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Smart cities and urban data platforms: Designing interfaces for smart governance

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ABSTRACT

The proliferation of smart city policies worldwide in recent years has seen digital infrastructure, urban data and software design play increasingly central roles in the contemporary governance of the city. This article addresses the role of urban data platforms in supporting the delivery of smart city initiatives by city governments, with a view to establishing a typology for effective strategic investments in urban data interfaces aligned to governance objectives. Drawing on a range of different interfaces and approaches, the article discusses the proliferation of urban data platforms through a set of distinct functions and typologies. The discussion aims to position urban data platforms as key sites for the development of new governance models for smart cities, and forums in which decision-makers, researchers, urbanists and technologists seek to test the potentials and pitfalls of data-driven methodologies in addressing a range of contemporary urban challenges.

1. Introduction

Today's cities are the engines of the new data economy. The rise of new digital services such as on-demand transport, intelligent water management, responsive lighting, and distributed energy resources are rapidly replacing the legacy infrastructures and service delivery models that have served the cities of the twentieth century. As a consequence, the millions of interactions and transactions that take place in cities on any given day—from volumes of energy used, movements of people, traffic, water and waste, social media interactions, emails, financial and retail transactions and multi-modal transport flows—are now generating huge volumes of 'data exhaust'. Growing at an unprecedented rate, the data exhaust of our cities is of increasing value to governments and businesses as they seek to apply data-driven methodologies to improve the quality and efficiency of city services.

As Goldsmith and Crawford write in *The Responsive City* (2014: 3), our ability to collect, analyse and share information today has great potential to transform and even reinvigorate the governance of cities. Smart city investments are now accelerating across the globe, resulting in the proliferation of data-driven tools and platforms, designed to usher in more 'responsive' urban services capable of addressing myriad city challenges (Arup, Livable Cities, UCL, & Smart City Expo, 2014; EIU 2017). This wave of smart city investment has sparked growing skepticism across research and industry communities in the idealisation of the smart city as a vendor-oriented vision of ICT-led urban growth (Batty, 2016; Hollands, 2008; Kitchin, 2015; Luque-Ayala & Marvin, 2015; McNeill, 2015; Söderström, Paasche, & Klauser, 2014; Vanolo, 2014). However, these concerns are also accompanied by growing recognition that, whether or not cities are 'smart', the proliferation of data-driven platforms requires governments to 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, Lieske, & Jamal, 2017).

Indeed, it is the capacity for city governments to support and cultivate partnerships spanning public and private data custodians, citizens and software developers, that is now provoking a shift away from the concept of top-down, vendor-backed visions of smart cities (now often pilloried as 'smart cities 1.0'). In this context there is growing interest in more collaborative models of smart city governance ('smart cities 2.0') that emphasise a role for city governments in the curation and management of data assets to support a city's strategic priorities. This paper addresses emerging concepts in smart city era governance and the influence of these concepts in driving investment in new platforms or interfaces for city data. As Luque-Ayala and Marvin (2015): 8) have argued, it is important we understand how particular technologies and interfaces associated with smart city investments emerge and continue to act within wider operating conditions of the city, in helping to "more intensively unbundle and rebundle users, space, services and networks".

The paper focuses on the development of platforms or interfaces for urban data management, often called 'city dashboards' or 'datastores', as supportive services in the development of smart city governance models. It addresses a range of different urban data platforms

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developed by cities, and teases the different public and commercial agendas embedded within their design and development. Finally, it demonstrates how different platforms reveal different operational logics emerging within an environment of data-driven services and smart cities. These inform the design and development of urban data platforms and reflect the different approaches to urban data management in an era of smart cities.

1.1. From smart cities 1.0 to smart cities 2.0

The widespread uptake of smart city strategies around the world is provoking attention towards the governance challenges and opportunities of cities that are 'run on information'. According to 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" (Arup, 2010). Importantly, 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, but necessitate a "'reinvention of governance' that involves transforming the way they work internally and together with outside partners and citizens" (Arup et al., 2014: 32).

For Goldsmith and Crawford (2014), increasingly abundant sources of data, from government data released in open, machine-readable formats, data created and contributed by citizens, and data contributed by private data providers, can help governments move beyond what they call the 'compliance model' in dominating the management of city services at the local or municipal level, towards more active, problem-solving capabilities "that truly value the intelligence and dedication of its employees and the imagination and spirit of its citizens" (6). The authors advocate the adoption of collaborative, data-driven models of governance that "open up the machinery of government to its people, letting them collaborate to create solutions coproduced by public servants and their constituents" (6). Data, they argue, can "deliver government whenever and however citizens need it", replacing the bureaucratic and centralised structures that have frustrated citizens and officials alike for decades (9).

Interest in the governance implications of smart city investments has become increasingly prevalent in recent years. In part, this has occurred 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" (2016: para 16). It is the role of government and political leaders, he argues, 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, re-usable code has served as the basis for improved software products to rethink the role and design of public institutions (see Clark & Margetts, 2014; Davies & Bawa, 2012; Gurtsein 2011).

'Government as a Platform' models of digital era governance, sometimes known as 'Government 2.0′, encourage external users, whether citizens, software developers, or other businesses, to co-design government digital services. Governments, facilitating access to government data in open, machine-readable formats, can in turn encourage wider digital innovations that internal public service employees might never dream of (Barns, 2016).

This mode of digital era governance has gained traction in recent years, particularly across the UK, US and more recently Australia (see Accenture, 2016; Barns, 2016; O'Reilly, 2010; Singleton, 2015; Williamson, 2015). Accompanying the rise of 'Government as a Platform' models has been growing recognition in the value of 'public sector information' (PSI) as an important strategic asset to the wider data economy, along with customer databases and other big data sets (see Ubaldi, 2013).

As a model for public sector technology investment this approach is, likewise, 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.

'Government as a Platform' frameworks in recent years have been driven primarily by digital technology officers appointed within government. In the United Kingdom this has taken the form of the Government Digital Service, an agency tasked with 'leading the digital transformation within government' and is led by a Chief Data Officer. In the United Kingdom this approach has focused on the creation of a single or 'core' data infrastructure from which multiple software services can be built for citizens. This has removed the justification for separate IT procuring of software services by different agencies and ensured 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 enabling of new positions such as the 'Chief Data Officer' to lead cross-agency approaches to the use of data-driven services (see Barns, 2016, p. 559).

In the US, a newly-elected Obama Administration launched its *Open Government Directive* requiring all 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.[1] The OGPD outlines four key components of what is involved in "changing the culture of government", relating to accountability, technology and innovation, citizen participation and transparency (OGPD, 2011).

These wider transitions in digital era governance provide important historical context for the investments made by city governments in urban data platforms. Epitomising a shift away from vendor-focused 'smart city 1.0′ investments towards 'smart cities 2.0' (Barns, Cosgrave, Acuto, & Mcneill, 2017), many platforms incorporate elements of the 'Gov 2.0′ or open government movement. However, they also incorporate what Goldsmith and Crawford (2014) described as the traditional 'compliance model' of local government, in seeking to measure city performance against set targets and regulatory frameworks, using more fine-grained data assets. Rather than opening up space for co-development of data services with citizens and software developers, as

[1] In 2016 the OGPD had been endorsed by 70 participating countries.