneurial business strategy, resulting in platform intermediation being adopted as an increasingly mainstream business development tactic, seen as central to the very future of the firm.

Platforms and the Future of the Firm

Phil Simon, whose book *The Age of the Platform*, was funded by a Kickstarter campaign, wrote in 2011 of the platform entering the 'business zeitgeist', as 'the most important business model of the 21st century' (Simon 2011). Business-oriented platform analysts emphasised the strategic significance of platform businesses creating 'ecosystems' of service providers and users. Ecosystems, they argued, were rapidly replacing traditional business models in and beyond the software industry. Amrit Tiwana described platform ecosystems at this time as an 'entirely new blueprint for competition' (Tiwana 2013). The unique strength of the platform-as-ecosystem model was that unlike 'traditional' firms, platforms would aim to be extended and elaborated from *outside*, by other actors—provided that those actors

TV interview. *CNBC*, 16 April 2018. https://www.cnbc.com/2018/04/16/how-mark-zuckerberg-described-the-facebook-in-his-first-tv-interview.html.

follow certain rules (Simon 2011). Analysts thus proclaimed a shift from 'pipes' to 'platforms' (Choudary, n.d.; Alstyne et al. 2016); from 'product and service competition' to 'platform-based competition' (Tiwana 2013); and from 'vertically-integrated companies' to 'platform ecosystems' (Simon 2011).

These business analysts saw how platform companies strategically integrated software design principles to create multi-sided marketplaces that would once have operated *within* the boundaries of their own company footprint. In this orientation, the utility of the platform was therefore, fundamentally, 'in the ecosystem that surrounds it' (Tiwana 2013: Section 1.2, para 1). Seen through the lens of platform economics, digital platforms can be seen to deliberately institute a specific digital architecture as a form of networked governance in ways that subtly 'steer' forms of digital engagement among their users and developers. This point is also celebrated as a money-making tactic in business development literature. Writing on the 'power of platforms', start-up consultant John Hagel writes that 'no matter the market, there is money to be made in providing *layers of capabilities and standards* that other players in that market can tap into and use to interact more efficiently' (2015, emphasis added).

In this way, digital platforms were celebrated as being able to transform markets not only for media and advertising, essentially intermediating a more traditional media model, but also broader ecosystems of diverse market actors. As Sangeet Paul Choudary put it: 'We are not in the business of building software, we are in the business of *enabling interactions*' (Choudary 2015, emphasis added). 'Enabling interactions' might be alternatively described as *actively intermediating* interactions. Or, as Jeff Bezos, CEO of Amazon, famously said, '[Their] margin is my opportunity' (Lashinsky 2012).

As a consequence, platform design has come to be understood as a deliberate form of market intervention, which aims to orchestrate diverse market-based activities through intermediating tactics that undercut competitor margins. This is the territory of management consultants and business analysts, whose advocacy of platform 'toolkits', 'stacks', 'layers' and 'planks' have helped to ideate the platform as an idealised mode of organisational design and business development strategy. While many platform strategists have used the language of the ecosystem to capture the nature

of market-based 'value-sharing' through platforms, Choudary has also characterised the architecture of platforms, and of platform governance, in terms of the 'platform stack'. To Choudary, 'all platforms essentially execute different configurations of the one stack', which include a set of distinct definable elements underpinning a (digital) platform business that facilitate its success. While the platform stack concept recognises all platforms, whether pure software platforms, shared economy platforms, social media or media platforms, are built according to common 'layers', it is the relative emphasis on different 'layers' of the stack that generates particularities across platforms. It also, importantly 'lays out the rules of governance for the interactions that ensue' (Choudary, n.d.).

Choudary, one of the most vocal proponents of the platform business model, has set out its three key dimensions (Choudary, n.d.). We can, in turn, interpret these through the language of platform economics:

1. To architect incentives that repeatedly pull participants to the platform ('steering' tactics as described by platform economists);
2. Providing a central infrastructure on which participants create and exchange value (software-based or digital intermediation); and
3. To match participants with each other and with content/goods/services created on the platform (solving the 'chicken and egg' problem).

Platforms were celebrated as new kinds of business entities, in their reliance on an 'external ecosystem' to generate value and to scale. Their dependence on this ecosystem also put emphasis on the *nature and quality* of interactions among ecosystem participants (Choudary, n.d.). Thus the launch of the App Store benefitted Apple immensely, and cemented its role as one of the world's leading digital platforms, integrating platform ecosystems into its very hardware. This is, in effect, what platform economists such as Evans (2011) see when they describe platforms as being 'catalytic value creators', because the App Store not only extended the functionality of the iPhone for all users, but also generated billions of dollars in revenue for both software developers and Apple (Wingfield 2018) (Table 6.1).

Table 6.1 Elements of platform strategy as promoted by platform business strategists

Platform ecosystems	Platform governance	Platform intermediation
A platform provides the infrastructure and rules for an ecosystem of participants to interact/share/trade/transact The players in the ecosystem fill four main roles: Owner, provider, producer and consumer Architecting the relationships both within and outside the ecosystem is central to platform strategy The utility of a platform is in the ecosystem that surrounds it. (*Source* Alstyne et al. 2016)	A set of layers and standards that determine the 'rules of the game' in the operation of a platform ecosystem Platform APIs (application programming interfaces) facilitate ostensibly open innovation and forms of value-sharing through common standards	The process of strategically orchestrating digitally-mediated relationships to produce 'platform ecosystems' in which participants can interact more efficiently—thus reducing competitor margins 'A platform strategy is an approach to entering a market which revolves around the task of allowing platform participants to benefit from the presence of others' 'A solid platform strategy will answer two key questions: How will you attract customers? And how will you make your technology the core of an ecosystem?' (*Source* Church 2017)
'We are not in the business of building software, we are in the business of *enabling interactions*' (Choudary 2015, emphasis added)		

Just as newspapers gave their product away relatively cheaply, so companies such as Google and Facebook were seen to deliberately 'open' participation by globally networked users. Tactics to deepen engagement maximised the volume of 'eyeballs' on their platforms and in turn enhanced their capacity to coordinate, or intermediate, market-based transactions using their software platforms. As the cliché goes: 'If you're not paying for it, you're the product'. In this context, maximising participation constitutes a kind of 'steering tactic' on the part of platforms, made manifest in free software for users (such as Google's Gmail, and access to the Facebook network). It is also manifested in the provision of APIs, which allow software developers, acting as micro-entrepreneurs, to continue to expand the

reach and capabilities of proprietary software for their own benefit, and those of their users. Understood not only as a technology strategy informing digital architecture, but as a corporate strategy or business model, the strategic execution of an API has acted as a central enabler of platform innovation. It is through the infrastructure of the API that a platform is able to shift or 'steer' the locus of innovation from within the firm to its external ecosystem. Empowering a platform 'user'—whether a software developer, kindergarten teacher or music creator—to become a producer on a platform enables them to create additional value on the platform, which they personally benefit from. As platform economists would see it, this is the 'positive externality' of the multi-sided market in action. But platforms also primarily exist to 'internalise' these positive externalities, by charging commission and, as I will discuss shortly, through data agglomeration.

While platform business strategists were initially inspired by the success of digital software companies such as Apple and Google, it soon became clear that the integration of digital software via distributed sensors and 'internet of things' (IoT) applications provided a way for ambitious companies to essentially 'platform' a wider marketplace. Platforms like Uber, Didi and Airbnb have demonstrated the capacity for 'platform-play' digital services to create disruption in established industries like transportation and tourism. The growing ubiquity of the 'internet of things', facilitated by the use of distributed sensors, cloud storage and advanced analytics, has also provided 'platform-play' opportunities in more traditional infrastructural services such as water, utilities and banking services.[3]

More recently, companies such as WeWork and Katerra have shown how narratives of platform intermediation have aimed to intervene in the production of physical urban infrastructure—but not always successfully. WeWork was initially established as a business that provides co-working spaces, but in 2019 rebranded as 'The We Company' to extend its focus on a broader range of market opportunities, revolutionising 'the way people and companies work' according to the company tagline (Reisinger 2019). As a representative of the real estate industry in New York explained,

[3]A 'Platform Strategy Summit' at MIT featured a range of companies and business leaders explicitly utilising platform strategy to enter new markets. See: http://platforms.mit.edu.

this is a model that ultimately sought not only to attract tenants to co-working spaces, but also to disrupt the relationship between tenants and landlords, tenants to brokers, and brokers to landlords (*Economist* 2018). The expansionist rhetoric of WeWork depended on a speculative view, backed by venture capital firm SoftBank, that the intermediation of these relationships was simply achievable via interior design, office space buy-out and brand *chutzpah*. The 2019 market response to the company's failed IPO, which saw WeWork's valuation crash from US $47 billion to potential bankruptcy by end 2019, made clear that WeWork did not, in fact, have the capacity to successfully intermediate and govern 'how people live and work', despite the billions it had attracted from SoftBank.

Another company, Katerra, is seeking to disrupt the construction industry by creating a 'technology-driven, off-site construction company'. Citing the fact that the construction industry has historically invested some of the lowest proportion of revenues into technology, Katerra is seeking to use digital technologies to 'optimise every aspect of building design, materials supply, and construction' (Katerra, n.d). Katerra uses a real-time data processing application called Saphana, integrated with IoT sensors within its building products, to achieve what Craig Curtis, the President of Katerra, calls 'deep integration and newfound efficiencies' (ibid). Buildings are designed in Revit, a 3D modeling software, with plans for a centralised platform for all suppliers to migrate to.

The company is proudly vertically-integrated, including all aspects of technology, design, procurement, manufacturing and construction under its remit. According to architect Phil Burnstein, the tools used by Katerra are not causing a shift to vertical integration, but rather 'enabling it' (Katerra, n.d.). With a focus on introducing more timber-based construction methods into construction sector, the company offers 'end to end' solutions its clients, offering a set number of modular components for selection in the design process. This method, as the company argues, essentially transforms construction into a process of product assembly, rather than one-off, custom construction projects. Underpinning this modularisation is a set of software tools that intermediate the design and construct process, allowing customers to select modular designs and materials for production and assembly by Katerra.

These examples show how methods and narratives of platform intermediation seek to intervene, not simply through 'digitalisation' of workflows and communication environments, or app-based consumer-facing services, but also by the active reassemblage of business-to-business (B2B) industry value chains as platform ecosystems. In short, the platform company intervenes in an industry or sector that is characterised as a 'laggard' in some way, and advocates for a new, more cost-efficient and productive set of inter-firm relationships that are invariably focused around a set of centralised, software-enabled services delivered by the company. As WeWork's experience of 2019 shows, these interventions can be more rhetorical than profitable, despite access to significant financial backing.

Platform Intermediation and Data Capture

The rules and tactics governing digital platforms have not only cemented their influence as a defining business model of the digital economy; they have also radically expanded the influence of digital entrepreneurs in the wider global economy. These are rules and tactics that have radically reshaped the conditions through which digital information is produced, disseminated and used. Wider promotion of these tactics has also helped attracted a significant upsurge of investment in technology-focused companies and digital start-ups that are able to demonstrate their credentials as 'platform companies', even if only rhetorically (Rushkoff 2016; Isaac 2014). Indeed, the spectacular profits generated by the world's largest platform companies means the platform has been considered by business analysts 'the most important business model of the 21st century' (Simon 2011: 330; Hagel 2015), and has, in recent years, attracted disproportionate volumes of venture capital into the software sector (Langley and Leyshon 2017: 25).

As notable examples, ride-sharing platform Uber attracted $13.8bn in private capital between 2014 and 2016, with a further $8bn invested by SoftBank's Vision Fund in 2018 (Kelleher 2016). Start-up platforms with demonstrated or potential reach have been acquired by more established platforms for huge sums of money: WhatsApp for $19bn in 2014 by Facebook; Nest by Google in 2014 for $3.2bn; LinkedIn for $26.2bn by

Microsoft in 2016 (Darrow 2016; Libert et al. 2014). Companies such as We Company and Katerra also saw significant investment by SoftBank over 2018. Major platform companies have the capacity to undercut or buy out competitors, or those companies who exist within the 'ecosystem' that they operate within, as demonstrated by Amazon's 2017 acquisition of Whole Foods for $13.7bn (Stevens and Haddon 2017), and the purchase of Instagram by Facebook. Likewise, powerful banking companies such as Goldman Sachs are now significantly invested in the accelerated growth of platform companies categorised as 'unicorn' start-ups, or companies with valuations over $1bn (Brooker 2015; McNeill 2016).

The scaling of platforms underscores the need to understand platform companies not only in terms of what they do, but also, as Gillespie and Annany (2016) put it, by *how they change*. In this section I want to briefly address how the globally-scalar nature of platform intermediation can be seen as reflective of increasingly conjoined processes of data accumulation and financialisation. As is increasingly recognised, the capacity for platforms to morph and scale is a reflection not only of clever business tactics, but also highly effective modes of data capture instantiated via governing tactics embedded in processes of platform intermediation. Speculation on data futures has facilitated the increasing financialisation of platform intermediaries, which has accelerated platform expansion into diverse urban marketplaces simultaneously. In this sense, the rapid expansion of platform companies, notably those such as Uber, WeWork, Katerra, Deliveroo and others, needs to be recognised not simply as an *inevitable* process of digital disruption, but as a strategic approach to monopolising future data aggregation platforms by investment vehicles such as SoftBank seeking to *intermediate* the ongoing expansion of global platform intermediation.

The Many Uses of Data

Today, the positive externalities of 'value' achieved by platforms take the form of data (Sadowski 2019a), to be bought and sold in data marketplaces and used to train machine-learning algorithms for ever smarter digital services and applications. As Yasser Zaki, a Microsoft strategist has extolled in relation to the power of platforms in a data economy:

> Leveraging the potential of the platform isn't just about doing things faster, cheaper and more reliably—it's about the ability to expand into new client scenarios through the power of data, and provide new experiences that were previously thought impossible. (2018)

Platform intermediaries are uniquely positioned to exploit the data collected by those who transact or interact via a platform service, making them uniquely powerful and drawing comparisons with feudal overlords of previous eras. The many different uses of data obtained by platform companies—the data exhaust of our daily lives—whether personal data, transactional data, social data or location data, have given rise to a variety of labels that are now used to describe platform intermediaries as occupying a distinct phase in the history of capitalism. These include, but are not limited to, surveillance capitalism (Zuboff 2018; Pasquale 2016), platform capitalism (Srnicek 2016) and informational capitalism (Fuchs 2010). Such conditions reflect the (total) datafication and surveillance of people, places, processes, things and relationships among them (Van Dijck 2014), which we can recognise as symptomatic of ever-deepening processes of platform intermediation. As Sadowski and Pasquale (2015) have argued, inherent to this process are the inbuilt feedback loops that see the constant gathering and feedback of data to support more data being generated, which in turn facilitates the further extension of data-gathering devices and services.

As noted by Weyl and White, strategies to promote data accumulation through conditions of platform intermediation undermine the often-presumed benefits of network effects and raises significant challenges for competition policy (2014). Specifically, there is a 'winner takes all' objective of platforms which hinges on their ability to coordinate, govern and ultimately exploit their wider network effects. As put by Langley and Leyshon (2017):

> It appears that the key for the platform is to intermediate the ever-expanding value created by user interactions across their market network. This is because continually increasing numbers of users – understood as producers and creators of value and generators of data, and not as consumers – is crucial to a platform's capacity to cultivate and capture value, and to do so over time and on an ever greater scale.

In this context, Plantin et al. (2016) have suggested that perhaps the 'system builders' of the past have been replaced by the 'ecosystem builders' of today's platform owners, who 'leverage programmability and interconnection to achieve control, rather than relying on direct provision and expansion' as did the monopolies of an earlier era. As is becoming increasingly well recognised, platform intermediation may facilitate positive externalities and network effects for its users, but under conditions of data commodification it also facilitates highly centralised modes of data governance and, ultimately, exploitation. From a platform economy lens, we can see this process of data commodification as one in which platform intermediaries attract into their 'ecosystem' data brokers and resellers, who themselves act as intermediaries for diverse market transactions, whether the selling of more targeted advertising or political messaging, as in the case of Facebook, or the training of machine-learning algorithms. While it is useful to understand methods of data capture as not only forms of commodification but also *as capital*, as Sadowski (2019b) has done, pointing to the normative importance of data extraction more generally, we need to remember that the process of 'datafication' via the specification of data standards and protocols also constitutes a kind of 'steering tactic' on the part of platform companies to expand the range and remit of the platform ecosystem that it governs. This delivers unbounded surveillance possibilities—but is also used to improve or extend the service offered by a platform to its users. Personalisation, in other words, might be thought of as the bright side of surveillance.

