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'SMART CITY': A REGRESSIVE AGENDA?[1]

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Abstract: The history of the smart city may be a brief one, but it has already left an indelible mark on contemporary discourses on urban development and associated innovation practices. Only a couple of decades ago, the term 'smart city' was hardly used by scholars, let alone by policy makers and practitioners. Yet, within the last decade or so, the term has enjoyed a meteoric rise to the extent that in the academic literature it has now come close to replacing the concept of 'sustainable city' that has dominated urban planning and policy for so long; meanwhile, policy-makers appear to have embraced this new concept wholeheartedly based on its (as yet untested) promise to reinvigorate urban economic growth while improving liveability and environmental performance. The risk of such popular embrace is that the smart city becomes a catch-phrase bereft of much precise conceptual meaning and, thus, susceptible to diverse interpretations and superficial practice. However, a different critical reading of this emergent phenomenon suggests that the popularity of the 'smart city' is in no small part due to the successful amalgamation of two powerful conceptual discourses – namely, the prospect of harnessing digital urban innovations for the purpose of urban economic growth and governance reform. In order to investigate this more fully, this paper seeks to analyse the conceptual roots of the 'smart city'. This acknowledges that, while the focus on applying digital technological systems to urban infrastructure and governance processes arguably lends this concept unique novelty, the 'smart city' nevertheless builds on pre-existing concepts. And in at least two important ways, it is argued that the 'smart city' represents a somewhat regressive agenda: for one thing, it suggests a return to a more modernist, rational planning tradition centred upon digital technology as standardising process for decision-making; and for another, it indicates a relative retreat from the commitment to urban sustainability, given the dominant focus on economic growth through digital technological innovation.

Keywords: smart city, frequency analysis, rational planning, urban sustainability, standards.

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1. Introduction

Once in a while, a new concept emerges in urban planning which suggests a significant turn away from previous theorising about the city and a shift towards new practice. The 'garden city', originally proposed by Ebenezer Howard (1965 [1902]) at the dawn of the 20th century, represents such an epoch-defining concept, which offered a powerful response to the increasingly widely felt excesses of the modern industrial city and consequently profoundly inspired urban planning policy and practice across the globe. The 'techno-city' applied garden city principles to various new towns planned and built in the inter-war and post-war periods in conjunction with major technological projects, thereby seeking to reconcile modern technology with community-based healthy living (Kargon & Molella, 2008). On its part, the 'ecocity' (or 'sustainable city') emerged in the late 20th century as a major concept promoting radical thinking and new design practices based on an explicit environmental agenda (Register, 1987; Roseland, 1997; Joss, 2015). More recently, since the beginning of the second decade of the 21st century, yet another new concept appears to be in the process of redefining our understanding of the city, and the role of technology in relation to it – namely, the so-called 'smart city'.

This paper seeks to analyse the conceptual roots of the 'smart city'. This acknowledges that, while the focus on applying digital technological systems to urban infrastructure and governance processes arguably lends this concept unique novelty, the 'smart city' nevertheless builds on pre-existing concepts. And in at least two important ways, it is argued that the 'smart city' represents a somewhat regressive agenda: for one thing, it suggests a return to a more modernist, rational planning tradition centred upon digital technology as standardising process for decision-making; and for another, it indicates a relative retreat from the commitment to urban sustainability, given the dominant focus on economic growth through digital technological innovation.

The paper is based on two recent research projects: the first consists of a comprehensive review of published academic literature dealing with key concepts of urban planning and development, including 'smart cities' (de Jong *et al.,* 2015). This project not only enabled a longitudinal mapping of the 'smart city' – thus confirming the concept's rapid rise to prominence over the last two decades – but also the identification of a 'conceptual field' situating the 'smart city' in relation to neighbouring concepts of urban planning. Building upon the first, the second project is ongoing and entails the analysis of the UK's 'smart city' strategy, and in particular the publication in 2014 of the 'smart city' standard by the British Standards Institution (BSI), one of the first of its kind and the basis for the current development of an international 'smart city' standard by the International Standardisation Organisation (ISO). As an authoritative, codified text, the BSI standard provides key insight into the conceptualisation of the 'smart city'; furthermore, it invites critical reflections on the role of standards in urban planning traditions.

