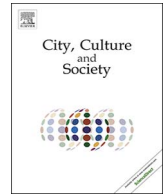


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SMLXL: Scaling the smart city, from metropolis to individual

Nicole Gardner^{a,*}, Luke Hespanhol^b^a Australian School of Architecture and Design, Faculty of Built Environment, University of New South Wales, Sydney, Australia^b Design Lab, Faculty of Architecture, Design and Planning, University of Sydney, Australia

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ABSTRACT

The 'smart city' is an oft-cited techno-urban imaginary promoted by businesses and governments alike. It thinks big, and is chiefly imagined in terms of large-scale information communications systems that hinge on the collection of real-time and so-called 'big data'. Less talked about are the human-scale implications and user-experience of the smart city. Much of the current academic scholarship on smart cities offers synoptic and technical perspectives, leaving the users of smart systems curiously unaccounted for. While they purport to empower citizens, smart cities initiatives are rarely focused at the citizen-scale, nor do they necessarily attend to the ways initiatives can be user-led or co-designed.

Drawing on the outcomes of a university studio, this article rethinks the smart city as a series of urban scales—metropolis, community, individual, and personal—and proposes an analytical model for classifying smart city initiatives in terms of engagement. Informed by the theory of proxemics, the model proposed analyses smart city initiatives in terms of the scope of their features and audience size; the actors accountable for their deployment and maintenance; their spatial reach; and the ability of design solutions to re-shape and adapt to different urban scenarios and precincts. We argue that the significance of this model lies in its potential to facilitate modes of thinking across and between scales in ways that can gauge the levels of involvement in the design of digitally mediated urban environments, and productively re-situate citizens as central to the design of smart city initiatives.

1. Background

The 'smart city' is an oft-cited techno-urban imaginary that has been promoted by businesses and governments alike, locally and internationally. Smartening up our cities, so the rhetoric goes, promises to deliver 'sustainable', 'efficient', 'secure', 'livable', and 'equitable' outcomes. The smart city joins a long history of techno-urban imaginaries, including—from an architecture and design perspective—the modernist visions of Le Corbusier's machine city and Archigram's Plug-In City and Computer City, to the more recent and largely corporate and technically-driven visions of electronic, digital, cyber, virtual, wired, sentient, and ubiquitous cities. Yet, what sets the smart city apart from its predecessors, is the significance placed on data over infrastructure and the ways to collect it, collate it, and significantly, how to translate it into 'useful' information. In this way, the smart city is often seen as synonymous with the concept of so-called 'big data' that typically refers to massive-scale data sets that can only be processed and analysed through the use of computational tools, and that offer new ways to understand and manage city-scale operations.

In addition to its common associations with big data, the smart city

is also understood as the application of 'intelligent' digital technologies and computational processes to form smart systems that operate to improve ways of living in twenty-first century cities. [Kitchin \(2015\)](#) has summarised the smart city narrative as following two key paths including, the application of information communication technologies (ICTs) to stimulate economic development, and, the embedding of software-enabled technologies into the urban fabric to augment urban management (p.131). Similarly, [Goodspeed \(2015\)](#) argues that there are two key, yet diverging perspectives, including on the one hand the knowledge economy and urban development, and on the other governments' use of technology. Above all, the smart city thinks big, and a key focus has been the implementation of large-scale ICT systems for data collection to enable real-time and predictive analytics. Given this, and not unsurprisingly, the bulk of smart city discourse is also focused at the big-picture scale; it is visionary, numbers focused, and gives emphasis to the ways big data can inform city-scale optimisation strategies, including infrastructure management such as road traffic, public transport, and waste services. Yet it is people's use of digital devices and the network connectivity they enact that now figures centrally to the amassing of big data, and also increasingly, to the very delivery of

* Corresponding author.

E-mail addresses: n.gardner@unsw.edu.au (N. Gardner), Luke.hespanhol@sydney.edu.au (L. Hespanhol).<http://dx.doi.org/10.1016/j.ccs.2017.06.006>Received 23 December 2016; Received in revised form 2 June 2017; Accepted 29 June 2017
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smart city services. Despite this, what the smart city rhetoric typically overlooks are the human-scale implications of its proposed technological systems, that is, its users and the user-experience.

The smart cities initiatives that are reported in the mainstream media and scholarly publications alike, are largely those that are government-led and enabled through corporate investment, and while they purport to empower citizens, they are rarely focused at the citizen-scale, nor do they necessarily attend to the ways smart initiatives can be ‘citizen-led’. Instead, smart city thinking is grounded in big numbers, such as key demographic trends including urbanization, the growing population in cities, and the ageing population (Rose, 2015). Furthermore, while the smart city rhetoric directs significant focus back to “cities as engines of growth” (Glasmeyer & Christopherson, 2015, p. 5) this often thinly veils a drive by many tech-companies to market their products as the best way to ‘fix’ urban problems and enable cities to compete in the twenty-first century global knowledge economy. While the ‘user’, ‘citizen’ or ‘publics’ are certainly not absent in smart city accounts, reference to these terms is typically made in the context of generalised notions of participation, and in ways that embody a kind of abstract and empty quality (Rose, 2015). This represents a significant oversight, Rose (2015) argues, as the “genealogy of the ‘user’” is in reality far more diverse. Along similar lines, Moritz (2016) notes that while big data offers new ways to see the world, “large and easily available data-sets may not show us the world we live in”.