Figure 6.1 captures how platform ecosystems have been understood as relational systems of value-exchange. Firstly, the platform acts simply as a basic, neutral intermediary for the exchange of value between buyers and sellers. Secondly, the platform is perceived as a value-generating service, that allows for multiple forms of sharing and trading (value-exchange) between diverse market participants, as envisaged by sharing economy advocates. Here, the role of the platform also remains relatively neutral, and the forms of value-exchange are limited to goods and services. Third, the platform ecosystem is considered through a data lens, whereby the platform is able to capture data relevant to value-sharing participants, and in turn can leverage this data to shape or intermediate new industries. This raises the challenge of defining platform influence in terms of the 'relevant

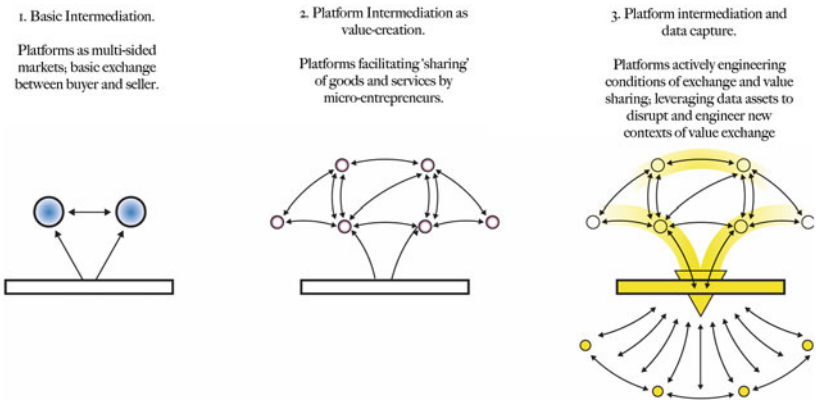

Fig. 6.1 Platforms and value exchange: from basic intermediation to data-driven platform ecosystems (*Source* Author)

market' that a platform operates in, because it shows how data value can always be leveraged, either to influence new (or hitherto not yet realised) markets, or to extend influence across existing marketplaces.

SoftBank as a Platform

Conditions that see datafication as a wholly-owned bi-product of platform intermediation, has encouraged speculation on data futures, and the increasing financialisation of the platform economy. In a sense, we have witnessed the emergence of an era in which platform intermediation and financialisation have a kind of equivalence: the platform ecosystem as a multi-sided market, fuelled to expand through the multi-variant nature of data as capital, sees the platform intermediary function as an expansionary vehicle for the financial intermediary. This transition is evident in the story of SoftBank, a Japanese software company established in 1981 by the entrepreneur Masayoshi Son. Son is known as an aggressive investor in technology companies, who established the company as a 'bank of software' but also distributor of software services and a Japanese phone company (SoftBank Mobile). In the 1990s SoftBank made major investments in Yahoo, and other dot-com era companies, resulting in losses to

Son in the dot-com crash of $70bn (incidentally, the highest losses by an individual in history). A relatively small investment of $20 m into Alibaba in 2000 amounted to a 27 per cent stake in the company, which was valued in 2018 at nearly $132bn (de la Merced 2018).

In recent years SoftBank has divested itself of many of its telecom assets, to focus entirely on its software investments as a venture capital firm. This process of evolution has seen the company recruit from Goldman Sachs and Deutsche Bank, including Rajeev Misra, former head of credit and emerging markets. In 2019 Misra lead what is known as the SoftBank Vision Fund, a venture capital fund seeking to raise USD $100bn in investment. It has been focused exclusively on realising a '300-year strategy' developed by Son, sometimes described as a 'cluster of ones' strategy (Softbank, n.d). The Vision Fund received USD $45bn from Crown Prince Mohammed bin Salman of Saudi Arabia, as well as Apple (USD $1bn) and Qualcomm (USD $1bn) and USD $28bn from SoftBank itself (Crunchbase, n.d.). The fund states its aim as investing in 'businesses and foundational platforms that SoftBank believes to revolutionise and innovate the world tomorrow' (Softbank, n.d). The 'cluster of ones' strategy aims to ensure SoftBank has a major stake in any aspirational platform intermediary that is seeking to own the 'ecosystem' of its targeted sector. The company is particularly focused on companies capable of realising the benefits of AI, which has seen it purchase UK chip maker Arm Holdings, robotics company Boston Dynamics (bought from Google parent company Alphabet), graphics processor Nviva, VR company Improbable and workplace communications platform Slack. SoftBank has also invested in major ride hailing platforms including Uber, Didi and Ola (Medeiros 2019).

Quite explicitly, SoftBank has expanded the reach of its capital investments in recognition that it is only by achieving rapid global scale that platform companies can accelerate the speed of data collection needed to establish and in turn orchestrate their ecosystems as AI-generating infrastructures. SoftBank targets those companies likely to become 'unicorns' in their sector, and injects capital to allow them to expand as if 'capital was no limitation' (Softbank, n.d). The Vision Fund is one of the largest foreign investors in China, India and Europe. We see in the SoftBank investment strategy how the notion of 'ecosystem' is continuously used

to describe the process of platform intermediation, which is conceived, ultimately, through the lens of speculative market dominance:

> Our playbook has been to take meaningful minority stakes and bring both capital, counsel, and connections to our entrepreneurs and introduce them to their sister companies inside of the broader SoftBank ecosystem.
>
> SoftBank managing partner Jeffrey Housenbold. (Marinova 2018)

As SoftBank's managing partner goes on to explain: 'Even a really well-funded start-up company will have trouble competing when it's up against a rival backed by a mega-fund like the Vision Fund' (ibid). Ultimately, in a data-driven world, there are perceived to be a certain set of industries where 'winner takes most'. So it follows that early on in the intermediation of an industry, the company with more capital can attract more talent, acquire smaller players, market aggressively and capture customers. In those instances, the injection of capital acts as a differentiator and ensures the platform intermediary, acting on behalf of the financial intermediary, is able to dominate that marketplace. As Son is known to say: 'Whoever controls the data controls the world' (Medeiros 2019).

Conclusion

Unlike traditional, vertically-integrated firms, platforms have differentiated themselves by seeking to be extended and elaborated from outside, by other actors—provided, of course, that those actors follow certain rules. The functionality of platform infrastructures is 'open' insofar as it is designed to enable others to add value, providing they do so within the structures and protocols established by a central set of rules and procedures. Increasingly, this process has seen marketplaces reimagined as 'ecosystems' of providers and value-sharers, rendered as relatively open marketplaces, despite the governing role of the platform provider in intermediating the diverse kinds of relationships and value that is shared.

Because of this, platforms have been discursively promoted through the conditions of value-sharing they enable—through open data value chains, and sharing economy narratives—rather than the conditions of

value extraction they establish. But by managing the infrastructure upon which users interact, in myriad unfolding ways, and controlling the terms of data access and use through proprietary APIs, platform owners control the means of data accumulation and, in turn, its monetisation. They act, in this sense, as *rentiers* of the digital economy (Sadowski 2019a; Olma 2014). The value creation performed by an ecosystem of participants on behalf of the platform reduces its overall marginal cost (Libert et al. 2014): thus Airbnb leverages the housing assets of Airbnb hosts, without actually owning any of this housing stock. Likewise, a platform like Facebook has evolved from a social media service into what John Lancaster described as 'the biggest surveillance-based enterprise in the history of mankind' (2017), its value mushrooming as its capacity for targeted advertising is continually reinforced by the participatory impulses of its user base.

As discussed earlier in the book, social media theorists have described this dynamic as a kind of 'proprietary opacity', whereby the programmability of platforms, by virtue of their API, at once decentralises data production while simultaneously recentralising data collection. Business analysts describe platforms as generating 'layers of capabilities and standards' that other players in a market can tap into and use to interact more efficiently. The benefits accrued to users of a platform are largely in the specific nature of the interactions themselves (whether accessing a nice room in a better part of town to that of a hotel, in Airbnb's case, or finding someone to give you a ride faster and cheaper than a taxi might, in Uber's case). But platform providers themselves accrue value well beyond the specific nature of these interactions, through the conventions they enforce relating to the use of and access to underlying data infrastructure. In the first instance these conventions support the capacity of the platform provider to use activity data to improve the quality and range of services available to platform users. But they also reinforce the capacity for platform providers to act as gatekeepers to the valuable activity data that is generated. This enables the platform to leverage the network effects associated with the multi-sided interactions it generates into a unique data ecosystem that it governs in absolute terms. Over time, the platform provider reaps profits, resulting from the increased lock-in from both sides of the market place (Plantin et al. 2016). As we have seen, through the vehicle of investors like

SoftBank, this process of platform intermediation is also one speculated on through processes of financial intermediation.

Each transaction we engage in, using the colourful interfaces of our smartphone apps—whether to order a meal, or hail a taxi, or make a payment, or even, perhaps, to design our next home—may well involve a data transaction with a company that belongs within the SoftBank 'ecosystem'. While the prospect of artificially intelligent (AI) devices, infrastructures and services has raised alarm bells in terms of potential workforce redundancies an AI-driven world will entail, through the lens of platform intermediation it is clear that we need also to be concerned about the dynamics of market-based agglomeration that are shaping this future. As Morozov and Bria (2018) have written: 'Ultimately, whoever controls the means of producing the most data obtains the best AI, making everyone else dependent on it, and allowing AI be fashioned as a service accessed on a permission-based basis'.

Though an advocate for the potentials of urban computing, in 1996 William Mitchell could see well enough the problems that ubiquitous 'data trails' would provoke. He foresaw prospects of unchecked digital surveillance, if data access provisions weren't properly addressed. As he wrote in *City of Bits* (1996: 222):

> Life in cyberspace generates electronic trails as inevitably as soft ground retains footprints; that, in itself, is not the worrisome thing. But where will digital information about your contacts and activities reside? Who will have access to it and under what circumstances? Will information of different kinds be kept separately, or will there be ways to assemble it electronically to create close and detailed pictures of your life? These are the questions that we will face with increasing urgency as we shift more and more of our daily activities into the digital, electronic sphere. Contention about the limits of privacy and surveillance is not new, but the terms and stakes of the central questions are rapidly being redefined. Isolated hermits can keep to themselves and don't have to keep up appearances, but city dwellers have always had to accept that they will see and be seen. In return for the benefits of urban life, they tolerate some level of visibility and some possibility of surveillance - some erosion of their privacy. Architecture, laws, and customs maintain and represent whatever balance has been struck.

As we construct and inhabit cyberspace communities, we will have to make and maintain similar bargains – though they will be embodied in software structures and electronic access controls rather than in architectural arrangements. And we had better get them right; since electronic data collection and digital collation techniques are so much more powerful than any that could be deployed in the past, they provide the means to create the ultimate Foucaultian dystopia.

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7

Platform Intermediation as Recombinatory Urban Governance

Introduction

The nature and power of platforms has become an increasingly central concern of our era. As put by Jose Van Dijck, 'a persistent interest in and substantial understanding of platforms is crucial to a critical engagement with one of the most significant transformations of this century' (Van Dijck 2012). The increasingly ambient and distributed nature of digital services and interfaces across cities today means that processes of platform intermediation are now more intricately part of our everyday environments. Smartphone apps, IoT technologies, machine-learning algorithms and cloud computing services are, increasingly, serving as primary infrastructures for urban living. The rise of distributed, ubiquitous computing, anticipated by some as a force for 'bottom up' urban transformation, has resolved into a machine for the production of globally-entrenched, vertically-integrated platform companies. Rendered thus, the natures of platform urbanism are being revealed in the form of planetary subordination to the logics of black-boxed, proprietary algorithms, whose capacity to embed and orchestrate machine intelligence into our everyday lifeworlds far outstrips the capacity of any sovereign state (Ong and Collier 2005).

S. Barns, *Platform Urbanism*, Geographies of Media,
https://doi.org/10.1007/978-981-32-9725-8_7

The necessary balance between privacy and services, between value-sharing and value-capture, has not yet been achieved.

Looking back, it's clear these conditions of data extraction and platform capitalism, now central to the contemporary 'tech lash' against major tech companies such as Facebook, have been powerfully assisted by the discursive positioning of these companies as catalytic value creators and engines of a digitally-networked society. A sense that infrastructures are no longer 'comprehensive, global or systematic' (Latour 1993: 118), their logics shaped by that of 'splintering' away from large-scale technical systems (LTS) to that of competing and fragmentary private services (Graham and Marvin 2001), would now appear to be shifting with greater recognition of the platform performing as what Bratton (2014) called a global technological megastructure. And yet, the discursive positioning of platforms as enablers of diverse forms of micro-entrepreneurialism and value creation continues to modulate and narrate the dynamics of interaction between platform providers and their users. As such, the conditions of platform urbanism have not been made to *feel like* that of subsumption to the logic of a centralised megastructure.

A highly coordinated data governance environment facilitates the concurrent processes of *service-based decentralisation* (extension of platform services and interfaces into diverse websites), and data standardisation and centralisation (establishing protocols and standards that ensure conformity of data collection in line with central databases). In urban settings, this process can be closely aligned to the spirit of *urban innovation,* including the 'opening up' of data and even 'sharing' of assets, services and infrastructures (Barns 2016). Never mind that this opening up can occur in ways that extend the reach of a single company, acting as platform intermediary. As Van Dijck et al. (2018) have argued, an 'ecosystem approach' to understanding platforms highlights a diversity of multiple actors whose interactions are constantly being coordinated through protocols and interfaces established by a platform but also, through relatively 'open' forms of programmability, their constant evolution and adaptation.

As discussed in the previous chapter, while the notion of 'ecosystems' has long been advanced by platform strategists, there is a need to better understand the forms of relationality constituted within these ecosystems. To negotiate platform urbanism is to address the dynamic, reproductive logic

of platform intermediation as increasingly critical to the diverse natures of contemporary socio-spatiality, both through the diversification of services on offer, and through its underlying data architectures. A 'platform logic' seeks to orchestrate maximum use-value from urban contexts by actively intervening to *produce* higher volume data-intensive interactions. This much has been widely affirmed in relation to social media (Van Dijck et al. 2018; Mackenzie 2018), however the increasingly distributed, spatialised nature of these platform interactions—structuring knowledge and navigation of urban context, intermediating access to urban transportation services, instrumenting light sources, monitoring energy use, and so forth—means platformisation is also an incredibly powerful mode of socio-spatial reconfiguration. As Van Dijck (2012: 171) has written in relation to social media:

> What is important to understand about social network sites is how they activate relational impulses, which are in turn input for algorithmically configured connections—relationships wrapped in code—generating a kind of engineered sociality.

It is through conditions of engineered *socio-spatiality* that platform urbanism deliberately enacts and reproduces the city as a *relational resource for data governing*, wherein 'networked publicity strategies' (Van Dijck, 171) mediate the norms of sociality and connectivity. In this respect platform urbanism is absolutely a spatial reconfiguration (Stehlin 2018), and an algorithmically fine-tuned mode of what Gabrys (2014) has called *environmentality*—a mode of governmentality that is applied to environmental behaviours. But it can also be seen to constitute a significant *processual reconfiguration* of relationships. Platform urbanism spatialises through the temporal, reproductive dynamics of urbanisation; it is never fixed as a specific company service but an assemblage of data governing tactics that seek increasingly to shape what it means to live today in connected cities.

Platform urbanism seeps beyond the behaviourist visualisations of the urban data scape (Mattern 2013); it is intimately experienced as multisensory connection to 'ambient' environments of information (McCullough 2013). Unlike visions of smart cities or real-time cities, platform urbanism is not necessarily enacted in an abstract way as a "geography of

distanciated, technological performance" (Crang and Graham 2007). Our experience of platform urbanism is a daily, habitual one of ambient and relational connectivity that alters our sense of space and knowledge of the urban in myriad ways. As social media scholar Mackenzie has noted, conditions of platformed integration implicate "senses of intimacy, belonging, participation, ranging across institutions, organisations and everyday life" (Mackenzie 2018). Reflexively promoting and engineering interactions between selves and sites, locations and devices, experiences, protocols and predictions, platforms continuously modulate each, empowering us to act, to share, to *relate*, in service of these wider interests of engineered connectivity.

Key Principles of Platform Intermediation

We can, at this point, summarise some key principles and conditions associated with the 'platforming' of everyday urban environments, by bringing together insights gathered from the fields of platform studies, digital political economy, platform economics and platform strategy. As I discuss shortly, these conditions can be thought of as enacting a kind of *recombinatory* urban governance, a Janus-faced way of governing that is 'open yet closed' (Table 7.1).

While much attention is today focused on the peculiarly novel techniques adopted by platform companies to extract greater value out of our everyday, digital environments, it is also important to remember that these processes are not themselves new, but consistent with conditions endemic to the commercial software sector. As Schmidt has written, 'the platforms we have today are not the result of technological determinism, but of design decisions of the people who have developed them, and of what their users are willing to accept' (2017).