2. The 'smart city' and its conceptual roots

A comprehensive review of the academic literature reveals two key insights about the 'smart city' (de Jong *et al*., 2015): first, its rapid rise to prominence over the last decade or two, to the extent that it has become a – if not the – dominant concept in urban policy and planning; and second, its

evolution into a distinct category, with conceptual roots that differentiate it from other key categories, most notably the 'sustainable city'. The research was motivated by the evident proliferation in recent years of urban concepts – such as 'sustainable city', 'green cities', 'resilient cities', 'liveable cities' and not least 'smart cities' – and the related question of whether these are by and large interchangeable or, conversely, should be thought of as conceptually distinctive in their endeavour to contribute to improved urban development. The survey was based on the repository of academic articles in Scopus – a comprehensive global source including the publication records of journals since 1996 – and included an exhaustive bibliometric analysis of 1,430 scholarly articles (published between 1996 and 2013) featuring one or several of twelve dominant urban development categories ('digital city', 'eco city', 'green city', 'information city', 'intelligent city', 'knowledge city', 'liveable city', 'low carbon city', 'resilient city', 'smart city', 'sustainable city', 'ubiquitous city'). The bibliometric exercise included the analysis of the frequency of appearance (=occurrence) for each of the twelve categories, which apart from yielding the total number of retrieved articles per city category also enabled the tracking of frequency across time. As a further step, a co-occurrence analysis was carried out; this helps establish and visualise the mutual connections among the twelve categories within the overall dataset. Furthermore, the co-occurrence analysis establishes what key disciplinary concepts ('keywords') are associated with each of the city categories, thus producing a conceptual field of theoretical and empirical connotations.

Figure 1 depicts the evolution of twelve city categories over time, as represented by the frequency of Scopus articles. While overall the 'sustainable city' remains the most frequent city category (mentioned in 546 out of 1,430 articles), what is striking is that the 'smart city' has achieved second highest frequency (222 articles) within a relatively short period of time. In other words, while across the time period analysed, the 'sustainable city' is the most dominant category – reflecting its long history, broad scope and strong resonance in policy – the 'smart city' has exponentially increased since 2009, even eclipsing the 'sustainable city' by 2012. The 'digital city', which is conceptually closely associated with the 'smart city', is also shown to be its historical forerunner, having emerged from the early 2000s and overall reaching third position (166 articles).

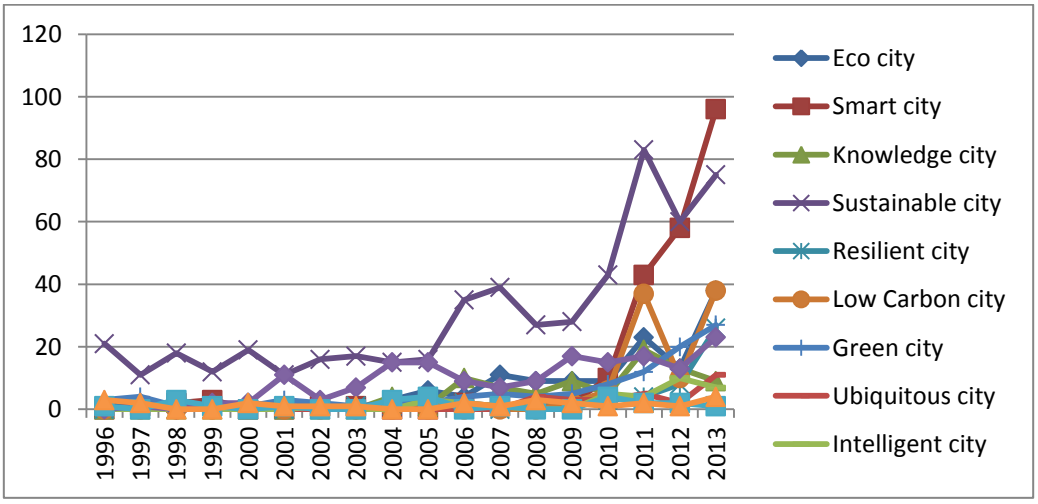

Figure 1: Evolution of twelve city categories over time (frequency in Scopus articles).

Source: de Jong et al. (2015)

Figure 2 shows the conceptual connections among the twelve city categories (based on the titles, abstracts and keywords in the surveyed articles). The greater the number of co-occurrences, the more central the position of a given category within the web of relationships. In addition, Figure 2 indicates the relative frequency of categories in terms of differing circle sizes (in red). Clearly, the 'sustainable city' turns out not only to be the most common category, but also quite centrally placed in the network, with connections to all but three sister categories. As such, it is something of an umbrella category in which much of the conceptual contents of the other city categories are contained. The 'smart city' has a similarly central position; however, it appears to be more distinctive and at the center of a sub-network of its own through its connection to the 'information city', 'intelligent city', 'ubiquitous city' and 'digital city'. The connection is strongest with 'intelligent city', followed by 'digital city' and 'ubiquitous city' (the latter is a term used for 'smart city' in Korean urban policy).

