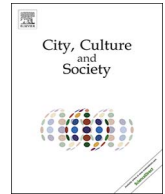




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## Introduction: Innovation and identity in next-generation smart cities

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## ABSTRACT

Cultural nuance, human behaviour and social identity require greater attention within the emerging smart city phenomenon. This special issue critically considers identity and urban culture as central to the smart city challenge. Current discourse on smart cities is obsessed with technological capability and development. Global rankings reduce cities to a one-dimensional business model and series of metrics. If the term 'smart city' is to have any enduring value, technology must be used to develop a city's unique cultural identity and quality of life for the future. The editorial reviews emerging research on the cultural dimensions of urban innovation and smart cities and places the six special issue papers within a theoretical context. Each paper critiques smart city theories in relation to the practical challenge of enhancing urban identity, quality and value at a range of scales and geographic contexts. Three main themes are used to frame the debate on smart cities and urban innovation: 1) local development histories, 2) face-to-face relationships and 3) local community scales. Each of these themes is lacking in current smart city approaches and requires innovative approaches to integrate into the smart city of tomorrow.

## 1. Introduction

The world is experiencing a 'smart city' boom. New radical technologies have been integrated in smart cities to create an explosion of data flows that are described in today's technical jargon as 'big data'. In some ways, the term is disingenuous, as these data flows are so immense they are changing the face of the global economy (Kenney & Zysman, 2016). The most valuable resource in the world is 'no longer oil, but data (The Economist, 2017)'. A new economy and networked business model have emerged to tap value from this growing asset. Cities are playing catch-up, learning how to negotiate big data and disruptive business models or platform capitalism by companies such as Alphabet (Google's parent company), Apple, Amazon, Uber, Airbnb and Microsoft. The data economy is a major driver of urban change. Smart cities are seeking to process and manage the real-time data flowing from new digital infrastructure and services. Today's citizens carry a complex package of sensors and devices in their pockets. This technology is networked within the smart city to form an informational footprint of startling complexity. Smart cities, by definition, refer to the data economy, stimulation from ICTs and improved urban management from software algorithms integrated within the urban fabric (Kitchin, 2014). As noted by Kitchin (2014), smart cities are 'increasingly driven by technically inspired innovation, creativity and entrepreneurship' (p. 131). However, a technocratic focus will not deliver the outcomes that

are necessary to create more liveable cities that innovate across all areas of society, from the environmental to social and economic areas.

First-generation smart cities have inspired research into digital technologies and their business potential. However, is this technology-and-business-based focus enough? Vanolo (2016) argues that urban innovation also rests in a city's social infrastructure and that current smart city approaches situate the citizen as a subaltern. Social and governance networks help cities manage the risks associated with innovation, unexpected events and contextual factors. A more balanced application of technology will help smart cities negotiate this uncertain future. Smart cities must therefore be imagined in terms of their cultural and social innovations as much as their technical and economic prowess.

The human experience within smart cities has been fundamentally altered. Much as the car and the train changed the outlook and cosmopolitan make-up of cities in the nineteenth and the twentieth centuries, so has today's digital landscape shifted our sense of space and human relations through social media, GPS augmented reality and platform urbanism. This new reality is as challenging and disorientating as it is empowering. This special issue considers different approaches to innovation in smart cities. The cultural nuances, human behaviours and distinctions within the emerging smart city phenomenon are given increased attention and are critically considered as central to the smart city challenge. The current discourse on smart cities is obsessed with

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rankings of technological capability. These global rankings reduce cities to a one-dimensional business model—as though they can be managed in the same way as platform capitalists Amazon or Google. If the term ‘smart city’ is to have any enduring value, technology must be used to develop a city’s unique cultural identity. The papers presented in this issue make a fundamental contribution to existing knowledge by developing theoretical and practical advances regarding the design, management and planning of cities and their urban culture. This initiates a creative dialogue around the issues and compiles an interdisciplinary commentary on the link between smart cities and urban innovation.

The six papers in this special issue address the following areas:

- Governance, urban data platforms and dashboards in diverse smart cities (Barns, 2017)
- Smart cities, the digital workplace and the future of work in relation to the existing urban form of the city (Vallicelli, 2017)
- Smart city policy and governance in emerging economies, with a focus on India (Praharaj, Han, & Hawken, 2017)
- Smart cities, specifically the identity of their data and informational ecosystem (i.e., integrated system and digital network)
- Digital tools and systems for planning and managing smart cities (Pettit et al., 2017)
- Creative and human-centric approaches to smart cities and their environments (Gardner & Hespanhol, 2017)
- Participatory urbanism and smart cities (Fredericks, Hespanhol, Parker, Zhou, & Tomitsch, 2017).