As I have argued, 'what users are willing to accept' has been shaped by a persistent imagistic representation of digital connectivity through the logic of networks. This has continued to discursively frame the expansion of platform ecosystems through logic of diversification, bottom-up participation and sharing. As Swyngedouw has argued, such models of networked participation present themselves as a kind of 'governance beyond the state',

Table 7.1 Platforms and lessons learned

1.	**The 'work platforms do'** is both *discursive* and *technical*	Gillespie (2010)
2.	**Discursive tactics** position 'the platform' as a neutral intermediary or helpful enabler	Gillespie (2010)
3.	Platforms produce **conditions of networked sociality**	Van Djick et al. (2018)
4.	**Platform data architecture is inherently recombinatory**. It decentralises and incentivises data production, while recentralising data collection	Helmond (2015) and Mackenzie (2018)
5.	**API Infrastructures** function as governing framework for networked sociality, embodied as the 'infrastructuralisation of platforms'	Plantin et al. (2016)
6.	Diverse relationships are reimagined as **'ecosystems'**, otherwise known as multi-sided markets producing their own 'network effects'	Rochet and Tirole (2003)
7.	**Steering tactics** are used by platform companies to encourage and incentivise platform intermediation, value-sharing and data production by participants. These include feedback mechanisms to promote user lock-in and entrench methods of data accumulation	Langley and Leyshon (2017)
8.	**Platforms scale** through the twin process of **data capitalisation and financial intermediation**	Srnicek (2016)
9.	Platform intermediation is not limited to transactional relationships, but also **implicate perceptual attention and embodied, everyday situational awareness**	Mackenzie (2018) and Barns (2019)
10	Platforms are not fixed entities. To understand the power of platforms, we must undertstand how they change	Gillespie and Annany (2016)

an idealised (though poorly evidenced) normative model that conceives the conditions of 'good government' as those where the demarcations between public and private actors are highly permeable and networked (2005). The nature of networked connectivity has also presented itself as inherently *decentred*, allowing for 'crowds' to self-organise outside the confined of existing institutions. This sense of networked amorphousness remains powerfully present within the experience of platform ecosystems, even if the underlying structures of data capture and use are not.

To continue this platform genealogy of sorts, in the following section I return to some of the principles of computer networking as they were first established experimentally, in the dawning of our computational era. I do this in order to address the networked imaginary as it has persisted in shaping ideas of digitalisation, but also to demonstrate how platform intermediation is itself quite consistent with the history of software development. As the saying goes, 'software is eating the world': the logics of platform intermediation may be moving centre stage in the arts of city building, but they are an extension, not a reinvention, of a way of architecting system-based relationality and its orchestration. Finally, with a view to better understanding conditions of contemporary platform governance and experience, I explore how cybernetic dreams of self-learning systems are being instrumented through conditions of platform intermediation through a short discussion about Uber.

From Cybernetic Imaginaries to the Platform Imaginary

As Matthew Fuller reminds us, computing needs to be recognised as 'something having a history, rather than just being permanently in a state of improvement' (Fuller 2008). The historical context that gave us today's Internet is widely known, and it is certainly not my intention here to give a full account of this history. Yet, some fundamental architectural features and ambitions behind the 'internetworks' designed in the mid twentieth century are worth returning to. Conditions of 'inter-networking', as initially understood, were executed as a series of controlled research experiments designed to test the benefits of 'combined computation', linking

ideas and propositions of cybernetics, mathematics and cognitive science. A set of experiments undertaken by the International Network Working Group (INWG), a research group led by Vint Cert, tested the benefits of creating 'host to host' software, and it was these experiments that would ultimately be responsible for ARPANet's first 'host to host' protocol called Network Control Protocol, a forerunner to the successful TCP/IP protocol for the distribution of information into 'packets'. While early Internet pioneers had concerned themselves with the software protocols for distributing information between computers located in different places, they nevertheless described these original efforts as being motivated by a desire to connect people (or at least, researchers), not computers. J. C. R. Licklider, head of the ARPAnet project and a cognitive scientist by training, is quoted as saying that it is 'not proper to think of networks as connecting computers. Rather, they connect people using computers to mediate' (quoted in Hauben 1996). Networking *people* through host computers was a way to experiment with the potentialities of the computer 'as a communications device' in the words of Licklider, and not only a mathematic device for speeding up computations (Licklider and Taylor 1968).

The potentials of networking people were, for Licklider, informed by a belief in the benefits of feedback for problem-solving. As a central concept of cybernetic thinking, as assembled by Norbert Weiner, continuous feedback described a mode of automatic or self-correcting reasoning. Having attracted a diverse cohort of scholars spanning psychology and cognitive science, computer engineering, mathematics and information theory, cybernetics presented both a framework through which to undertake 'controlled experiments' in computation, but also a way of interpreting dynamic interactions between biological, human and machinic systems (Kline 2006; Weiner 1948, 1950; Dechert 1965). Such ideas proved influential in framing these early experiments in 'internetworking'.

For Licklider, connecting computers offered the potential for dynamic, networked communication between people, helping to generate positive feedback and results. Computational communication could, he argued, be dynamic. 'When minds interact new ideas emerge' he wrote (Licklider and Taylor 1968). In this context, the creation of a programmable and networked digital computer was anticipated as a medium whose nature was infinitely plastic and changeable:

> …[A]bove all a common medium that can be contributed to and experimented with by all. . . Its presence can change the nature and value of communication even more profoundly than the printing press and the picture tube, for … a well-programmed computer can provide direct access both to informational resources and to the process for making use of resources. (Licklider and Taylor 1968)

It is widely recognised that the ideas informing the design of early computer interfaces, including the Graphical User Interface, as well as protocols for 'host to host' sharing, were shaped by key concepts associated with cybernetics. Reinvigorated in the post-war period, Wiener introduced the notion of the 'cybernetic' in 1948, a term based on the Greek term *kybernete* (which means 'steersman' or 'governor'). Put simply, cybernetics to Weiner was (as the title of his book states) 'Control and Communication in the Animal and the Machine' (1948). For Weiner, both human and machinic systems ought to be reimagined as 'communicative organisms'. As such, they ought to be described through a 'new language' equally applicable to living organisms, machines and human societies. Drawing on concepts of energy flow, feedback, computation and probability, as developed by physical scientists and philosophers such as Maxwell, Shannon, Leibnitz and Einstein, Weiner's cybernetic imaginary presented a 'systems view' of dynamic relationality, informed by the idea that all matter could ultimately be understood as discrete messages or signals that 'controlled' via systems of continuous feedback. Such systems worked in ways that were both self-governing but also highly productive (Kline 2006; Hauben 1996).

Weiner was not himself the originator of the term cybernetics, but drew from its usage by French physicist André-Marie Ampère in 1834. Ampère sought to establish a classificatory system of the sciences, and used '*la cybernétique*' to denote the future science of government (or political science) (Levin 2000). Cybernetics, as Weiner introduced it, drew its lineage from the ideas of Leibniz, whom he called a 'patron saint of cybernetics' (Weiner 1948). Leibniz did much to advance a 'binary' mathematical system and a 'universal symbolic language' as expressed through the calculus, arguing that through the combination of all 26 letters of the alphabet, it

would be possible to calculate the number of all possible truths (Rescher 1979).

This particular imaginary, which Heidegger and others later excoriated as the reduction of the world to calculation, advanced a philosophy of the world through 'discrete' forms, in a mathematical sense, no longer continuous in form but operating as separate, divisible parts (Boyer 1996a; Cristin 1998). When imagined through its divisible parts, the world could, in turn, be infinitely 'computable'. Furthermore, the capacity to 'network' computational insights presented the opportunity to accelerate and extend processes of continuous feedback and learning inherent within a program or system. Licklider and Taylor saw, using these ideas, the opportunity to combine information transmission and information processing via network researchers, in order to improve levels of cooperation, collaboration and coherence as among isolated researchers (Hauben 1996). This could, in turn, lead to 'the creation of communities not of common location but based on commonality of interest that would be large enough to support comprehensive accummulations of people, data and programs' (Licklider and Taylor 1968).

The superior 'intelligence' of a cybernetically-realised system is based on a particular rendering of both 'the part' and 'the system'. Within cybernetic thinking, the part can never control the whole; structural changes result from changes in system-wide conditions (Kline 2015; Woodward 1981) James Clark Maxwell is credited with establishing fundamental precepts of this 'system' and 'part' relationship, defined through the logic of the feedback loop (Dechert 1965). Taking the example of the self-adjusting valve mechanism of a steam engine, which keeps the steam engine at a constant speed under varying conditions of load, Maxwell investigated the operation of the valve in mathematical terms. He described the operation of the valve as a 'steering mechanism' or 'governor', which directed levels of steam flow to the engine relative to levels of speed. The steering mechanism thus constituted a kind of feedback loop, which linked the output of the system to its input. It did so in such a way that recognised, through some 'programmed' understanding of equilibrium or normality, what compensatory behaviours were needed to maintain a steady state (Dechert 1965). These key concepts from physics—which would form the basis for theories of electro-magnetism—were understood by Weiner as a

'behaviouristic approach' that examined 'the relations of output to input'. Unique to this conceptualisation was the role of the 'control loop' existing within a system, which may be either 'open' or 'closed'. The interaction of a self-regulatory system with its external environment (the steam train moving through space) is understood to involve an open loop, necessitating receptors, sensors or 'actuating devices' that perceive environmental changes and transmit new orders to 'effector' elements (ibid.) (Fig. 7.1).

Critical to this framework is the notion of 'control' being constituted by the communication of information. For Weiner (1948) the concept of control drew heavily from the ideas of mathematician Claude Shannon. Shannon's radical conceptualisation of information was divorced from any notion of meaning or content, and instead addressed more technical problems associated with coding, transmitting and decoding of signal sequences or processing (Kline 2009). Extending Leibnizian logic, this reduced all

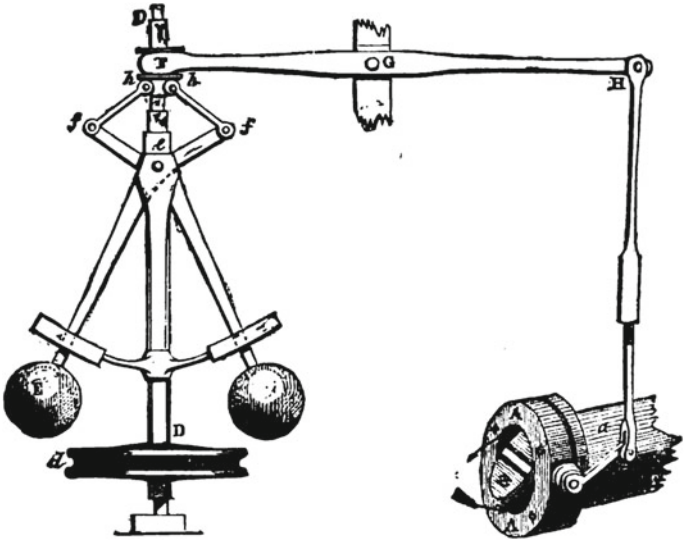

Fig. 7.1 Drawing of a centrifugal "fly-ball" governor, which formed the basis for Maxwell's infamous mathematic equations of 1868. The balls swing out as speed increases, which closes the valve, until a balance is achieved between demand and the proportional gain of the linkage and valve (Author: Unknown. Date: 1900. *Source* Routledge, via Wikimedia. Licence: Open Domain)

information—no matter its form, whether biological, or electro-magnetic, to that of a 'divisible part' or common unit, that of the 'bit', the basic unit of a binary algorithm or code. By demonstrating that all information could essentially be 'codified' into divisible parts, whether letters, radio transmission signals or televisual images, Shannon consequently devised a new language—a language of 'bits'—through which *to address any form of information.* As Shannon demonstrated, systems of communication can be translated into code (for example, binary code), which facilitates the transformation of information from one form to another, thus constituting what is described as an 'input-output device' (Krippendorf 1986).

While cybernetics asserted its origins as a behavioural and mathematical science, its emergence as a form of computational 'systems thinking' was therefore also closely informed by the emergence of information theory. Together, both cybernetics and information theory provided a set of theoretical propositions to be tested experimentally through the advent of computing machines. Experimental practices of 'inter-networking' were, for example, guided by the proposition that 'open loops' in a self-regulating system, when programmed in a way that was 'purposeful', or given particular objectives, would speed up the rate of system-based learning. Licklider and Taylor described system-based learning as one of 'intelligence amplification', allowing the Internetworking of computational decision-making capacities to be used to serve the benefit of reasoning and problem-solving (Licklider and Taylor 1968).

There are a set of fundamental ideas here that have continued to prove powerful in shaping the development of software culture and, by extension, platform intermediation. The notion of self-regulatory systems, addressable points or 'bits', and commanding 'code', serving to transform 'input into a desired output', continue to function as framing devices through which to understand relationships between constituent parts (Fuller 2008). They have, in turn, proved extremely powerful theoretical frameworks within which to experimentally test the potentials for 'intelligence amplification' of internetworking computers. As Mattelart and Mattelart have noted, such conceptual models have helped to amplify the notion that *relations between elements*, in the form of relational, intermediating and interactive processes, are more important and indeed valuable than the elements themselves (1998).

Informed by these ideas, the earliest computers were used not only as arithmetic aids but as mechanical devices for 'simulation and control of a system' (Krippendorf 1986). Computer programs established a programming language that instructed the computer to organise an arithmetic unit in such a way that a particular problem could be 'computed' or solved. By extension, networking these basic functions had the potential to speed problem-solving, and diversify the applications and intermediations of computational decision-making. Pioneers of internetworking and cybernetics recognised not only the great power in these applications, but also the potential dangers. In particular, they expressed concerns about how *assymetrical conditions of information sharing* might create socially unpredictable outcomes, if executed in real-world settings. Licklider and Taylor, in particular, were concerned about the negative consequences that could result if only a portion of the population were able to enjoy the benefits of 'intelligence amplification'. If this were the case, they worried that 'the network may exaggerate the discontinuity in the spectrum of intellectual opportunity' (Licklider and Taylor 1968).

Likewise, Weiner was concerned about the 'entropy' of information systems, or nature's tendency to destroy what is ordered (Mattelart and Mattelart 1998; Weiner 1950). Weiner argued that the amount of information in a system represented a measure of its organisation; by corollary, the entropy of a system, as expressed by Weiner as its disorganisation, was precipitated by a *lack of available information*, or obstacles to the exchange of information. Such concerns reflected a recognition that there were always limits to the application of biological and mathematical principles as models for the functioning of society-despite Weiner declaring the future realisation of an 'information society' a 'new utopia' (Mattelart and Mattelart 1998; Weiner 1948). But they also clearly rested on a belief in the *potency of informational abundance*, both as a mode of proper systemic organisation and, through methods of internetworking between programmable 'learning machines', of accelerating intelligence.

Subsequent decades have witnessed the radical potentialities of informational abundance, informed by code-based governance frameworks and programmable, self-learning and 'artificially intelligent' systems. Ambivalence about how these principles play out in highly political and unstable

contexts has remained a constant theme (Krivy 2018). As critics of cybernetic thought were quick to point out, cybernetics[1] provided the means for technocratic managerialism to develop by, in the words of Theodore Rozak, envisaging 'man [sic] and social life generally as communicating apparatus' subjected to the science of communication and control (Kline 2015). Sheldon Wolin argued that without a concept of history, but only one of the states such as equilibrium or homeostasis, systems theory, as encapsulated by cybernetics, is unable to address 'age old problems of social and political dominations' (Wolin 2006). Then there were others, like Stuart Brand, who were happy to advocate cybernetics *as social program*, as a model for the world more conducive to communal forms of organisation; for whom 'internetworking' could mean decentralised power structures (Turner 2006). Heightened awareness towards the principles of ecological care, informed by the insights of evolutional biology, also confirmed for some the need for more cybernetic forms of social organisation. For McLuhan, a cybernetic rhetoric of human–machine entanglement offered the basis for a mystical, universal humanism (McLuhan 1964).

As I discuss in the following section, code-based translations of information into a 'desired output' can themselves limit and govern the way information 'flows' with a self-regulatory system. This condition can be seen less as a *poor* execution of cybernetic theory to society, or an expression of societal 'disorder', but rather a manifestation of the necessary contingencies of code. Within cybernetics, as Weiner argued, 'communications systems are control systems: control operates by comparing output with input' (1948). Information theory allowed for the divisible part not only to be 'addressable' but also for particular codes or algorithms to facilitate the more efficient communication of information through diverse forms of reassemblage. As Wendy Chun has argued, we describe code as being 'executable' 'because it embodies the *power of the executive*, the power of enforcement that has traditionally […] been the provenance of government (2010, italics added)'.