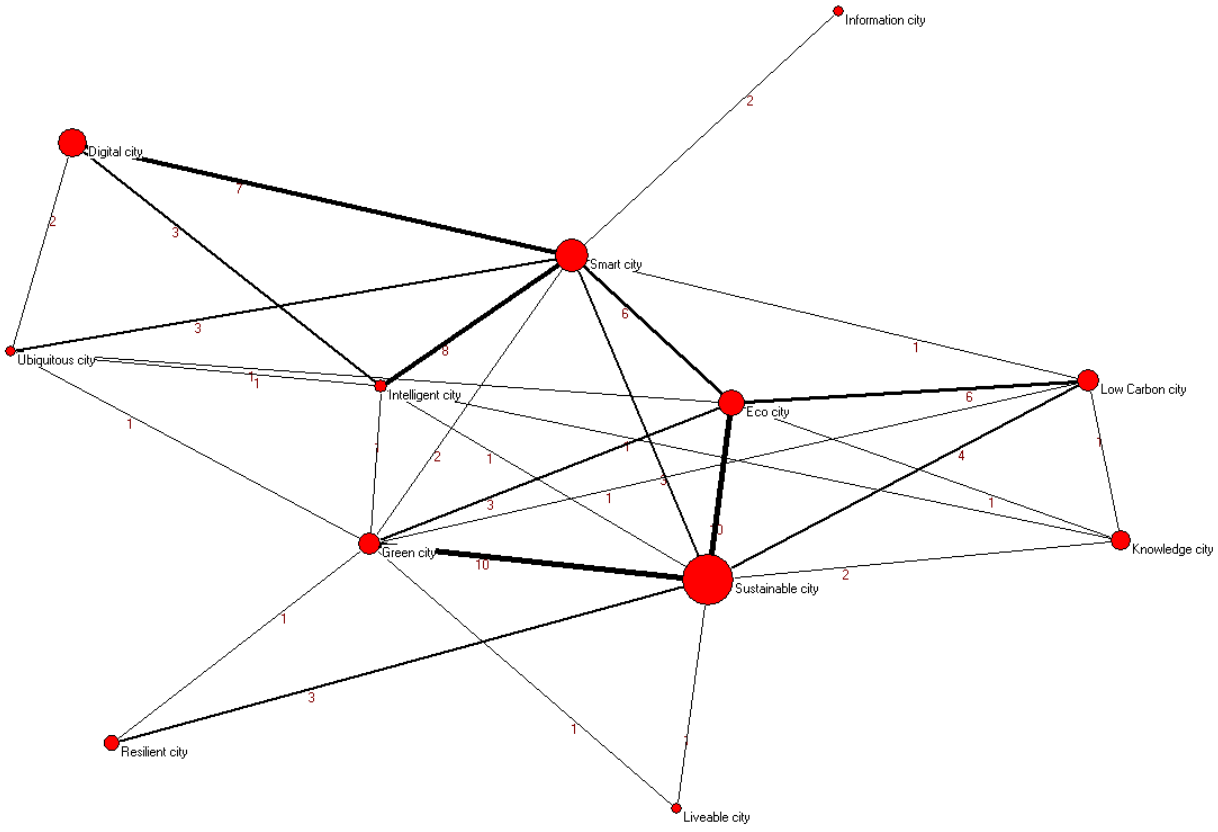

Figure 2: Co-occurrence of the twelve categories in titles, abstracts and key words.
Source: de Jong et al. (2015)

The 'smart city' cluster helps explain the evolution of the concept. As noted, its main progenitor is the 'digital city'; this was first piloted in 1994 in Amsterdam/NL (which presently is regarded as a leading 'smart city') and emerged as a concept in the academic literature in the early 2000s. As the term implies, its focus is on the application of digital technology to urban development. While some literature continues to treat the 'digital city' as a distinct category, in recent years it has coalesced

into the 'smart city'. Consequently, genealogically, the early stage 'smart city' was conceptualised as essentially one that provides combined services via the integration of the IT and construction industries (see e.g. Korea Land Corporation, 2005). However, soon thereafter proponents began to argue that the validity of any claim to 'smartness' ought to be centred upon something more than the use of information and communication technologies (ICT) alone (e.g. Hollands, 2008). This has resulted in a significant conceptual broadening. According to a recent comprehensive literature review (Caragliu *et al*, 2011), the 'smart city' now features the following six characteristics across the literature: (1) improving administrative and economic efficiency and enabling the development of culture and society by utilizing networked infrastructures; (2) an underlying emphasis on business oriented urban development; (3) a strong focus on the goal of realizing the social inclusion of different kinds of urban residents in public services; (4) emphasizing the significant role of high-tech and creative industries in long-term growth; (5) paying ample attention to the function of social and relational capital in city development; and (6) taking social and environmental sustainability as an important aspect of smart city development.