A growing body of critical literature has responded to the smart city’s relentless focus on technicity, IT infrastructure and big data (Allwinkle & Cruickshank, 2011; Foth, 2016; Greenfield, 2006, 2013; Hollands, 2008; Kitchin, 2015; Luque-Ayala & Marvin, 2015; Moritz, 2016; Rose, 2015; de Lange & de Waal, 2013). Much of this discourse is framed in terms of ‘the right to the smart city’, and advances alternate models of smartness that are bottom-up or citizen-led (Foth, 2016; Foth, Forlano, Satchell, & Gibbs, 2011; Greenfield, 2013; Townsend, 2013; Vanolo, 2014). Such approaches lend emphasis to the small-scale or finer grain workings of the city and to ways of utilizing technologies to shift ‘control’ into the hands of citizens. While these approaches are valuable, they skip directly to the other end of the scale and by-pass alternate strategies that might lie somewhere in-between, and where designers, architects and third sector organisations might become more innovatively and productively engaged (Rose, 2015). The approach outlined herein draws into focus how large-scale smart city thinking can translate to the human or citizen scale through smart design initiatives that take into account local-scale specificities.

2. Scales of thinking smart city design

Undoubtedly, big or large-scale data sets in the magnitude of terabytes and petabytes can offer unprecedented and new ways to analyse places, people, and times, and significantly, their interrelationships. That big business and private enterprise are necessary to the technical and organisational complexities of collecting, managing, and transforming big data to address city-scale conditions cannot be underestimated. Aside from collecting data, private-sector organisations are often those that ‘clean’ data to make it more useful, and also anonymous. Yet, as Schwartz and Hochman (2014) note, these approaches rarely examine the “particularity of specific places within the city, favoring an aggregated image of the entire city or of confined regions within the city” (p.53). In this way, the smart city’s large-scale focus can mean the sociocultural aspects of specific places and times can remain unaccounted for.

With the issue of how the smart city can better account for locational specificities in mind, this article takes up a question of scale by considering an approach to designing between and across scales. The notion of scale carries numerous interpretations across disciplinary contexts, yet for our purposes, scale is understood here in terms of its analytical definition, and as that which describes a spatial and temporal range at which a given phenomenon (such as interaction), or a system,

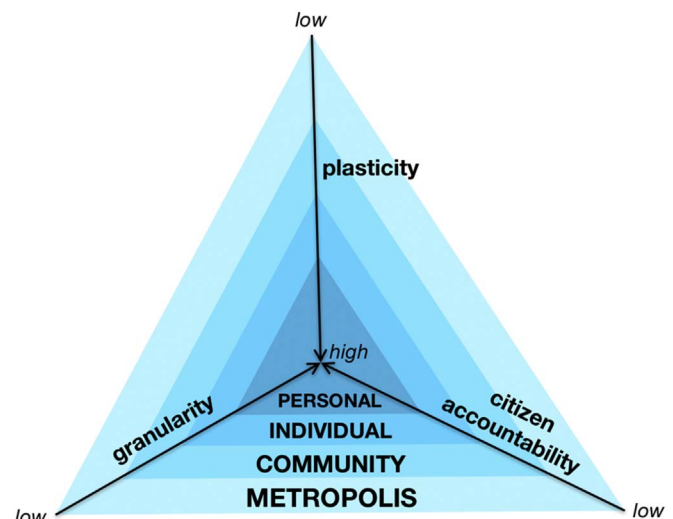


Fig. 1. Model for user-centered design of smart city initiatives.

operates and can be observed. Problematising scale provides a significant way to lever open the smart city debate, as ways of conceptualising scale fundamentally shape how social interaction and its attendant spatiality can be understood (Herod & Wright, 2002). From this perspective, and informed by the theory of proxemics (Hall, 1968), we define the levels of design analysis and intervention in terms of a series of urban scales [Fig. 1].

Translating the focus of smart city thinking from city-scale technocentric policy to local-scale interactions, events, actions, and situations, reflects broader shifts in urban theory, planning and design approaches. In the mid-twentieth century, urban theory, design, and planning focused on radical and massive-scale morphological change including zoning, infrastructure, and large-scale residential schemes with little concern directed towards the smaller-scale and the ‘local’. While attention to cities as centres of economic growth has more generally gained traction since the new millennium, more recently, the possibility to track, collect, and analyse a diverse range of networked data, has meant the functional and economic value of the city could be better understood in terms of how smaller spaces and local movements sustain it (Batty, 2012). As Batty (2008) points out, cities are complex systems that mainly grow from the bottom up, that is, from the level of the individual to that of the metropolis. Some of the internal processes driving the interactions between citizens, and namely those related to the use of space, follow well-defined scaling laws that work in similar ways regardless of the city size, since they reflect nothing more than the accumulation of discrete, individual interactions. In other words, while the city is always created at a citizen level, depending on the scale of analysis, urban interactions can reflect different levels of intensity, such as more intense at the level of the individual citizen, yet smoother at the level of the metropolis.

In the subsequent sections, cross-scalar smart thinking is discussed in the context of a university design studio. Following this we propose an alternate, human-centered model of smart city thinking that designers, architects and so-called third sector organisations can operate within to address the often less attended questions of what sort of urban life the smart city can offer, and for whom? This classifies smart urban initiatives with consideration of their level of citizen-engagement, to provide ways to address the genealogy of users at community and individual levels, but also with attention to various degrees of personalisation.

3. The design studio

Putting the user-experience at the centre of the smart city is a key approach advanced in the first year design studio “Ubiquitous Cities”

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