[1] I am referring here primarily to first order cybernetics, and its relationship to information theory. See Hayles, N. K. 1999. *How we became posthuman: virtual bodies in cybernetics, literature, and informatics,* Chicago, The University of Chicago Press. among others, for a discussion on the difference between first and second-order cybernetics.

When we examine the evolution of the software industry, it becomes evident that there are conditions of software development that *proscribe* conditions of replication, data agglomeration, ultimately, asymmetries of information access. These are the very conditions endemic to today's platform era, and yet, looking backwards, these are also the replication of 'software-sorting' tendencies that allow asynchronous systems of both exclusion and subsumption. Put simply, the governance conditions instituted by more contemporary platform companies are not themselves unique or novel: they repeat tactics tested by the software industry for decades, and realise the fears held by early pioneers of internetworking.

As I discuss in the next section, the computational design tactics established by contemporary platforms build on a number of principles and tactics that informed the historical emergence of our computational era. Cybernetics thinkers recognised that the application of 'generalisable principles' to social affairs was rarely achievable, and also envisaged dangers associated with 'entropy' and lack of, or uneven applications of, informational abundance. As we have seen in subsequent decades, information asymmetry can also be a functional expression of programmability, particularly when programs, acting as platforms during an era of Web 2.0 services, were designed or 'steered' in ways that purposefully acted as *self-regulatory systems of information agglomeration and commodification.*

The Asymmetries of Code-Based Governance

The history of information may, in large part, be told as the story of informationism as ideology. Matthew Fuller has observed that, just as computing needed to be recognised as something having a history and not just permanently 'in a state of improvement' (Fuller 2008), so computing history would need to become discursive, open to palpable alternatives. Wendy Chun has called software 'extremely difficult to comprehend'. She asks: 'Who completely understands what one's computer is doing at any given moment?' (Chun 2010). There is, she notes, a paradox in trying to know something one might not really understand, one not dissimilar to the way we come to 'know' other relations between the visible and

invisible, the relations between ideology and culture, the 'invisible hand of the market'.

Software historians recognise the way programming languages have acted as discursive architectures upon which others must build. Code is, in the words of Katherine Hayles, always necessarily 'open to alteration/iteration rather than an airtight anchor' (in Chun, 28). As Herman H. Goldstine and John von Neumann emphasised, the value of code is always in the form of 'intermediate results' which essentially control the 'automatic evolution of a meaning' (ibid). Every iteration alters its meaning. By extension, *the more active the forms of repetition, alteration and use, the more valuable the code.*

In the early decades of software, developers of large proprietary software systems such as the SDC (Systems Development Corporation) and IBM were, in the words of software historian Claude Baum, 'system builders' (1981). The work of developing new software packages was long seen as equivalent to that of 'system design', a process described as the 'creation of separate programs that operate together and exchange information' (Steinmueller 1995). This 'design process' bundled operating systems, previously known as 'system control programs', utilities, programming languages and database packages to form the basis for multi-billion dollar software industries that blossomed in the 1970s (Cortada 2002). Writing on the history of software from the 1960s, Cortada notes that these 'system control' programs constituted computational architectures that have, in effect, remained the 'basic design points for subsequent software tools' (73). The very architecture of programming language, established during the 1960s, necessitated that subsequent applications conform to these languages' basic functions. The ongoing diversification of computational applications would, in turn, facilitate an effective strategic alliance between commerce and code, as underlying programs became foundational to other software innovations.

A particularly seminal moment in the history of software innovation is well known as the 'unbundling moment', precipitated by IBM's influence over the 1960s software marketplace. Through its dominance of computing hardware, IBM had developed a practice of essentially bundling its software systems as part of its hardware. A program like 'Consolidated Functions Ordinary' or CFO, was essentially given away for free when

a computer was purchased. As a consequence, any external software was priced out of the market. An example of one such software program was a product called 'Mark IV', made by a company known as Informatics, founded in 1962. Mark IV was essentially a simple database or file management package, and it was considered a 'horizontal' application because it supported the needs of many other builders of custom systems. Mark IV cost a considerable sum—USD $30,000 when first released in 1967—and could not compete with IBM's free software (Cusamano 2004). Situations such as this made clear that IBM exercised undue influence over the software market, and in 1969 the US Justice Department brought an antitrust action against the company (Vogel 2009). In response, IBM signed a consent degree to charge users for distinct software components used by the computers they owned. In other words, they unbundled its software from hardware (Computer History Museum, n.d.). Unbundling meant that IBM would charge for applications separately to its 'mainframe' or operating system and hardware. This is considered by software historians the 'moment' when a competitive software industry was borne.

In more recent years, as I've discussed, critical platform scholars have highlighted the way these computational architetures integrate the functions of code and commerce (Langley and Leyshon 2017). And yet, methods of integration between commerce and code are entirely characteristic of the history of the software industry. As I have been discussing, what is distinct to our present era is the volume and ubiquity of networked interactivity, and the financial intermediation and scaling of data infrastructures. Through its unbundling, in 1969 computer software became a 'product', and software development emerged as a competitive industry in its own right. Software makers were essentially programming new kinds of functional and commercial inter-relationships between discrete applications and users. Crucially, this 'unbundling' moment is also credited with creating new incentives for external software developers to build competitive programs that utilised IBM-compatible mainframes (Cusamano 2004). Software unbundling saw the development of the applications industry, and gave birth to a generation of software entrepreneurs who recognised the benefits of establishing the 'horizontal' application upon which other programs and custom services could be built. This process introduced new competitive opportunities within different stages of a software value chain,

that allowed different software suppliers to compete in the provision of applications built using a standardised operating system such as IBM's Disk Operating System (DOS).

Steinmueller (1995) has described the distinct outputs of the software industry as being both *intermediate* and *final*. Intermediate software goods are used to produce other goods and services. As a final 'product', software can be valued according to its volume of sales and so forth; but as an intermediary, its value begins to grow relative to the volume of other applications that are utilising it. As intermediary, software products and services are positioned horizontally across markets and industries, and, with relatively limited up-front capital investment, can generate not only significant profit but also create for themselves significant market imbalances. Microsoft, for example, would pursue similar tactics to IBM through its bundling of Internet Explorer with its computers, while also imposing limits to third party software using its Windows operating system. As with IBM, this would significantly impact the competitive business strategies of other software providers and ultimately result in an anti-trust case against Microsoft being pursued in the late 1990s.

In this respect, the tactics adopted by platforms to 'bundle' certain parts of their value chains (hardware and applications, or applications and users), mimic generations of software developers who aimed to position their code 'horizontally' across markets and industries. When Facebook created applications that allowed a person's real-world network of social relationships to be 'activated' online, the company introduced multiple instances of 'bundling' between different applications. Akin to earlier generations of software, this was a kind of 'system building', utilising the programmatic and 'commanding' capacities of code, but this time undertaken within the context of an open and distributed web, accessible via personal computers and later, smartphones. Facebook's 'platform' structure, for example, integrates interface, database and code as a dynamic, self-learning operating system. Where operating systems were previously 'bundled' to its computing hardware, a platform like Facebook instead architects a software ecosystem that continuously benefits from the 'internetworking' of its diverse users. It acts in this way as an intermediate service to the diverse forms of connectivity and engagement between users.

As a platform, the tactics introduced by a company like Facebook during an era of Web 2.0 digital participation in this sense represent an extension of software commercialisation tactics. These achieve competitive market positioning in ways that monetise the intermediating capacities of unbundled software applications to great financial effect. Google's Page Rank system, the first algorithm used by Google's Search web application to rank websites, can likewise be seen to 'bundle' the search activities of users (and later, all other online activities undertaken using Google applications), which determine how sites are organised and listed via Search, with the 'operating conditions' established through its algorithm. Or, put simply, Page Rank is the DOS mainframe that, like IBM's operating system, determines the operating environment through which others generate value online.

Considered in the context of the historical development of the software industry, today's platform age can be understood as one that has, quite simply, seen the imperatives of commercial software strategy, and the technical affordances achieved by the inherent programmability of software, acting to intermediate increasingly diverse relationships or networks of connection. Intermediation is an essential feature of digitisation, being an essential function of software. While the capacity for 'internetworking' between discrete, indivisible nodes of a network was interpreted, in dawning era of the Internet and, subsequently, during the initial proliferation of web 2.0 platforms, as a more hopeful portent of a coming era of more distributed information flows, it also created the conditions for mass, global intermediation and programmability by those software services able to establish the conditions upon which *wider networking could take place*.

This is, perhaps, one of the greatest areas of blindness evident in a purely 'networked' conceptualisation of digitalisation—and, indeed, the networked imaginary that underpins the celebration of 'bottom up' and distributed digital publics (Mattelart 2002). Conditions of 'internetworking', as implemented in a computational sense, are themselves always contingent upon the particular information protocols that allow information or data to be processed. This sets up what are known as path dependencies within technological platforms, which allows generative and adaptive

models of feedback to be used to support the broader refinement of a system for information processing.

Cybernetic Visions of the City

As with previous waves of technological innovation, the ideas of Norbert Weiner and the many cybernetic thinkers of the 1960s were to find enthusiastic adoption as a new, idealised form of urban imaginary used to drive new experiments in urban practice and design. Writing on 'City Cybernetics' in 1969, Robert Kevin Brown (1969) describes cybernetics as 'essentially functional and behavioristic, seeking to arrange, understand and relate individual components into a functional system'. Such a mode of analysis was seen to have special applicability to the analysis of land uses, by allowing a city to be viewed as a 'functioning system composed of many interrelated "machines"' (407). Furthermore, given the complexity of urban systems, cybernetics offered a scientific mode of analysis of these systems in ways that could not be ignored. Informed by developments in information theory, cybernetics also paved the way for city behaviour and interaction to be captured in terms of informational feedback loops.

In this way, Brown argued that informational environments could essentially be 'programmed' in such a way that citizens could be released from the physical constraints of their urban environments. He argued: 'Physical improvements have considerable lag time involved in their creation and endure for periods of time that often extend beyond their usefulness to society. Surely, a more expeditious form of feedback than that currently found in the marketplace would help overcome this problem' (411). Perhaps planning could, he asked, in the future, become a discipline that merged the programmatic potentials of cybernetic thinking to institute more effective forms of informational feedback within urban systems? (411). This idea would be taken up by other planners such as John Reps, who argued that mathematical models and computer data banks should replace physical land use planning (in Lee 1973).

These efforts would ultimately lead to many failures, as documented in a paper by Douglas Lee called *Requiem for Large Scale Models* (1973). The development of computer-based large-scale models would fail to find

purchase by city governments, and, according to Lee, would be abandoned by the end of the 1960s. One of the key problems (or 'sins') Lee documented was the 'sin of hyper-comprehensiveness'. Computer-based models were 'designed to replicate too complex a system in a single shot' and served too many different purposes at one time. Another problem was that the models could not provide adequate richness of detail for a less than comprehensive scope (165). In addition, he noted, 'data constituted the window through which the model views a city'. The data requirements needed to replicate the functioning of the complex city were, he argued, enormous. Meanwhile, '[s]trong theory could extract from this data', but, he argued, 'it could not add new information' (165). Lee would therefore caution against future attempts at 'comprehensiveness', which relied on too much data to solve complex urban problems.

If large-scale urban modeling got off to a bad start, cybernetics did unleash a wave of creative interventions within architectural practices. The well-known experimental architecture group Archigram, formed in 1961, would take on a cybernetic vision of the city as a 'kit of parts' and 'plug in city' which could be 'playfully deployed according to the dictates of individual desires' (Scott 2007). 'Archigram' was itself a combination of the words 'architecture' and 'telegram', intended as a way to signal to open up architecture's complex articulation with technology (Scott 2001). According to Peter Cook, it was a way to 'experiment out of architecture'. For experimental Italian group Archizoom, informational theory was put in practice in urban thinking through graphic renderings of a 'quantitative city'. Overwhelmed by the rise of global infrastructures for electronic media, the group saw the metropolis as becoming less of a 'place' and more of a 'condition'. As such, they argued: 'The city no longer represents the system, but becomes the system itself, programmed and isotropic, and within it the various functions are contained homogeneously, without contradictions' (Varnelis 2006; Archizoom 1971).

These experimental architectural interventions were undertaken as a critique of the flattening, homogenising influence of global capitalism. Playful experiments were designed to question architecture's disciplinary servitude to the requirements of capital accumulation and intensification. Nicholas Negroponte would pioneer a series of experiments at MIT designed to promote a 'machine-led' approach to urban environmental

design, creating artificial interfaces between 'computer and man' and 'computer and real world' (Scott 2016), by representing and then monitoring of environments in systematic components. These were early experiments in 'responsive' design, designed to accelerate 'humanism through machines' through a process of mutual evolutionary exchange between computers and their environment (357).

As a way of diagnosing urban behaviour and patterns, cybernetics' influence upon the urban imaginary was subsequently discredited by urban thinkers such as Lewis Mumford, who criticised urban planning in becoming too reliant on technical means to progress their urban visions (Mumford 1961). The general orientation towards societies through a 'functionalist' and behaviourist lens also came under widespread attack from thinkers such as Hannah Arendt who, in *The Human Condition,* cautioned against the unintended consequences of using electronically powered instruments, combined with behaviourist methods. These, she worried, 'may end in the deadliest, most sterile passivity history has ever known' (Arendt 1959; Mattern 2013). More abstract, systems-level visions of the city would lose purchase in the 1960s and 1970s (Soja 1996), particularly in response to the rise of more globalist accounts of urbanisation. According to Castells, writing in the early 1970s, the specific spatial form of the city had given way to a mode of capitalist development (urbanisation) that was in fact 'anti-territorial' in that it was no longer wedded to a particular ecological or spatial order (Castells 1977). Urban thinkers such as Henri Lefebvre were at the same time advocating for an urban politics of the 'everyday' that sought to undermine the potency of abstract representations and the politics of subsumption these forms engendered. For Lefebvre, spatial constructs, rationally ordered into circulatory patterns—for example, the city as a network of circulation and communications or of information and decision-making—present as 'truth and total dogma', enabling the spatial planner, and the architect, to position themselves as 'architect of the world, human image of God the Creator' (Lefebvre 1991). In this way, he argued, abstractions of the city were oppressive.

Cybernetic thought has traditionally been thought of as exemplary of this mode of abstracted, systems-level thinking, and was banished from much progressive urban thought for some decades. One of the common

criticisms waged against network technologies was the sense of 'virtualisation' they encouraged, which failed to accurately represent the complexity of urban conditions, experiences, sensory entanglements and so forth. We see this evident in the writings of Jane Jacobs, who argued against Robert Moses' 'abstract visions' of the ordered city of motorways, arguing instead for an embodied arts of observation that was alive to the complex nature of everyday streets. In *Flesh and Stone*, Sennett (1994) argued that modern technologies were 'weakening the sense of tactile reality and pacifying the body', thus achieving a kind of 'disconnection from space'. In turn, the rise of the Internet in the 1990s also fuelled a vision of the 'cyber city' as an *alternate* virtual reality that would parallel, not represent, urban reality, sounding the death knell for the urban environment with which we are familiar (Boyer 1996b; Graham 2005; Robins 1999). As Robins (1997) argued in his essay 'Global Cities: real-time and…byzantine', when they claim the democratic potentials of the cyber city, techno-culture enthusiasts forget that it is the very exposure to the 'difficult reality' of disturbance and disorder in the city that presents opportunities for meaningful 'public' encounter and participation. Here, a duality is evident between the 'real', messy city of everyday publics, and the virtual, abstracted and extractive logic of computational machines.

If the spectre of the cyber city, a complex urban system rendered through the abstracted logic of emergent, 1960s-era software programming, was discursively attached to the failed project of urban modernism, so the increasing diffusion of 'information and communications technologies' in the city has oftentimes been rendered as a politics of urban abstraction. Writing on the emergent practices of urban computing, facilitated by the roll-out of distributed sensors and RFID tags, Crang and Graham (2007) argued that embedded within the everyday lifeworlds of digital, sentient cities is a 'politics of visibility' that not only concerns the ways in which technologies are made visible to us, and how we are made visible to them, but is also underpinned by a 'fantasy of pure vision' that harbours dreams of perfect spatial and urban transparency (812). Furthermore, it is this perceived 'fantasy' of the cybernetic imaginary that lies behind many critical responses to recent smart city initiatives. As Greg Lindsay (Lindsay 2011) has argued:

> The bias lurking behind every large-scale smart city is a belief that bottom-up complexity can be bottled and put to use for top-down ends — that a central agency, with the right computer program, could one day manage and even dictate the complex needs of an actual city.