This wide range of topics provides a compelling overview of emerging research into the cultural dimensions of urban innovation and smart cities. Each paper critiques smart city theories in relation to the practical challenge of enhancing urban identity, quality and value at a range of scales and geographic contexts. The following sections discuss the topics within three main themes. Each theme is spatial and frames the debate on smart cities and urban innovation in terms of three key factors: 1) local development histories, 2) face-to-face relationships and 3) local community scales. Each of these themes is lacking in current smart city approaches and requires innovative approaches to integrate into the smart city of tomorrow.

## 2. In search of more imaginative approaches to smart cities

Currently, there are two major approaches to smart cities (as there is for all cities). Greenfield smart cities that are built from scratch, such as Songdo International Business District in South Korea, aspire to be a ‘super-platform’, integrating all segments of city services, governance and management within the technological infrastructure. The other approach involves the partial retrofit of older established cities, such as the Quantified Community in New York City, IJburg in Amsterdam and 22@Barcelona. Songdo or 22@Barcelona do not look or feel particularly futuristic and frequently reference traditional forms. In its recombinant urbanism, Songdo borrows boulevards from Paris, canals from Venice and Central Park from New York City (Picon, 2015, p. 112). 22@Barcelona is based on technologies and corporate building types grafted onto the city’s famous nineteenth-century grid. These distinctly different smart cities—one with hard-wired smart technologies and the other retrofitted—provoke important questions regarding evolution versus invention.

Cities consist of a combination of diverse spatial and material technologies from the humble sewer to the dizzying skyscraper. Rather than invent a new type of city, the extraordinary array of smart technologies available allow existing spaces to be reconfigured, experienced and imagined in new ways. The smart city presents an astounding array of possibilities. Innovation in next-generation smart cities is about recombination and the greatest breakthroughs will allow us to imagine more diverse possibilities and process this complexity. As Brynjolfsson

and McAfee (2014, p. 82) note, ‘the constraints on the economy’s growth then becomes its ability to go through all the potential re-combinations to find the truly valuable ones’. The first two papers in this special issue discuss what might be called ‘meta-technologies’ that involve analysing data and using smart tools to select the best ideas for today’s and tomorrow’s cities. As such, they are decision-making technologies that bring together human intelligence with a range of smart technologies and data flows.

These ‘meta-technologies’ are touched on by Barns (2017) in her paper on urban data platforms and dashboards in diverse smart cities. Barns explained that governments worldwide are playing a more active role in the management of their cities’ data assets to tap into the vast amounts of data generated every day by their citizens. The different approaches to synthesising and interpreting this data reveal as much about the culture of cities as it does about their informational footprint. The dashboard as a web tool for collating and interpreting data is a key site for the development of new governance models and highlights the ‘potentials and pitfalls of data-driven methodologies in addressing a range of contemporary urban challenges’ (Barns, 2017).

While Barns (2017) investigated the cultures of data analytics and management, Pettit et al. (2017) discussed the challenge of planning in the contemporary metropolis, grappling with both data flow synthesis and analytics and design futures. Technology in the smart city often creates uncertainty through disruption; however, it is also a means to shape consensus, interaction, engagement and transparency. Pettit et al. argued that planning support systems present opportunities for smart cities to tap into big data and apply data-driven approaches for envisioning and modelling future developments. The diverse planning support systems now available have not been utilised for several reasons—foremost among these is unawareness (Russo, Lanzilotti, Costabile, & Pettit, 2018). Training and education in engaging with smart technologies and their limitations and potential will help bridge the gap between availability and adoption. Planning support systems helps address two enduring challenges in building and imagining new cities and developments: coordination and collaboration. Such tools can assist with the difficult political task of developing controversial scenarios and testing ideas through processes of co-design that enhance consensus building and a sense of place.

## 3. Living laboratories and urban innovation ecosystems

Since their inception, cities have been brilliant ‘machines’ for social interaction and exchange. When cities are combined with digital technologies, our urban habitat becomes the most sophisticated technology for interaction ever created. The enduring relevance of face-to-face exchanges and collaboration has disproved early predictions for the dissolution and irrelevance of the city. Instead, urban governments are considering how they can use smart technologies to better promote innovation through enhancing the urban qualities and performance of neighbourhoods and precincts (Yigitcanlar & Bulu, 2016). For example, governments are implementing concepts, such as ‘Living Labs’, that focus on bringing together the innovation potential of citizens with business, scientists and researchers (Schaffers, Ratti, & Komninos, 2012, p. iii). Other concepts, such as innovation districts and innovation ecosystems, have emerged in an attempt to understand and capture the inherent advantages and capacity of well-known, highly productive urban neighbourhoods and districts (Hawken & Han, 2017; Katz & Wagner, 2014). While conversations about technology, connectivity and big data dominate the smart city movement, the most innovative smart cities go beyond this to ‘provide the conditions and resources’ for citizens to ‘shape urban change’ and ‘[realise] their ambitions’ (Schaffers et al., 2012, p. ii). In this way, ‘the smart city is an urban innovation ecosystem, a living laboratory acting as agent of change’ (Schaffers et al., 2012, p. ii). Smart city applications—such as social networking, smart mobility, the trust-based technologies of blockchain and smart contracts, open data based technologies and platforms, the

internet of things —can play a vital role in helping cities develop their own informational ecosystems.