Taken together, these features underline the relative shift from an almost exclusive focus on digital technology (and its application to urban infrastructure) to a more central focus on urban governance reform aimed at consolidating knowledge-based urban development and public service efficiency. Digital technology remains central, but the attention has shifted to how this manages to facilitate urban entrepreneurial governance. Hence, the more recent literature is as much represented by a discussion about what enables 'smart governance' and 'smart living' – to be achieved through governmental and business reform – as by more narrowly defined technological design concepts (e.g. Giffinger & Gudrun, 2010; Lee *et al*, 2013). As such, the 'smart city' literature has begun to develop a closer kinship with the older 'knowledge city' concept. Both share a focus on information- and knowledge-intensive urban development (with reduced environmental impact), although the latter is associated more with the economics of innovation, and in particular the concept of 'knowledge-based urban development' (KBUD) (Arbonies & Moso, 2002; Yigitcanlar & Loennqvist, 2013).

3. Standardisation: a return to rational planning?

The shift towards a new mode of integrated governance to facilitate and enhance information- and knowledge-based urban development is also in evidence in the 'smart city' standard published in 2014 by the British Standards Institution (BSI, undated). This is one of the first endeavours to codify the city in the form of a standard issued by a national standards agency; and it has since been instrumental in driving the 'smart city' agenda in the UK, with several British cities now using the standard in their implementation of 'smart city' initiatives. Furthermore, the BSI standard acts as a template for current efforts to develop an international 'smart city' standard through the International Standardisation Organisation (ISO), expected in 2017. The economic impetus for the BSI 'smart city' standard is clearly underlined by the fact that it was commissioned – not, as one might expect, by the UK government's Department of Communities and Local Government (DCLG), which is in charge of urban planning – but by the Department for Business, Innovation and Science (BSI). This is the same department which spearheaded the national 'Future Cities Demonstrator' competition (2012-2015), resulting in the city of Glasgow (Scotland) being selected as national

'smart city' demonstrator project (with the cities of Bristol, Greater London, and Peterborough receiving funding as runners-up, out of a total of 29 shortlisted applicants).

The BSI 'smart city' standard consists of a suite of six documents, with two more under development (see Table 1, below): the first three overview documents provide an introduction to 'smart cities', a framework for 'smart city' planning, and an explanation of the role of standards; these are followed by the three standards proper, which contain, respectively, a vocabulary of key terms, a development and planning guide, and a concept model for data interoperability'. A discourse analysis of the texts reveals the dominant framing of the 'smart city' in terms of governance reform. This is justified in the standard corpus, on one hand, by the need to (re)focus urban development on economic innovation and growth; a narrative which has particular resonance in the UK under the current economic austerity agenda. On the other, the need for a new 'transformational' governance model is underlined by the assertion that traditional government (also described as 'traditional delivery channels') is no longer sufficient. Within this predominant framing, the call for (sustainable) resource efficiency is more muted and mainly made in terms of it being a necessary condition for achieving urban growth and prosperity.

Table 1: Suite of BSI smart city standards.

	Suite of standard documents	*Published*	*Reference*
1	The Role of Standards in Smart Cities	Aug 2014	BSI-RoS
2	Smart cities overview – Guide	Feb 2015	BSI-PD8100
3	Smart cities – Guide to the role of the planning and development process	Oct 2014	BSI-PD8101
4	Smart cities – Vocabulary	Feb 2014	BSI-PAS180
5	Smart city framework – Guide to establishing strategies for smart cities and communities	Feb 2014	BSI-PAS181
6	Smart city concept model – Guide to establishing a model for data interoperability	Oct 2014	BSI-PAS182
	(Not analysed)		
7	Smart cities – Data sharing framework	In preparation	BSI-PAS183
8	Smart city solutions – procurement and business case	In preparation	BSI-PAS184

BSI = British Standards Institution; PD = Published Document; PAS = Publicly Available Specification.