Rethinking Cybernetics in a Platform Era

And yet, today's conditions of platform intermediation return us to a different cybernetic imaginary to that of the abstracted, large-scale system of control (Krivy 2018). Gandy (2005) wrote of the increasing melding of the technological and the human as enabling a kind of 'cyborg urbanisation', drawing attention to the role played by cities in facilitating the establishment of what Amin called a 'physical infrastructure that links the human body to vast technological networks' (2007). Platform intermediation enacts this kind of 'cyborg urbanity' in the palms of our hands, which, via well-designed app interfaces, link us to multi-scalar infrastructures that span intimate, everyday encounters (in a cab, in a house, on the street) to global networks of dataveillance and data capture. Here, we are instrumented as part of an open system that is trained to learn through algorithms that govern continual feedback loops, who, in turn, 'steer' our behaviour in ways at once opaque and proprietary. As Maros Krivy has argued, this experience is more closely linked to the second generation of cybernetic thinking attached to ideas of positive feedback, widely embraced as part of a progressive movement that was opposed to centralised institutions (2018b, 17).

If first generation cybernetic thinkers were focused on the abstracted relations of systems, whether biological, informational or human or all at once, second generation cybernetics is a field known to resist abstractions by collapsing previous distinctions between observer and observed. There is, within this imaginary, no place of objective observation of a system in operation. Just as quantum physics recognised observer and observed cannot be separated, so subjectivity and self-organisation became more central to second-order cyberneticians, among them Gregory Bateson and von Foerster (Heylighen and Joslyn 2001; Scott 2004). Thus, to Bateson,

whose focus became the 'ecology of mind', '[t]he rules of the universe that we think we know are buried deep in our processes of perception' (Bateson 1972).

In the way that platform ecosystems enrol their users, through a process Van Dijck (2012) describes as 'engineered sociality', there is a sense that we lack a clear observation point, so deeply are we embedded within continuously active conditions of platform surveillance, algorithmically-tuned information feeds, data scraping, harvesting and (machinic) *learning all the time*. The sense of intimate enclosure within such dynamic ecosystems has been described in terms of 'second generation algorithms', cumulatively self-learning in nature, enlisting the everyday workings of society as a kind of 'bio-cognitive capitalism' (Fumagalli et al. 2018). Here, as those such as Scholtz argue, the monitoring and tracking of users, eagerly working on their online identities, is turned into monetary data, such that idleness and leisure are 'put to work' as a kind of unpaid labour of the platform economy (Scholtz 2017; Fumagalli et al. 2018). But while the process of value extraction is asymmetrical, as platform users, our behaviours are continually modulated by and through platform interfaces and many of us remain active and willing participants in global platform ecosystems, so long as the services rendered are worthwhile enough.

Jennifer Gabrys has previously argued that, in this way, urban citizens have been reimagined as sensing nodes through conditions of 'environmentality'—a kind of governmentality that she calls distributed *environmental-behavioural control* (Gabrys 2014; Krivy 2018). Always 'opening up' to accelerate participation, transaction, engagement and use, while 'closing' through centralised protocols and standards and black-boxed algorithms, processes of platform intermediation position their users as active participants, rendering the relationalities of mind and interface, interface and world, through the principles of human-centred design. The modulations of code are experienced in ways that respond to our highly personalised daily needs, preferences, desires, and in their mode of interfacing, they are not *experienced* as extractive, even while our informational inputs are put to good use. Operating in this way, methods of platform intermediation 'instrument', via apps, devices, things and so forth, our experiences of networked sociality in ways that are continuously responsive to feedback—learning, evolving, improving—thus facilitating

new domains of intermediation, catalytic value creation and, concurrently, extraction.

These dynamics have been conceptually more challenging to comprehend than that of a more simple, subsumptive logic of control, associated with the abstracted, large-scale 'system of systems' characteristic of previous eras of cybernetics (in its initial, first generation rendering) (Krivy 2018). In contemporary processes of platform intermediation, embedded and embodied relationality is intensively peer to peer. It is also, through code-based architectures and protocols, facilitated in highly centralised ways, ensuring that every peer-based interaction is *put to use*, in the service of broader ecosystem dynamics. Conditions of platform use and interaction are not, as such, necessarily experienced through modalities of subordination of code-based domination, but enacted as a form of active engagement, participation and choice.

Conclusion

When processes of platform intermediation are urbanised, the city is itself rendered as a platform ecosystem. Cities, after all, have always been agglomerations of transaction and exchange; they are the oldest kind of 'multi-sided markets'. As Lefebvre remarked (2003/1970):

> What does the city create? Nothing. It centralises creation. And yet it creates everything. Nothing exists without exchange, without union, without proximity, that is, without relationships. The city creates a situation, the urban situation, where different things occur one after another and do not exist separately but according to their differences.

Under conditions of platform intermediation, the 'urban situation' becomes ecosystem, subjected to deepening recombinatory conditions of platform governance and its proprietary opacities. As with previous eras of software commercialisation, this intensifies asymmetries (or what Weiner would call entropy) in the way information is shared and distributed, producing unevenly platformed geographies of information.

In Chapter 9, I will discuss how some of these asymmetries/entropies are made manifest in urban policy settings. I focus on how platform companies are able to enrol public actors into their 'ecosystems' of platform intermediation, ostensibly in service of city policy outcomes such as regeneration, liveability and congestion reduction. As my examples illustrate, such asymmetries of information are becoming critical to the politics of our times, as different versions of urban publics—one rendered a platform ecosystem, another a deliberative democracy—each seek their right to the city.

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8

Intimate Entanglements

In which I reflect, briefly, on the experiential and affective natures of platforms, drawing on ideas about the attention economy, urban atmospheres and intimate digital publics. The intent here is to point to alternate modalities of platform thinking which are alert to a variety of emotional registers and performative conditions that allow platforms to be 'made urban'.

Is it sometimes hard to understand why, given the significant eruption of opposition and anger directed towards technology companies, the use of major proprietary platforms continues to be so embedded within daily life? The *Cambridge Analytica* scandal of 2018, as well as growing attention towards algorithms as 'weapons of math destruction' (O'Neil 2016; Ananny and Crawford 2018; Gorwa 2019), are emblematic of a worldwide 'tech lash' against global technology platforms, accompanied by major regulatory enquiries into the misuse of power by technology companies across numerous jurisdictions. Yet this does not correspond to a significant reduction in, for example, time spent online or on mobile devices. A number of recent studies have found the average person spends between three and four hours a day on their phone; this does not include time spent at a

S. Barns, *Platform Urbanism*, Geographies of Media,
https://doi.org/10.1007/978-981-32-9725-8_8

computer (Mackay 2019). A *Deloitte* survey found in 2018 that American users check their phones 52 times a day on average (Deloitte 2018).

Smartphone addiction is now widely recognised as a problem. Mental health advocates recommended social media 'detoxes'; the new iPhone offers an app to monitor screen time and thus help users modulate their behaviour. There are now deliberately 'dumb' phones on the marketplace that remove the addictive features that have so many people (including myself!) 'hooked'. Much of this focus on the mental health implications of excessive smartphone use also puts the onus of responsibility on the user to 'extract' themselves. But a culture that has evolved to embrace 'always-on' ways of working, navigating, educating and socialising means 'tuning out' and turning off these interfaces is not necessarily an option for many.

As a growing cohort of writers and scholars now highlight, the dynamics of interaction and interface design have played a critical role in shaping the daily habits of platform users. App-based interface design methods are designed to deliberately attract attention; specifically, to privilege digital over other modes of interacting. The phenomenon of 'constant partial attention' is not just a flaw of the individual, it is an accomplishment of the digital design professions. James Williams, a former advertising strategist at Google, writes of techniques used by the company to 'distract by design', whereby 'our moment-to-moment experiences, our interactions with one another, the styles of our thoughts and the habits of our days now take their shapes, in large part, from the operation of these new inventions' (2018).

Williams, like Tim Wu (2016), sees technology companies as 'attention merchants' who are always competing for our attention. The tactics used by companies to attract attention are often ignored, William argues, when digital technologies are primarily addressed as informational tools. This has resulted in mounting concerns about the political and ethical implications of information use, framed in terms of privacy, security, surveillance and so on (12). However, as Williams emphasises, it is the capacity for digital platforms to *remediate experiential worlds*—the spaces of our attention—into 'a never-ending flow of potential informational rewards' (22) that is critical to their influence over our informational assets.

The use of 'variable rewards' is an example of a cognitive design tactic used to randomise the reward schedule for a given action, and is known to

increase the number of times a person is likely to take that action. According to Williams (2018: 34), this is the underlying dynamic driving the high levels of engagement users have with 'infinite' scrolling feeds replete with 'pull to refresh' functionality, which intentionally vary the levels of social engagement a post may generate. Tactics like variable rewards are known to promote obsessive engagement with social media sites like Instagram and Facebook, while other tools, such as notifications, act as 'functional distractions'. These are today embedded into every mode of platform-based interaction, using the colour red to attract attention. Like Williams, other former employees of platform companies now openly describe the use of 'dopamine driven feedback loops' to promote ever increasing levels of user engagement (Haynes 2018). Frischman and Selinger (2018) describe these tactics as a kind of 'techno-social engineering'. For Williams (2018: 10) it is not technology products that are being redesigned, but their users.

From a socio-spatial perspective, the capacity for platform ecosystems to reprioritise attention in this way also deeply implicates the practices of everyday urban encounter. Put simply, the challenges provoked by this age of platforms are not only issues of political economy—but raise questions about how we relate, in experiential and multi-sensory ways, to the world around us. The mobile interface has become an increasingly significant locus for the remediation of spatial experience, where the platform-enabled subject is themselves highly active in facilitating, through a kind of co-creation, this spatial reprioritisation. Performativity and technology interfaces are, consequently, increasingly blurred. As digital cultural theorists Leeker et al. (2017) have reflected:

> Human performativity is linked to intentionality, reflexivity and sense-making, to embodiment, repetition and transgression. The technological, one the other hand, refers to deterministic operations without semiotic or affective qualities. This neat separation of human agency and nonhuman 'procedurality' has become untenable. Human bodies and technological apparatuses enter instead into a relation of performativity.

The interface design tactics used by platforms to maximise the sharing of value and attention between participants (and therefore extract their

data) can be seen to also modulate and extend digital cultures of performativity more intimately within the fabric of everyday life. If platform capitalism has come to see global social media as an extractive form of data accumulation, at the same time, social media scholars also understand these platforms as sites for 'digital intimacy' (Donson et al. 2018). Both, of course, are true. However, with the urbanisation of social media platforms, social media engagement is increasingly habituated as an interface of everyday urban encounter.

As Carah and Angus write: 'The narration of social life in images, videos, likes and comments came to double as the production of data about individuals, their social networks and cultural worlds. That data feeds the development of social media's algorithmic engagement and targeted advertising models' (Carah and Angus 2018). We might swap 'social life' with 'urban life' to recognise how daily interactions with places often entail performative practices of documenting, sharing and narrating experiences of places and spaces. They, too, are increasingly critical in the algorithmic management of urban selves in space by global platforms.

As Nicolas Carrah (2018) has further reflected, social media spaces need to be understood as spaces of public intimacy, even as the platforms that manage them engineer this intimacy for profit. They are, he writes

> characterised by public performances of intimate feelings; the organisation of intimate life from messages between loved ones to hook-ups with strangers; the documentation of everyday moments - coffees, dogs, sunsets; and the expression of values and ideas that link us as individuals to larger public collectives.

In this sense, they are, increasingly for many, where practices of intimate life are 'learnt, reproduced, given value, contested and commercialised'. This perspective underscores the need to affirm the underlying public value that social media embody, both as expressions of our enduring desires to connect with each other but also by contesting how methods of commoditisation *at this intimate scale* affects wider conditions of public life. Carrah's affirmation of the intimacies of social media reminds us of what Gillian Rose and Alastair Willis (2019) have described as the 'particular affective enactment of being smart that happens via social media'. Our

algorithmic relations with datafied, platformed urban conditions are often experienced as affective and intimate entanglements with each other.

Uncanny Nights

Seeing and sensing the 'digital intimacies' of social media also highlights the increasingly Instagrammed nature of urban festivals and light art events. Through the prism of the curated social media feed, cities, like brands, are projected in highly performative ways, as sites of the uncanny and the strange. Instagram has become a critical site for the curation of public art in cities, and provides a key platform for users' socio-spatial engagement with diverse geographies—captured by one writer as the 'instagrammisation' of the world (Matchar 2017).[1]

Instagram culture is in turn helping to drive the curation of major public art projects and urban events across many cities. Light festivals, including Sydney's Vivid Festival, Durham's Lumiere Festival, Singapore's iLight Festival at Marina Bay and Kobe's Luminarie Festival, as well as countless others, create magical dreamscapes and distorted visions of the built environment (Edensor 2015). Their tricks of illumination exploit technical tools—3D architectural mapping, sensors, software-enabled visual distortions, real-time image manipulation of the ever growing, luminous flux of data—to introduce into public spaces a sense of the technological uncanny, a phantasmagorical urban world in which anything, seemingly, is possible (Barns and Sumartojo 2015) (Fig. 8.1).

The geographer Tim Edensor (2015) has highlighted the growing significance of such light art events and practices to the experience of place and space. Drawing on Ranciere, he argues for greater appreciation of how the world is illuminated, noting a more general neglect of light and space across the humanities and social sciences (a neglect he has since helped to redress). Edensor is interested in the ways 'lighting and darkness can express meanings, or transform space in multiple ways' through their

[1]The 'Uberisation of everything', the 'instagramisation of the world' might be thought of as updates to the overly familiar line that 'software is eating the world'.

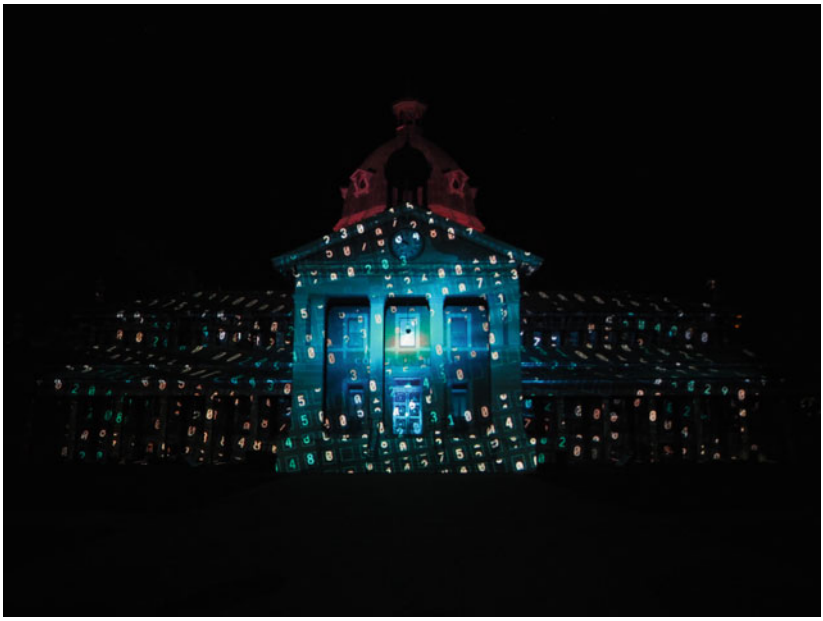

Fig. 8.1 Many light festivals have developed in recent years as a form of destination marketing in the age of Instagram, integrating performative platform cultures into the production of the built environment (*Source* Esem Projects [Sarah Barns and Michael Killalea])

'emotional and affective power' (2015: 129). He notes the way many practitioners working with light are 'keen to foster a sensuous interactivity', encouraging audiences to 'dance with light, clap and laugh and sing to encourage responsive patterns, experience their likenesses cast in space, and manipulate the design of buildings and bridges' (130).

As forms of urban activation, light festivals have continued to grow in size and scale as a mode of 'place branding' and 'creative placemaking' (Courage and McKewon 2018; Barns s of urban spectac; Tomitsch et al. 2015). Such festivals have continued to grow and multiply alongside the growth of Instagram, ideally positioned as vehicles to generate wondrous images of everyday places made surreal and lively with light. 'Vivid Sydney is here to light up the city – and your Instagram feed' exclaims Vivid Sydney's marketing material on its 'top 10 instagrammable Vivid Sydney light

installations' (Vivid 2018). Just as they contribute to the production of 'urban atmospheres', such festivals have become part of a wider arsenal of urban brandscaping activities supported by cities (Löfgren 2014).

Through destination marketing and urban placemaking activities, cities are following the lead of major brands in using Instagram to promote engagement with their 'product'.[2] In this context, the interfaces of the city—buildings, bridges, ground—are rendered as media architectures (Tomitsch et al. 2015), disassociated from their more inert, traditional forms. The twinning of Instagram and light festivals captures the partially attentive gaze of urban citizens, who 'participate' in the co-curation and dissemination of these altered urban states through their own forms of lively encounter with cities made strange.