In this special issue, Vallicelli (2017) examined the evolving workplace in three European smart cities in relation to digital culture. Using innovative Twitter data mining and visualisation technologies, Vallicelli mapped the different digital and workplace associations in Amsterdam, London and Paris, focusing on the association between digital culture and the traditional distribution of office space and workplace infrastructure. The research is helpful in developing approaches to innovation districts that rely more on knowledge-intensive business services locations than traditional office geographies. Further, it demonstrates how the challenge of applying big data to urban design and management is not a straightforward task and requires creativity and additional innovation.

#### 4. From global economies to local communities

Smart cities have been criticised as a generic concept that positions itself in generic space and time and promotes technology itself as generic (Greenfield, 2013). Built by multinationals using proprietary platforms, current smart city approaches are positioned within the neoliberal economy. This means that local economies and communities are valued as consumers, rather than their distinct identities and culture. For this reason, studies such as that of Praharaj et al. (2017) are particularly important, as they assert local needs in the context of complex local policy landscapes. In recent years, the world's largest emerging economies, such as Nigeria, China and India, have joined advanced technological nations like Korea in implementing smart city programs. Praharaj et al. asserted that India's '100 Smart Cities' plan was grafted onto a plethora of existing policies without addressing the need for innovative coordination and synthesis. The multi-level local policy critique emphasises the importance of coordinating policy across multiple tiers of government and various physical scales (White, 2016).

Even within established smart cities there are challenges in moving between global and local scales. Batty has suggested that there is a need to link policy with real-time data provision or in other words to 'map these new technologies to the organizational and political nexus that cities depend upon' (Batty, 2015 (p. 150)). Big data needs to be linked to future research that addresses this linkage because presently it is not collected with urban analysis in mind (Batty, 2016a, b, p. 321). Despite its ability to measure small time intervals spanning seconds to days, big data is unstructured in nature. Batty, 2016a, b observed the need for new forms of data visualisation and the development of more informed methodologies and structures for data mining. Theory must also inform data analysis procedures, otherwise patterns may be prematurely inferred. Big data needs to be investigated in more detail—its availability, efficient collection, structure, quality, openness and modes of visualisation—to enhance urban innovation. Further, the business bias within smart cities needs to be challenged. Smart cities need to address global issues that have severe local effects including mass urbanisation, global migration, climate change and fiscal austerity (White, 2016, p. 578).

At the local level, Wood and Dovey. (2015) has commented that the associated micro-spatialities and morphologies of creative clusters remain under-researched. Wood et al. contributes to this viewpoint and has focused on the relationship of creative clusters to urban morphology (specifically lot size, building age and height and interface type between public and private) in a small-scale area but did not examine the layering of real-time, fine-grain data. Fredericks et al. (2017) sought to investigate the division between digital mapping and data as opposed to real-world actions and events through interventions called 'pop-up urbanism'. This investigation covered two projects engaged with a range of participatory technologies such as urban screens, media facades, projections, interactive posters and distributed voting systems that were blended with manual or analogue activities and materials. This research demonstrates novel approaches for digital place making initiatives that provide new opportunities for inclusive city making

within local communities. This form of action-based research provides approaches to educate and connect with a broader demographic beyond the traditional digital citizen. The importance of moving between global and local scales is further emphasised by the final special issue article by Gardner and Hespanhol (2017), who investigated digital technologies in an educational context by examining innovative pedagogical approaches that integrated abstract global concepts, such as sustainability, at local scales. The ability for designers to work between digital global and local scales is of critical importance for designing smart cities that have local meaning and significance.

#### 5. Concluding remarks: informational identity as a source of local value

As massive new streams of data that describe movement and location patterns in city systems become available, there is an opportunity to better understand future trends that drive urban innovation (Van Leeuwen, 2015, p. 2). Closer attention to the 'informational footprints' of smart cities can assist in addressing the generic approaches embedded in current smart city practice. Designing smart cities around the distinctive informational ecosystems of real cities will help counter this global generic bias. Fostering the distinctive digital cultures that are increasingly evident in smart cities worldwide will allow cities to become more sustainable and resilient. This resilience is essential in tackling the complex global crises at both macro and micro scales. This type of urban innovation is crucial if smart cities are to move beyond the hype to deliver meaning, quality and community values. Future smart cities will rely on their distinctive informational ecosystems to address economic, social and environmental needs. As such, true success should be viewed in terms of the ability to create high-quality places for everyday life, rather than a single-dimensional race to reach the top of the smart city ranking ladder.

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