Digital technological innovation becomes the enabler of the new governance model at the centre of the 'smart city' concept. But rather than explicating a particular set of digital technologies and how these might relate to urban space and infrastructure, the standard documents instead focus on digital data as the outcome of socio-technical processes, with emphasis on how such data can be rendered 'interoperable' to achieve system integration across various urban governance spheres (infrastructure, services, economic activities, policy-making). The premise is that achieving digital data interoperability will allow for the proper integration of different systems, improve flows of information, and enhance engagement among stakeholders and citizens. The claim is even made

that this will not only improve the efficiency of municipal governance, but also increase the sense of democratic participation among the wider citizenry.

What is striking about the discursive rendering and conceptual framing of the 'smart city' across the standard documents is the seemingly positivist, rational approach to urban planning and governance. This works at two levels: first, the 'smart city' is rationalised in terms of linear, multi-step processes of decision-making, including the use of 'step-by-step' guidelines and 'decision trees'. This is most explicitly encapsulated in the 'smart city concept model' (SCCM), which makes up one of the three main standard documents. Consequently, while complexity is highlighted – cities are said to be complex systems, which conventional government can no longer adequately handle – it is at the same time *de facto* reduced to an abstracted, rational and linear process. Importantly, this rationalistic approach is reinforced, at a second level, by the standard itself: the very notion of standardizing the city appears to reach back into the modern planning tradition. Notably, the standard is not a mere explanatory text, but it is posited as a necessary, integral tool for realising the 'smart city'. It is in this dual sense that the 'smart city' reads like a return to urban modernity.

4. Whither urban sustainability?

There is a further turn to be observed in the conceptual evolution of the 'smart city'. As Figures 1 and 2 indicate, the 'smart city' has emerged against the background of the 'sustainable city' and 'eco city', which have dominated urban development policy and practice over the last half a century and which themselves had emerged from the earlier 'garden city' and 'techno city' traditions. It could, therefore, be assumed that the 'smart city' carries on the prevalent concern about effecting more sustainable urban development. And yet, as Figure 2 shows, the 'smart city' has begun to evolve into a distinct category of its own, forming a conceptual cluster apart from (and with a relative weak link to) the central 'sustainable city' node. Consequently, in the 'smart city' the attention has shifted away from environmental conceptions of the city to ones oriented towards infrastructure and information use. The terms 'eco', 'green', and 'sustainable' are added mainly to indicate the inclusion of green spaces and parks for recreation. This has led some authors to question the net contribution of the 'smart city' to environmental improvements (e.g. Gargiulo Morelli *et al*., 2013; Viitanen & Kingston, 2014; de Jong *et al*., 2015). This tendency is further confirmed in the analysis of the UK's 'smart city' standard, where again environmental and social sustainability are of secondary importance, in the main mentioned as a necessary condition – in the form of resource efficiencies – for effecting urban techno-economic innovation and growth.

5. Conclusions

The 'smart city' is a relatively new addition to the vocabulary of urban policy and planning, albeit one which has enjoyed an exponential rise, so much so that it may be in the process of unseating 'sustainable city' as the prevalent category. Being a recent phenomenon, and one that places the digital data revolution (itself a recent development) at its core, arguably renders it quite unprecedented. Certainly, its close lineage with the 'digital city' (and 'intelligent city' and 'information city') sets it apart from the 'sustainable city', its main sister category, thus creating a distinctive conceptual cluster of its own. And yet, as this paper has sought to show, in significant

ways the 'smart city' also conceptually reverts back to older traditions in urban planning. In particular, its strong embrace of an urban economic governance agenda puts it in conceptual proximity to the 'knowledge city' and its progenitors, such as urban innovation clusters, science parks and techno-industrial districts. What is more, the discursive framing deployed in the 'smart city' literature – and especially reflected in the development of 'smart city' standards – suggests a return to a more positivist, rational planning mode. This is not least surprising in that the 'smart city' purports to embrace complexity science, yet in practice subscribes to reductionist approaches to the governance of urban development processes. Furthermore, and arguably worrying for environmental and social analysts and activists, with its emphasis on economic feasibility and engineering systems solutions the 'smart city' risks losing the sustainability agenda. As it stands, whether the current mode of 'smart city' can adequately cater for social equity and environmental progress remains uncertain. In that sense, we may yet see the 'smart city' go back on the commitments of earlier concepts, including the 'eco-city', 'techno-city' and 'garden city'.

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