The proliferation of urban placemaking, through such strategies of urban spectacle, in this way engages with what Carah and Shaul (2016) describe as the productive ability of cultural intermediaries like Instagram to not only orchestrate the production of images but also to enhance intimate affiliations with places and spaces. Such tactics deliberately seek to benefit from the highly personal nature of Instagram connectivity, but also to amplify the performativity of urban design and activation planning. As such, curation strategies for public art are today shifting away from a reliance on 'plonk art' that is permanently installed as physical artworks, towards much more socially-integrated creative programming strategies and activations, in which citizens perform within an urban spectacle as much as the artwork itself.

In this sense, when we trace the contours of platform-enabled urbanism, we need to remember how diverse sites of participation are not simply through invisible code, or data points on a map, but can also be achieved through conditions of highly personal, performative engagement (Gandy 2005). Platforms may enact conditions of algorithmic governance, and extract our data to train their algorithmic interfaces and services, but their means of extending into diverse locales and registers of urban life and

[2]A conceptualisation of cities as a 'product' is promoted by Professor Greg Clark, whose consultancy The Business of Cities ranks cities through a set of global benchmarks. See Clark, G. 2016. *The Seven Habits of Highly Successful Cities: Advice for Sydney.* Sydney: Committee for Sydney; Clark, Moir, Moonen, Morrissey, & Nunley. 2018. *Culture, Value and Place: A Report for NSW Department of Planning and Environment.* Sydney: NSW DPE.

experience are *all-too-human*, and depend fundamentally on our contingent, relational, performative and creative natures. Platforms, like casinos and slot machines, intermediate our attention, and the performativity of vibrant digital cultures.

Intimate Data

As scholars seek to map the different forms of influence, intermediation and intervention platforms make into the 'technological everyday' of urban social lives, and to understand conditions of regulation and transaction that underpin much of the city's daily rhythms, the call to resist framing the daily habits of urban citizens as wholly subsumed by programmable logic of platform design remains vital. In any attempt to understand how platform architecture reshapes urban experiences and relationships, we need to remain ever mindful of the many lively, noisy, messy, old, outdated, intimately entangled and unstable ways in which urban citizens continue to negotiate digital platforms as everyday infrastructures of urban life.

Appraising the emergent condition of platform urbanism, Agnieszka Leszczynski (2018) has, along similar lines, sought exceptions to the 'dominant narrative of platform urbanism as the subsumption of all aspects of urban life to the imperatives of the platform economy'. Drawing on the language of the 'glitch', for Leszczynsk, it is the *latent possibility of malfunction* that extends what she calls the possibilities for 'an indeterminate, ontogentic politics of the urban. [italics added]'. Leszczynski resists the rush to proscribe a condition of subsumption as characteristic of platform urbanism, and in doing so, defends a vision of the urban as 'ontogentic'—allowing for a space of possibility that cannot be properly defined (measured, quantified, monetised).

Such calls are echoed by those who are advancing more lively engagement with geographies of the affect, through encounters with multisensory and processual conditions of spatial experience and reproduction (Sumartojo et al. 2016). Sumartojo et al. (2016) look to Doreen Massey's (2005) articulation of space in order to disrupt a more dominant understanding of its datafication, drawing from Massey's processual and relational spatiality to disrupt datafication as an objective representation

of the world. The authors argue that 'affect is vital in the mixing of digital and material' (2016: 34), by resisting the reduction of diverse epistemologies of urban knowledge to that of quantified knowledge (Mattern 2013, 2016; Sumartojo et al. 2016). The work of teasing out multiple forms of affective and multi-sensory encounters between bodies and environments reasserts the always open, 'never closed' (Massey 2005: 9) and unstable relations that constitute the production of space. This work has become, for many geographers, central to a politics of the everyday, which seeks to resist a narrative of entrapment and subsumption. Massey continues to inspire many to affirm the relational contingencies of space as one of the 'central stakes of the political' (Massey 2005). Massey's space is 'the sphere of possibility of the existence of plurality, of the co-existence of difference […] It's that sense of right now being so many different things all at once: that is the gift of space' (2003: 109).

As Shannon Mattern and others remind us, algorithmic methods for managing and processing information do not necessarily *replace* other methods we might use to interpret and understand people's behaviours. As Mattern has argued in relation to the over-reach of urban data science as way of knowing and interpreting the city, to presume as much is to lapse into a kind of mid-nineteenth century behaviourism, which frames technical systems as capable not only of informing human behaviour absolutely but also to presume urban behaviour can (or ought to) be neatly mapped into technical systems (Mattern 2016). What is being defended here is the agency of the urban citizen. 'Within this model', Mattern points out, 'people do possess agency, but their actions are framed by their roles as consumers and generators of data'. As such, they are subject to what Hannah Arendt described as a kind of 'sterile passivity' (para 31).

This critique remains vital to the study of platform urbanism. Platforms will adopt a set of procedures for encoding and using the data created out of diverse urban behaviours in order to inform and deliver new urban services, and as such, platforms might be seen to 'reshape' urban behaviours, in the way that Uber is changing the way we travel, or Airbnb the choices we make when we book accommodation. While these platforms are generating important 'impacts' on cities, we must continue to defend the actions and orientations of urban citizens in ways that resist this 'platformed' condition as one of control and subsumption (Leszczynski 2018).

The particular relational entanglements defended by those such as Massey, Mattern, Leszczynski, Sumatojo and others open up lines of enquiry around more intimate and multisensory engagements with datafied space and places, too often rendered inert and passive in the face of technology's unstoppable progress. If previous eras of technological transformation struggled with the oppressive abstractions of modernist urban planning, the 'urban operating system', and the replicable urban grid, today we are confronted by the visions of smart, real-time cities, and a data-driven science of the urban. Critically rendered as a version of 'dataism' (Van Dijck 2014) this new era renders the space of the urban as capable of being resolved and managed through innumerable data points, underpinned by a resurgent turn towards quantification and its financialisation, as a privileged way of knowing and managing an increasingly urbanised world.

Conclusion

As I have been discussing in this book, how we conceptualise the relationality of platform ecosystems is critical to a future research agenda of platform urbanism. Platforms, even those with global reach, do not govern absolutely, and nor do they manage the lives of urban citizens in absolute ways. We need to continue to defend a politics of urban space, and of urban experience, as exceeding the representational and governing capacities of digital platforms. By articulating the recombinatory conditions inherent within platform ecosystems, my intent has been to emphasise the dual natures of platforms as both 'open' to the lively interventions and 'value-creating' experiences of their users but also 'closed' in the way they extract and commoditise the value of these interactions. Also, by attending to a genealogy of platforms as they have come to be understood by scholars from diverse disciplines, I have aimed to draw together multiple narratives, disciplinary perspectives and historical contingencies of the present.

To underscore this point is, in part, to defend the multiple different registers of urban experience, representation, transaction, interaction and 'sense-making' that urbanists and geographers have long defended as part of a politics of the urban, which cannot be neatly subsumed into 'the

encoded procedures' that enable data to be transformed into a desired output. To argue this is not to fall victim to a naïve determinism that posits 'the platform' as impacting or reshaping urban space as a neutered, technologically subsumed domain, but rather to interrogate how the discursive representations of urban social relationships and transactions are being rendered through the technological affordances, protocols and governing tactics pursued through and on behalf of platforms. Platforms, in short, have limits, exceptions, malfunctions and many 'seams'.

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9

City Bricolage: Imagining the City as a Platform

In which I discuss how different models of urban governance are being articulated through of alternate data architectures, shaped by an understanding of the role of city governments as custodians in the management of urban data assets. I consider the evolution of urban data marketplaces, commercial models of global platform intermediation via Uber, and alternative models of platform co-operatives and data sovereignty.

Introduction

As I have discussed previously in this book, the adoption of digital services by city governments is today widely associated with the 'smart urbanism' movement, and the adoption of smart city strategies by city administrations. Where smart cities express spatially confined strategies of place-bound urban administrations, processes of platform intermediation exceed the territories of the smart city. The smart city strategy is executed as a vision of spatial integration; platformed conditions of urbanisation co-opt spatiality, and spatiality as a unit of information, along with everything

S. Barns, *Platform Urbanism*, Geographies of Media,
https://doi.org/10.1007/978-981-32-9725-8_9

else. These twin conditions position city governments as *bricoleurs* of sorts, sorting between diverse kinds of digital products and services, strategies and masterplans, in the effort to divine their digital futures and leverage the benefits of big data and algorithmic intelligence in the service of their urban publics.

Indeed, whether or not cities explicitly set out to adopt and champion a comprehensively branded 'smart city strategy', the proliferation of data-driven platforms is today demanding that governments play a much more active role in the management of their cities' data assets—the vast amounts of data generated by citizens everyday—if they are going to enlist the support of data-driven tools and services to address their city's most pressing challenges (Pettit et al. 2018). A 'smart cities 2.0' movement (or 3.0, or 4.0) increasingly looks to public–private data partnerships as opportunities to invigorate and improve the way cities are managed by their governments, emphasising more collaborative governance models ('smart governance') to support a city's strategic priorities (Williams 2016; Barns 2017). As put by engineering and planning firm Arup, 'the smart city is so different in essence to the twentieth-century city that the governance models and organisational frameworks themselves must evolve'. Importantly, the authors argue that the ideals of the smart city, in seeking to leverage the benefits of digital services to improve the way a city works, can't simply be realised by investing in distributed sensors and technology solutions alone. Such shifts necessitate a 'reinvention of governance', which involves 'transforming the way they work internally and together with outside partners and citizens' (Arup and UCL 2014).

Interest in the data governance implications of smart city investments has become prevalent in recent years (Barns et al. 2017; Kitchin and McArdle 2016). In part, this upswing of interest is in response to the perceived failures, or lack of impact, resulting from smart city investment to date. As technology consultant Rick Robinson put bluntly, 'smart cities still aren't working after 20 years', pointing to the fact that despite some high-profile projects, relatively little has really been achieved (Robinson 2016). The reason for this, Robinson writes, is in part because 'the massive investments that are being made in smart technology at a scale that is transforming our world are primarily commercial: They are investing in technology to develop new products and services that consumers want to

buy' (2016: para. 16). Commercial agendas driving investment in digital tools and services may, he notes, create convenience for consumers and profit for companies, but it can't be guaranteed they will create resilient, socially mobile, vibrant and healthy cities. He writes: 'Commercial agendas for smart cities are just as likely to reduce our life expectancy and social engagement by making it easier to order high-fat, high-sugar takeaway food on our smartphones to be delivered to our couches by drones whilst we immerse ourselves in multiplayer virtual reality games' (ibid.).

It is, Robinson argues, the role of government and political leaders to support and 'scale up' appropriate technology solutions to address a city's greatest challenges. While the idea that governments play an important role in addressing market failure is hardly new, the challenge here is to articulate the appropriate policy frameworks needed by governments to facilitate investment in data-driven services that are aligned to the strategic priorities of a city. Here governments have drawn from principles of the open source software movement, in which shareable, reusable code has served as the basis for improved software products to rethink the role and design of public institutions (Mazzucato 2011).

As previously discussed, 'Government as a Platform' models of digital era governance, sometimes known as 'Government 2.0', have been widely adopted to encourage external users—whether citizens, software developers, or other businesses—to co-design government digital services. The logic here is that by facilitating access to government data in open, machine-readable formats and APIs, governments can in turn encourage wider digital innovations that internal public service employees might never dream of. But as a model for public sector technology investment this approach is not especially new. The launch of weather, communications and positioning satellites have in the past been undertaken along similar lines, whereby governments invest in the technology infrastructure needed to facilitate massive private sector investment and subsequent innovation. A good example is the Global Positioning Satellite (GPS) service, created and maintained by the US Government, which provides geolocation and time information to any GPS receiver free of charge, and is the basis for many profitable location-based services operating in the marketplace today (Mazzucato 2011).

As Mazzucato has further emphasised (2018), governments play an active role in supporting and enabling technology innovation, not least by acting as the primary investor in fundamental underlying platforms like GPS. The Chinese Government's investment in AI technologies also demonstrates how powerfully state-backed interventions can shape and indeed accelerate the growth of the technology sector. The widespread adoption of platform intermediation tactics in digital marketplaces today—across both western and non-western marketplaces—makes it inevitable that public agencies will need to proactively respond to these models as part of the arts of contemporary city building and regulation.

In this chapter, I discuss recent civic responses to conditions of platform intermediation, particularly through the lens of urban data governance. In the first instance I address the creation of urban data marketplaces and civic data trusts. Secondly, I look at the example of Uber as a company that challenges urban policy through asymmetrical modes of platform intermediation. Finally, through the example of Sidewalk Labs, I briefly discuss the formation of public–private partnerships in the revitalisation of a city precinct in Toronto. The Sidewalk Labs initiative provides insights into how a more traditional platform intermediary, in this case owned by Google parent company Alphabet, is seeing the city as a platforming opportunity. Each example demonstrates different dynamics of data governance occurring in an era of platform intermediation. I tease out some of the implications of these alternative models in a concluding discussion.

Building Urban Data Marketplaces

The rapid expansion of proprietary urban platforms over the past decade has produced new kinds of data enclosures, particularly in cities where the government has not remained a majority owner of major data platforms. Imagistic representations of real-time, responsive cities were built on the expectation of freely flowing big data assets, but the rise of commercial platform ecosystems has made much of this data only accessible on the terms deemed commercially viable by its proprietors. If cities are the engines of the data economy, the opportunities generated by this shift towards data-driven services have largely been realised in commercial terms.

As Carlo Ratti has noted: 'What is happening in cities is almost naive compared to what is happening in our pockets' (Aouf 2019)—though the differences in data architecture being adopted across western cities compared to cities across are stark. Through the integration of social media technologies such as WeChat (owned by Tencent), and other technologies, the Chinese Government has been able to create a Chinese Social Credit System (SCS), with the goal of centralising data platforms into a big data-enabled surveillance infrastructure. Ultimately, this system is designed to manage, monitor and predict the trustworthiness of citizens, firms, organisations and governments in China. Essential to the creation of this centralised system is the capacity of the Chinese Government to access underlying raw data of citizens, on terms that it stipulates (Liang et al. 2018).

The CSS initiative points to the possibilities of 'country as a platform'—a term used by platform strategists such as Choudary to describe Singapore (2019), via the Smart Nation initiative, but could equally be applied to that of the Chinese Government's digital initiatives. Under President Xi Jinping, China has adopted an increasingly centralised internet governance framework, involving the establishment of the Cyber Administration of China, with Xi as its head. This agency is authorised to regulate its information environment but also to manage public opinion and 'upgrade propaganda' (Jiang and Fu 2018). In addition, the integration of WeChat into many public systems in recent years has also allowed for more mobile and personalised interactions with government entities. As Jiang and Fu argue (2018), this has ultimately expanded the capacity for big data surveillance into governance. In this context, big data, artificial intelligence, cloud computing and facial recognition are each being used to enhance the state's capacity to collect and analyse large amounts of citizen data and internal government data. At the same time, the public remains unable to access the government's own data.

In western countries, data governance environments are radically different. The proprietary nature of most successful digital platforms means that the majority of real-time data collected via smartphones and social media is not available, at least in 'raw' format, for governments to access. Platforms will limit government and citizen access to data in the name of privacy protection. As David Lyon has noted, following the Snowden

disclosures, questions about big data have generated unprecedented public interest in surveillance in many countries around the world, and with it, a heightened interest in privacy protection measures (Lyon 2014). Regulatory responses from more than 100 countries have involved comprehensive data protection laws and bills (Greenleaf 2019), and prominently, the EU's General Data Protection Regulation (GDPR) (European Union 2018) set new standards with enforcement capacity and consequences.

At the same time, much of the data generated through proprietary platforms is only made available via APIs, on terms wholly determined by their proprietors. Underlying 'raw data' is often not available for commercial or privacy reasons. As Wachsmuth and Weisler (2018) have been closely monitoring, Airbnb makes very little of its data available to city governments, and as a consequence many cities lack the capacity to monitor the operations of the platform and its compliance with relevant legislation. Indeed, the terms on which platforms make their data available might be thought of as part of a suite of tactics known as 'regulatory hacking', by limiting government access to necessary information needed to enforce compliance with local laws.

Platforms also make effective use of APIs to support the goals of city administrations, and use these tools as services to support city planning. Uber, for example, runs a digital service called 'Uber Movement',[1] which shares anonymised data aggregated from the ten billion trips hosted on its platform over the past decade, with a view to supporting improved urban planning around the world. Likewise, Google sister company Sidewalk Labs has developed the Coord platform to assist cities in the management of 'curb side' services, integrating a range of data sources to capture everything from parking metres, delivery services, ride-share services. Data it captures is delivered via API to "empower cities to create and enforce rules around curb usage" in cities such as New York and San Francisco (Raetzsch et al. 2019).

Initiatives such as these have highlighted the capacity for city governments to manage their urban data assets. Increasingly, city governments act as data curators, or what I call *bricoleurs*, through the creation of city APIs and city data stores that allow for the integration of multiple data

[1] https://movement.uber.com.

streams aligned to specific city policy goals. Across Estonia and Finland, for example, a joint government data exchange platform called 'X-Road' operates an open source technology designed to link individual servers through end-to-end encrypted pathways. The data platform allows for the delivery of over 80 per cent of government services in Estonia. The City Data Exchange, established within the City of Copenhagen, has been another example of an urban data platform designed to facilitate the sharing of a wide variety of data from multiple sources between all types of users in a city—citizens, city government, businesses (Barns 2017). Unlike the X-Road initiative, the platform was short-lived. Its creators describe critical challenges to do with an immature data market, fragmented data landscape, reluctance to share data due to concerns about privacy and competitor access, and a data skills gap (CDE 2018). As part of an evaluation of the initiative, the City of Copenhagen identified the fragmented data landscape as a major barrier to wider uptake of the marketplace, with more and more private companies electing to sell their data rather than making it available via the Data Exchange (CDE, 9).

The Greater London Authority (GLA) Datastore reflects the ambitions of a *Data for London* strategy that seeks to ensure London has 'the most dynamic and productive city data market in the world, [where] city data will be recognised as part of the capital's infrastructure' (GLA 2016). As part of the initiative, a London Borough Data Partnership[2] was formed to support the work of London boroughs in sharing, organising and structuring data in more consistent formats, to enable development of analytical tools, big data approaches and new collaborations to deliver social, economic and environmental improvement in London's communities. The London Datastore's development in recent years has been explicitly focused on building collaboration and 'openness', not only by releasing data out into the public, but also by involving key stakeholders early in the project's development. The Datastore is also explicit about the necessary internal investments needed to achieve the data analytics accessible online, including an expansion of internal research resources to include

[2]For details on the London Borough Partnership see https://data.london.gov.uk/borough-partnership/.

maths and hacking skills, and investment in internal data sharing partnerships between London Boroughs (GLA 2016).

These datastores and data exchanges provide examples of how city governments are navigating varied informational resources through public–private collaborations around data access and use. Policy advocates at the think-tank GovLab describe these as 'data collaboratives' which aim to generate sustainable data partnerships around specific challenge areas (GovLab Research 2013). As I have elsewhere discussed, city-sponsored data stores and marketplaces represent a relatively progressive approach to urban data governance, in that they are informed by an understanding of the need to both promote access to open data by citizens and developers, but also curate diverse data sources and partnerships, both public and private, around city policy goals and priorities (Barns 2017).

At the same time, however, many of these initiatives have been limited mostly to the surfacing of government open data. There has, for example, been very limited results in establishing what the Copenhagen Data Exchange described as a 'mature data marketplace' where multiple public–private entities were able to share data (Table 9.1).

City Data Commons and Data Sovereignty

The lessons from these data governance experiments are reflected in the more recent design of the City of Barcelona's DECODE initiative. Led by the city's chief technology and innovation officer Francesca Bria, DECODE stands for 'DEcentralised Citizen-owned Data Ecosystems' and aims to address the lack of momentum around city-run data marketplaces to date by rethinking fundamental principles of urban data in a platform economy. This city-wide initiative is taking place against the backdrop of the General Data Protection Regulation (GDPR) taking effect in the European Union (EU), demonstrating how a city government is acting in ways to locally enhance digital rights (Calzada 2018). Bria describes this initiative as a 'new deal on data', which sees citizen data as a public infrastructure of the city, which should be collected, used and governed as such (Lewin 2018).

Table 9.1 Urban data platforms and their governance functions[a]

Urban Data Platforms			
Data Repositories	Data Showcase	CityScores	Data Marketplaces
Open Data Portals • Provide access to government data often in machine readable formats • Data not usually listed according to policy or performance target • Created by city governments	City Dashboards • Promote access to data visualisations aligned to urban policy priorities • Underlying data not always available or machine-readable • Created by city governments or through partnerships with educational institutions	Score Cards • Integrate a range of dataset to support performance monitoring against set targets • Underlying data not usually available • Created by city governments	Datastores • Provide access to data in machine readable formats • Data access and reuse by external parties promoted and encouraged (incl sales) • Performance monitoring one among a number of data uses • Created by city governments or private sector
Objective • Data services innovation • Transparency	Objective • Data visibility • Transparency	Objective • Performance Monitoring	Objective • Data services innovation
Examples • New York Citizen Dashboard • Socrata Dashboards • CKAN Dashboards	Examples • Dublin Dashboard • London Dashboard • Sydney Dashboard	Examples • Boston CityScore • GSC Dashboard	Examples • London Datastore • City Data Exchange (Copenhagen)

[a]Table originally published in Barns, S. (2018, March). Smart cities and urban data platforms: Designing interfaces for smart governance. *City Culture and Society, 12*, 5–12. https://doi.org/10.1016/j.ccs.2017.09.006

Underpinned by a reconceptualisation of data value, DECODE is designed to enable citizens to own and manage their own data as part of a 'data commons'. It is being supported as an EU Horizon 2020 project

with 14 European partners, including NESTA, each developing technologies for the project, which include distributed computing and advanced cryptography tools (NESTA 2019). Once built, DECODE will allow citizen-generated data to be integrated from a range of different sources, spanning noise levels from individual sensors, healthcare data and administrative open data, to be displayed via dashboard. Citizens are given the option to control how this data will be used, including to inform policy proposals. The platform also plans to offer anonymous verification capabilities (such as when creating and signing local petitions) to minimise the sharing of sensitive or personally identifiable data with government. In addition, DECODE will use a distributed ledger platform called Chainspace, to ensure all interactions can be audited (NESTA 2019).

The DECODE project represents a further civic-backed progression of the urban data marketplace, but with critical differences. Underpinning the initiative is a set of regulatory requirements being implemented by the City of Barcelona, which seek to enforce how platforms collect and make their data available within the city. For example, Barcelona is requiring private entities to essentially 'give back' the data it harvests from Barcelona citizens when accessing their services. Vodafone, the provider of the city's telecoms services, is contractually obliged to give back the data it collects from the public, which will be published anonymously on the council's open data website.

As Morozov and Bria have argued in a report on *Rethinking the Smart City* (2018), cities are in a position to completely rethink how private platforms control citizen data. To do this, they argue, cities 'require a new vocabulary and conceptual apparatus to reassess their relationship to technology, data, and infrastructures' (2018: 22). Fundamental here is the language of technological or 'data sovereignty', in which citizen access to and control over how their data is used is prioritised. As Morozov and Bria (2018: 27) write:

> Barcelona seeks to lead a transition towards technological sovereignty that allows the government and its citizens to determine their own priorities in terms of the direction and use of technological innovations, with clear social benefits and public returns.

> This implies reclaiming critical knowledge regarding data and technology infrastructures which far too often remains in the hands of major multinational service providers, while involving local SMEs and innovators to develop the digital services and solutions citizens need.

The DECODE initiative is at the forefront of growing momentum behind city-scale responses to questions of data sovereignty and digital public value. Here we see a role for city governments that go well beyond that of sharing or making available government open data. This position now extends to consider the civic value of data produced by citizens using commercial platforms, underpinned by enforceable standards around how citizen data is used, whether by government or large technology companies. The DECODE project is yet to be built at the time of writing, but when realised it will set an influential new benchmark in civic responses to conditions of platform intermediation.

This initiative is not alone, but representative of a growing number of projects that are today adapting platform strategy models in ways that think through the public value implications of platform intermediation. Fairbnb is a 'platform cooperative' that, at the time of writing, is seeking crowdsourced investment to deliver a community-centred alternative to existing vacation rentals platforms such as Airbnb. Designed to be run as a cooperative, hosts using the platform are members of the cooperative, and therefore owners of the company. As an alternative marketplace, the platform would invest a proportion of fees from home sharing back into the communities in which it operates. In this model, the platform ecosystem is reconceived as a set of value-sharing relationships in which local community and local host are able to benefit from the mode of platform intermediation achieved by a major global platform like Airbnb.

While Fairbnb is still in start-up mode, it is part of a wider platform cooperative movement that seeks to disrupt the association of 'platform' with 'capitalism' by returning to more cooperative business models (Scholz 2016). To date, the movement has lacked the opportunities of scale that commercial platforms have benefitted from through significant venture capital investments from companies such as SoftBank. Nevertheless, they point to the need for continued engagement with underlying value-sharing

relationships as central to any platform strategy that is seeking to enhance conditions of urban public value.

Uber: Platform Intermediation at Scale and in Real-Time

As a major platform company, Uber epitomises a completely different trajectory for data governance in an era of platform urbanism. Early 2019 estimates are that approximately 3 million drivers use the platform, with approximately 100 million overall users worldwide—creating an estimated 10 billion rides. The company raised a total of $11.5 billion in venture capital over the decade, leading to a valuation in 2018 at over $62 billion, rising to close to $70 billion. The rate and scale of this expansion over such a short period of time is itself evidence of how closely linked have become processes of digital intermediation and financial intermediation. Major investments by venture funds such as SoftBank are reflective of a broadly held view that the rapid scaling of a new digital infrastructure can facilitate a 'winner takes all' scenario, whereby digital services, operating as platform infrastructures, achieve rapid network effects that exceed the capacity for competitors to challenge.

Uber's rapid and often aggressive expansion into new urban markets has been accompanied by large business losses—leaving many to question the validity of its underlying business model. In 2017 Uber reportedly lost a total of $6 billion due to its rapid expansion that year. According to business news sites such as *Forbes*, its business model is 'fundamentally broken' (Sherman 2017). Its vulnerability is seen to lie in the relatively low barriers to entry (e.g. multi-homing), impacting profit margins and growing legal battles over the employment status of drivers (Pollio 2019).

But nevertheless, in the months following the announcement of this loss, venture capital fund SoftBank invested more than $8 billion in Uber (Griswald 2018), taking total venture capital investment to $11.5 billion (Sherman 2017). The speed of expansion—and scale of losses—can be seen as a kind of 'steering tactic', to ensure the platform harvests maximum 'interactions' (data trails) on the platform via its 'ecosystem' of users.

The Uber ecosystem includes drivers, riders, data centres, software developers (including open source coders both employed by Uber and working elsewhere) and its shareholders. This ecosystem is integrated with external software APIs, while Uber's own API ensures its service is effectively promoted and bundled across other platform services, whether these be calendar integrations within Microsoft, or flight booking integrations through airline websites. By ensuring globalised interactions via the Uber platform conform to its common centralised standards, Uber's capacity for data aggregation at scale has allowed it to leapfrog other companies in the race to build self-driving cars (BBC 2018).

Uber's model of transport intermediation revives the cybernetic imaginary. We don't experience it through a birds-eye, systems-level view of the city, but instead through myriad relations enacted through dynamic ecosystems experienced at the level of everyday encounter between those who transact with each other through the Uber platform. Uber instruments its citizens around the world as 'data rangers' on its behalf, working daily to support ongoing improvements to the platform, expanding the capabilities of Uber's self-driving car division and facilitate its emergence as an urban data innovator. In Uber's case, users will inadvertently participate in 'upwards of hundreds' of experiments being run by Uber's data team on any one day, which seek to test out assumptions about how users respond to data provided, potential vulnerabilities present across the platform and also how trip information is used and adopted. As the Uber Engineering team has explained on its website: 'Every engineer watching a dashboard tends to care about data in a particular location or region, around a set of experiments, or related to a certain product' (Lozinski 2017). Incoming metrics are compared to predictive models based on historical data to determine whether current data is within the expected bounds. In a sense, the Uber user will be constantly harvesting city data on behalf of the platform, but at the same time benefit from on-demand data delivered via the app interface, for example in the form of ETAs (estimated time of arrival information).

We can think of the way Uber manages and influences its users as constituting dynamic integrations of code, commerce and everyday urban relationality, in ways that ensure value is shared by diverse platform users while also, in the language of platform economists, 'internalising' these

positive externalities through data centralisation and agglomeration and enhanced service provision (see Barns 2017, 2019). When we step into an Uber car, we enter the 'code space' of the Uber network (Kitchin and Dodge 2011), and are ourselves instrumented as forms of feedback that support the broader training of Uber algorithms. While Uber extracts 'rent' from these interactions, deducting a relatively high proportion of the cost of each trip, it casts those who accrue earnings by using its platform as independent platform users, and its role as limited to that of intermediary, whereby participants choose to use the platform out of their self-interest.

Data generated by users on the platform has become one of its most valuable resources, and is promoted as a way to support the work of city governments in better understanding the transport dynamics of their cities. Reportedly, the company has spent more than $1m per day expanding its capabilities in autonomous driving, which presumably benefit from user activity data (BBC 2018). As Fran Bell, the head of data science at Uber has pointed out, 'Uber tackles some of the world's most challenging data science problems *at scale and in real time* […] We use data intelligently to build better experiences for our users and solve problems at scale' (Vorwerk 2019, italics added). As it engages in legal battles to defend the employee status it offers Uber drivers, the ecosystem it now manages across global markets are likewise used to challenge the operational efficiency of the state, particularly at the city-scale, with a number of city governments also choosing to adopt the 'Uber model' for on-demand transport services (Townsend 2014).

Investments by companies such as SoftBank demonstrate a clear link between conditions of platform intermediation and financial intermediation, with Uber acting as venture-backed vehicles for future infrastructure and asset management; one of the potential 'foundational platforms' of our future cities (Griswald 2018). As such, the contours of platform ecosystems invite us to see them both through the lens of micro-transactions between drivers and riders, or 'eaters and delivery workers' in the case of Uber Eats—but they also encompass the ecosystem of diverse investors, city-scale governments that utilise Uber engineering insights, and the network of companies that integrate Uber APIs within their own platforms. As such, Uber's platform ecosystem can be understood as itself encompassing a new kind of speculative urbanity, an engineered urbanity in

which 'upwards of hundreds' of data experiments in machine learning can be run each day, to improve the overall operational efficiencies of the network. In the short term, the interventions by city governments to regulate the way Uber treats its drivers are significant, and may even block Uber further growth as a ride-hailing service. There is, however, also a longer term prospect that Uber remains focused on its future earning potential as an urban data platform which can supports multi-modal transport services, including autonomous vehicles.

Building a City from the Internet Up

The widely publicised presence of Sidewalk Labs in the City of Toronto provides another instructive example of how platform companies are intervening more directly into city governance settings. The project has been widely publicised, and it is not my intention here to offer an exhaustive account of its rather contested history. Nevertheless, the project remains notable specifically because it is being developed by Google sister company Sidewalk Labs, an urban innovation start-up established by parent company Alphabet to 'rethink cities from the internet up'. Sidewalk Labs has also incubated a range of spin-off companies that aim to tackle urban planning and design challenges. These include Coord; City Block Health, a personalised health service; an outdoor media platform called Intersection as well as sister company Waze Carpool.

In 2017 the start-up was selected by the City of Toronto to revitalise an urban waterfront precinct known as Quayside. The Quayside precinct, dubbed 'Sidewalk Toronto', was initially planned as a 500-hectare sandpit for testing a suite of new tech products. The aim has been to radically reimagine the way a city is made, focused particularly around liveability and sustainability targets. Examples of planned services include a parking app that doesn't only locate available parks but introduces tiered parking fees dependent on where a user has travelled from (if you live close by, you should have walked, therefore you will be charged more). Local sensors are also being promoted not only to monitor air quality and movements but also to test alternative zoning opportunities, or what Sidewalk Labs has called 'radical mixed use zoning'. As these examples demonstrate, Sidewalk

Labs is seeking to redesign urban services using more connected urban data, through integrations with broader data assets such as navigational tools (Google Maps), and AI services such as Google's Deep Mind, rather than simply 'monitoring' urban environments. The solutions they have been seeking to offer here take in the full span of city regulation, pricing, planning, building and human interaction.

This is not just tinkering at the edges of urban systems with new technology; this is redesigning the system with machine-learning technology at the core. The thinking behind Sidewalk Labs is evidenced in sentiments expressed by the head of Google X's research lab Astro Teller, who explained to *Wired*: '[P]rogress is still bogged down by 20th-century "civil engineering mentality". The shift taking place is much more than simply instrumenting existing infrastructures with connected senses: it's embedding digital intelligence into the very design of city systems' (Wohlsen 2014).

Despite investing US$50 million to support an 'open conversation' between citizens, governments, universities and others about what Sidewalk Toronto should be, the project has been plagued by public controversy particularly focused on the data governance models that underpin Sidewalk Labs, and its business case for investment into new infrastructure within the waterfront precinct. The commercial in confidence nature of the agreement between the City of Toronto and Sidewalk Labs also sparked widespread distrust about the terms accepted by the city to allow Sidewalk Labs to conduct its 'lab style' urban experiments. To address some of this controversy, the company announced an independent Civic Data Trust, and underscored that 'no one has the right to own information collected from Quayside's physical environment', with anyone seeking to use the data required to establish a 'responsible data impact assessment' with the Data Trust that is publicly accessible. The company has also promised to use open standards for any digital infrastructure and services it provides (Dawson 2018).

The Sidewalk Toronto project is just one of the more controversial examples of public–private partnerships around city revitalisation that emerge as 'born platform' models. Public support for the project has been reported as broadly positive, with 55 per cent of Toronto residents supporting it, according to a survey undertaken by the Toronto Region Board

of Trade (Plautz 2019). However, conflict has centred around data governance, provoking mistrust within the local development community. A #BlockSidewalk campaign has developed, with critics arguing that the project is an Alphabet 'intervention' to essentially commercialise Google AI., and concerned at the combination of creeping infrastructural privatisation, combined with data extraction, monitoring and optimisation by a large platform company (Wylie 2019). As such, this experiment in city building 'from the platform up' is provoking a reassessment of the very nature of public space as a 'civic environment that is there for everyone' (Lorinc 2018).

The forms of instrumentation and data collection proposed by Sidewalk Labs in Quayside are not very different to those routinely enacted by platform companies, delivered via highly personal app interfaces. Nor are they very different to many of the data harvesting activities put in place in the rollout of 'smart infrastructure', whether in the form of smart lights, smart metres, smart home devices or smart energy monitoring. However, what the controversy reveals is surely growing public discontent around the prospect of a large platform company, in this case a sister company to Alphabet, managing an *entire* urban precinct in this way. The project's missteps, which have seen the City of Toronto communicate poorly regarding the terms of agreement with Sidewalk Labs, also underscore the need for greater appreciation of the centrality of information policy to the achievement of broader urban policy goals. Even if a small majority of residents support the project overall, over 70% believe any data created as part of the project should be kept under public control (Plautz 2019).

Conclusion

Conditions of platform intermediation are placing a spotlight on the need for civic-oriented data governance frameworks, which can ensure governments have access to the necessary data resources to support wider public policy priorities. Dashboards, data marketplaces and open data initiatives supported by city governments have aimed to curate and profile diverse data sources for a wide variety of public uses, however a more emboldened approach is now in the ascendant. In more ambitious approaches, like the

DECODE initiative, it is not only data sharing, but data sovereignty, that is becoming the goal.

As the Sidewalk Toronto experience demonstrates, the attempt to build cities 'from the internet up' comes at a time when the business tactics of platform intermediaries are increasingly considered to be extractive, resulting a stronger push for public ownership of city data. At the same time, as the Uber platform shows, the financialisation of platform intermediaries also demonstrates the scale at which platform ecosystems seek to operate globally. While Uber's ride-hailing business model may be under pressure, it has meanwhile built a global urban data platform, and amassed a level of data intelligence, operating *at real time and at scale*, that far exceeds that of any place-bound city government.

Here, then, are two quite distinct futures of platform urbanism. One sees citizen data as sovereign, and sees governments empowered to leverage their regulatory influence over the spaces occupied by dense urban populations, so that they might demand better data sharing deals. This, in a sense, updates the *quid quo pro* approach to spectrum regulation established during the era of broadcast media, but this time in defence of the digital public spaces of cities and urban innovation. This approach seeks to intervene to produce different forms of value-sharing not only between users of a platform, but also between civic authorities, platform owners and their users. Another scenario sees proprietary platforms continue to accelerate and advance their range of software services, further extending the reach and capabilities of their data harvesting and machine-learning capabilities into known and unknown territories. While we as citizens, will surely benefit from the services on offer, we will do so on the terms and conditions agreed to when we refresh the app.

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10

Concluding Reflections: An Ethics of Public Value in an Era of Platform Scale

At the beginning of this book I posed a question: What kinds of cities are being created, in a world ambiently populated with platforms? When I look around the public spaces I find myself in, it's clear the smartphone has embedded itself into the ways we build, dwell in and think about cities in fundamental ways. We've been able to see these rectangular devices glowing and tugging at our attention for a decade; perhaps over the coming decades different modes of interactivity will emerge: Instead of swiping and tapping with fingers, perhaps we will speak more to them, perhaps we will listen more. Perhaps they will listen, more and more, to us.

We can expect the form and shape of these devices to change rapidly over the coming years. To focus on the specific rectangular object omnipresent today is simply to draw attention to the material presence of disruptive technology in our lives, as a way into—an interface into—thinking through the radical changes so very recently brought about to our ways of connecting, sharing, trading and dwelling in the cities we find ourselves in. The different 'bundled' capabilities of smartphones—as objects, media interfaces, communication devices, data harvesting machines, remote sensing devices, surveillance machines, cameras, music and podcast players, banking interfaces, writing machines, and so forth—challenge conventional boundaries of disciplinary enquiry. Media, telecommunications,

S. Barns, *Platform Urbanism*, Geographies of Media,
https://doi.org/10.1007/978-981-32-9725-8_10

infrastructure? Distracting or enabling? Situated or ambient? These phones are windows into altered conditions of relationality that can now be instrumented with any smart device. The altered states they conjure have confounded us for many decades: the potentials of intimate, real-time connection with souls far away; the radical annihilation of distances; the possibilities of internetworking social, biological and physical systems via controlled experiments and feedback loops. The software we find bundled in our hands today just means these altered states are also the altered states of everyday life, bundled into our experiences of cities, infrastructures, relationships, memory, labour, movement and maybe even wild landscapes. (Or maybe you put your phone away then, in the hope that natural systems might cleanse your mind and body of all this constantly partial connection.)

As I've been discussing in this book, the altered states of platform connectivity are not themselves unique to our current times. Each wave of technological change, particularly over the past century of electrically-mediated connection has brought with it profound challenges, and new potentials. The past decade brought hopes of a more decentred world, which gradually resolved into the bundling of the much of the world's information assets into data architectures owned and controlled by only a few. One hundred years before, the recent discovery of another new resource likewise animated scientific endeavour, and was embraced worldwide as a new technology capable of illuminating that which had previously been invisible. The resource discovered then was radium: a chemical discovered by Marie Curie and her husband Pierre, whose radioactive properties could be used to illuminate previously invisible structures once beyond the scope of scientific investigation, including the nature of the sub-atomic universe.

In 1913 the New Zealand scientist Ernest Rutherford used the alpha particles emitted by radium to locate the existence of a tiny, dense, energy-packed core at the centre of an atom. During the years of his early work with radium and alpha rays, the world was enraptured by the properties of this newly discovered material, and, once we learned how to artificially create it, radium would come to be used widely in all manner of things, from toothpaste to cosmetics to watches. Radium was the ultra-modern material used to illuminate, clean and sparkle. It was only after

its widespread integration into society that the dangerous properties of radium as a radioactive material were finally revealed.

Data is not radium, and yet of course we can see there are echoes of this story reverberating in our current century. Whether or not the volume of electromagnetic radiation emitted by wireless communication devices turns out to be dangerous to those exposed constantly over decades of a lifetime is yet to be known. And even if the health impacts of our data exhaust are relatively negligible, there is now widespread recognition of the dangers attached to data agglomeration, as it fuels the coming century of machine-learning algorithms and artificial intelligence. What has been unleashed? Will we look back on this past decade in the way we looked back in horror at the lives of the 'Radium Girls'? What forms of 'control', as envisaged by the pioneers of cybernetics, have been unleashed? How will such forms of authority and influence be used to address one of the greatest challenges of our time: that of climate emergency?

Reflecting on Platform Relationalities

In this book I've sought to embed the significance of contemporary platforms within a historical narrative that has interwoven stories of urban disruption, digital dreaming and contemporary governance. In doing so, I've explored our platform age as an era historically-constituted by persistent imaginaries, as much as by technology capabilities and entrepreneurial ambitions. I've aimed to position platforms not just as data extractors and conglomerates, though they *are* these things, but also, fundamentally, about conceptions of value-sharing and relationality, as constituted or made real through the lens of the 'platform ecosystem'. Like a smartphone, any infrastructure can be 'platformed' as a set of value-sharing relationships that institute proprietary data architecture at the core, enabling and engineering our relational impulses in a way that produces the 'intelligence amplification' imagined by early pioneers of internetworking. If cities are today widely perceived today as informational infrastructures, their ambient qualities modulated as much by what can be seen as what can't be seen, then it would appear everything is up for grabs.

As I've discussed in this book, how we negotiate the nature platform interactions and relationships matter very much to emerging conceptualisations of platform urbanism. The notion of 'platform ecosystems', which render relationality through the logic of mutual exchange and benefit, represents a particular way of orchestrating and engineering urban relationships, particularly when they are dependent on what Mackenzie (2018) has called the 'proprietary opacities' of platform APIs and data architecture. Rendered through the prism of the sharing economy, or Web 2.0, or City 2.0 movement, the work of building and orchestrating value-sharing interactions between platform users constitutes an important form of public value, one where everyone can benefit, and profit even, if they get on board the platform. What this particular picture missed, for perhaps too long, was the value of data extracted, used as training data to support the algorithmic governance of user behaviour in ways designed to engineer even greater connectivity, sharing and data value for the platform owner. A cybernetic system in operation, in real time and at scale. In this sense, the public value embodied within platform ecosystems continues to be coopted in the form of proprietary data holdings. Initiatives to advance models of data sovereignty and data commons represent ways in which urban activists and innovators are seeking to reintegrate an ethics of public value within platforms ecosystems.

By tracing various genealogies of the platform, my intent has been to render platform urbanism not simply via the apps we keep checking on our phone, or through specific companies, like the home-sharing service taken up by millions worldwide, but as a dynamic of transformation that demands historicisation. As such, I have sought to understand platforms a form of increasingly ubiquitous software intermediation that has been facilitated, in different ways over the past decades, by the *persistent, discursive appeal* of 'networked' modes of organisational design and informational abundance. As Paul Edwards has argued, we can only make sense of computers as tools when we simultaneously grasp their roles as metaphors and political icons (Edwards 1997). The rise of platforms has simultaneously embodied the hopes of distributed, networked publics against the disciplinary planning of smart cities and centralised control systems. The realities of implementation for new technologies rarely live up to the

utopian ideals they serve, which include the potentials for more participatory and 'open' forms of association and information sharing. As I have discussed, many of the characteristics of our platform era express conditions endemic to that of software commercialisation, not democratisation.

Through the well-designed user-centred interface of the platform, existing fault lines between everyday urbanism and disciplinary planning break down. Just as cybernetics remains banished as a mode of urban intelligence by progressive urban activists, citizens are engaged as everyday data rangers enlisted to support the broader efficiencies of the everyday services they make use of, the handy apps that sit gleaming in our hands. If major global giants such as Uber, Airbnb, Google, Facebook and Amazon are critically evaluated as data agglomerates and *rentiers* of the platform age, it remains the case that they are deeply embedded in our lives as everyday tools and interfaces of urban conviviality, intimacy and relationality.

We are, as I have elsewhere written, *all platform urbanists now*, insofar as we all participate in the production of platform economies (Barns 2018). Many of us choose to use platforms with global scale and reach because they are functionally superior; they have been built through the 'intelligence amplification' resources of an infinitely networked global society. As such, awareness of data extractivism doesn't necessarily result in the mass withdrawal by consumers and users of major platforms (even if the platforms themselves change). The lens of platform economics helps us understand why. Each user of a platform is engaged not on disciplinary terms, *because it benefits them, in infinitely various ways*. Platforms are not enacted as disciplinary architectures, subsuming their users through architectures of 'communication and control', as Norbert Weiner expressed it, but, in their recombinatory natures, they enlist us to help us create value in our own lives. Expensive software is something we all appear to find quite useful, particularly when it doesn't cost anything. At the very same time, we are instrumented to continuously expand the globally integrated design of vast technology infrastructures; our movements, interactions, emotions and transactions acting as feedback to support the amplification of intelligence at scale that could never have been planned in the way first generation cyberneticians envisaged.

The Potentials of Reform

The pivot towards the platform as a lens through which to understand the asymmetries of power, behavioural influence, labour relations and data intelligence engendered by this immersive world of distributed software clearly demonstrates the need for radical reform. As a growing cohort of regulators and policy activists now argue, these are global informational infrastructures built by all of us, over decades of heavy use and, in the words of Francesca Bria and Evgeny Morozov, should therefore be owned by all of us (Van Dijck et al. 2018; Morozov and Bria 2018). Governments at national or supra-national scales now seek to intervene to restrict or reduce the power of platform companies, whether through anti-trust legislation, greater use of algorithmic governance techniques, and through resource to citizens' data sovereignty. What seems critical, for now, is that this era of platform scale be recognised as an opportunity to articulate alternate conditions of digital public value, and to identify what levers or tools can be used to nurture these conditions.

As I discussed at the beginning of this book, previous eras of technology transformation identified conditions of scarcity—in particular, spectrum scarcity—as a basis from which to enforce particular public interest obligations on the part of major media companies. The approach to *quid pro quo* broadcasting and telecommunications legislation in countries like Australia, the UK and Canada, gave major companies access to 'broad' or mass audiences access (and hence advertising dollars) in return for access to 'scarce' but powerful spectrum. In 2019, the Australian Government, via its competition watchdog, considered the impact of digital platforms like Google and Facebook on news and media audiences (as consumers) and the role of these platforms in reducing competition. In this Digital Platforms Inquiry, the 'public interest' is represented through the lens of competition, consumer privacy and relevant markets. But what if an alternative conception of the public interest was defended?

Cities are naturally dense informational ecologies. They have always been 'multi-sided markets'. It is the 'networked effects' of urban marketplaces that attracts more and more of the worlds populations to live in urban regions. Cities have always been platforms, too. As such, city governments equipped with relevant regulatory remit to manage and benefit

from the 'value-uplift' achieved by growing demand for scarce urban space could do well to remember the lessons of our broadcast age: that scarcity can be leveraged in ways that not only benefit markets but can also cultivate thriving public media ecologies. As the Barcelona example shows, cities can show leadership by enforcing standards around data access and use by platforms that seek to operate in a city, in exchange for a 'license to operate'. This approach has proved successful in the way cities demand fair pay for Uber Drivers. Extending Barcelona's approach data access standards can be underpinned by ambitious attempts at data sovereignty, or they could be used to seek contributions to local economies, communities, housing or other local resources. This sets out a powerful role for city governments to act as champions of public value in a platform age.

Ultimately, these interventions would reconceptualise the potential of a platform ecosystem as one that balances the enduring value and appeal of networked sociality with the value extracted from our relational selves in support of machine-learning tools and interfaces. As Van Dijck et al. (2018) have argued, both forms of value need to be informed by an ethic of public value, underpinned by a clear-eyed understanding of how value is shared, extracted and used to modulate our experiences and intimate encounters with these ambient interfaces of urban life. An initiative like Fairbnb demonstrates alternative models of platform-enabled house-sharing where a percentage of profits or service fees can be used to contribute to local economies and communities. The fact that Airbnb has scaled in ways that do not include any provisions for the local investment in relevant infrastructure—the conditions that attract guests to use the platform to 'live like a local' as the tagline goes—demonstrate the workings of an extractive business model that has not yet got the balance right in the way it leverages the values of community and 'local' life while simultaneously undermining these same values. Whether or not all platform businesses need to be run as cooperatives, cities should nevertheless demand more effective 'two way' value-sharing between platforms, the environments they operate in and leverage, and their users.

Likewise, these more shared forms of value need to continue to be articulated in the context of the functional integration of user data into platform data architectures and algorithmic models of governance. The DECODE initiative points the way to how algorithmic platform governance need

not only be extractive, and could instead be used in ways support a greater number of beneficiaries to make use of the machine-learning capabilities of urban big data.

Critical questions that may guide further work include:

- How are different relationships of value-sharing articulated within a platform ecosystem, at different scales, including local, national and global scales?
- What *different* forms of value, including public value, are created and shared through data harvesting and use arrangements orchestrated by a platform, and how might these be supported?
- What are the implications of these forms of value for different kinds of urban relations: community relationships, labour relations, ecological relations and city governance relationships?

It is clear that platform business models have become central to the global economy, and will no doubt continue to remain critical in the decades ahead. It may well be through a reconceptualisation of platform ecosystems new forms of environmental and public value can be more clearly defended. What remains unknown is how we will choose to redress the asymmetries of information exchange created during a decade that radically changed the terms and conditions of our 'always on' era. To paraphrase William Mitchell (1996), who quipped some decades ago, when appraising the scene ahead: *This is urban life—but not as we knew it.*

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