Reflections, Issue 9

SMART CITIES: FROM CONCEPT TO PRACTICE[1]

Professor Simon Joss
University of Westminster
josss@westminster.ac.uk

Abstract: The term 'smart city' has enjoyed a rapid rise in popularity since the late 2000s. This essay reviews the use of the term and its conceptual dimensions – describing how smart city initiatives attempt to reconcile economic, environmental and social objectives through interconnected governance and coordination, using information and communication technology and infrastructure. It then considers recent moves towards the standardisation of the 'smart' city by the British Standards Institution (BSI), including guidance on vocabulary, strategy and data interoperability. Finally, it summarises some of the key challenges lying ahead: the inclusion of citizens; the governance of data; and assessing whether 'smart' initiatives really do result in improved environmental performance and more enabling services.

Keywords: smart city, standardisation, standards, governance.

---

1. Smart cities: a growing policy trend

Since the late 2000s, the term smart city has appeared with increasing frequency in both policy and academic debate, to the extent that by now it may even have eclipsed earlier urban sustainability concepts, such as the sustainable city and eco-city.

As one recent study concludes, 'sustainability is no longer the main prism through which thinking about the future of cities takes place […] "smart cities" has become the most popular formulation for the future city, and is becoming a globally recognized term' (Moir et al. 2014).

---

[1] This essay was first published in the BSI (British Standards Institution) Newsletter, February 2015.

This trend is reflected in several national and international policy initiatives. For example, in the UK, the government's Foresight Future Cities and Future Cities Catapult programmes promote urban innovation chiefly through various smart city strategies, with Glasgow spearheading efforts to demonstrate 'how technology can make life in the city smarter, safer and more sustainable' through its Future City Glasgow initiative (Future City Glasgow n.d.)

At European level, the Smart Cities and Communities initiative was launched in 2011 with a view to forging partnerships between industry and cities 'to develop the urban systems and infrastructures of tomorrow' (European Commission n.d.). Further afield, smart city programmes of one kind or another have been launched by national agencies, most notably across Asia (e.g. China, India, South Korea). Major international technology companies, including Cisco, Hitachi and IBM, have become active both as contributors to conceptual development and partners in pilot projects.

Smart City Nansha project, Guangzhou, China
(Image credit: ISA Internationales Stadtbauatelier/Wikimedia Commons)

2. Conceptual dimensions

If the sustainable city concept is traditionally defined by the triple bottom line of environmental, economic, and social sustainable development, then the smart city can be defined by a triple bottom line of its own, interrelating information and communication technologies, urban infrastructure systems, and integrated governance processes. While the goal essentially remains the same, namely sustainable urban development, in the smart city this is mainly to be achieved

through the central use of information and communication technology for digitally linking up and coordinating various urban systems in an overarching information system.

Underlying this, conceptually, the smart city is closely aligned with the theory of ecological modernisation, which posits that environmental protection and regeneration should go hand in hand with economic growth by means of rendering economic development more resource efficient and, thus, circular.

Linked to this is a second conceptual dimension of complex adaptive system theory, which conceives that urban infrastructure is an inter-dependent, networked systems; these lend themselves to sophisticated analytical modelling and the application of integrated, systemic solutions. In turn, this puts the spotlight on technological innovation, and in particular the potential for using big data technology in tandem with social media technology with a view to optimizing urban infrastructure and related services.

The significance of smart technological innovation then lies less in individual applications and more in the potential to achieve integrative capacity through the systematic incorporation of multiple socio-technical components. Consequently, questions relating to governance come to the fore – namely, what structures and processes are needed to enable relevant innovation and achieve effective co-ordination? And, relatedly, who are the stakeholders to be involved in these processes?

Smart city innovation may well imply a move away from traditional forms of urban governance, with modern control rooms and urban service hubs increasingly taking centre stage, and technology and engineering firms exerting an increasingly influential, direct role.

3. Towards standardisation

To be applicable at different urban scales and replicable across diverse settings and as a relatively new concept, the smart city is in need of definitional clarification and development. The aspiration for smart city processes and solutions is to be scalable and transferable.

In response, efforts have been underway at both national and international levels to arrive at smart city standards. Broadly, standards intend to drive innovation. They do so by demarcating a particular field of development, defining related goals and targets, as well as providing accompanying technical specifications. This should benefit developers by providing them with incentives and goal-posts for engaging in innovative practice; at the same time, it should benefit policy-makers and planners by giving them a tool for steering and monitoring development.

In the UK, the Department for Business, Innovation and Skills (BIS) in 2013 launched a smart cities initiative to encourage innovation across British cities as well as to enable British business to take

advantage of what is estimated to be a global market of more than £200 billion by 2030 (DBIS 2013).

As part of this initiative, the British Standards Institution (BSI) was commissioned to develop a smart cities standards strategy. As a result, BSI published a suite of three complementary Publicly Available Specifications (PAS), thus making the UK the first country to issue smart city guidance in this field.[v] [v] British Standards Institution (undated).

The three smart city PASs, all published in 2014, are:

- PAS 180: Smart cities. Vocabulary. Defines concepts and terms for smart cities relating to various urban infrastructures, systems and services
- PAS 181: Smart city framework. Provides a guide to establishing strategies for smart cities and communities, including 'good practice' guidance for decision-makers in the public, private and voluntary sectors
- PAS 182: Smart city concept model. Provides a guide to establishing a model for data interoperability (the ability of systems to provide services to, and accept services from, other systems) for data generated, used, and monitored by a city across all sectors.

At international level, in 2014 the International Organisation for Standardisation (ISO) published a technical report – ISO/TR 37151 (ISO 2014) – on smart community infrastructures, with focus on the harmonisation of metrics and methodologies used for benchmarking smartness for infrastructures. This technical report serves as the basis for the development of an ISO technical specification (ISO/TS 3 7151), which is currently ongoing. The European Commission has launched a funding programme to accelerate 'the development of system standards for smart cities and communities solutions' (European Commission n.d.).

4. Emerging practice

Given widespread policy resonance and mounting interest among a plethora of public and private stakeholders, it is not surprising to see a fast growing number of practical smart city projects.

According to one analysis, in 2012 there were 143 smart city initiatives underway, with the majority based in Europe, followed by Asia (Lee and Hancock 2012). This figure is likely to have grown significantly since. At the same time, detailed information and in-depth analysis are currently hard to come by, as most projects are still in their infancy and the researchers have only recently begun to pay closer attention. As such, the practical feasibility of smart city strategies has yet to stand the test of time.

Among UK cities, Birmingham, Bristol, Glasgow, London and Manchester are currently among the most talked about smart city innovation centres (Birmingham Smart City Commission 2013; Connecting Bristol, n.d.; Future City Glasgow n.d.; GLA n.d.; Manchester Digital Development

Agency n.d.). In Bristol, for example, the city council and university recently teamed up to implement £75 million worth of city-wide fibre infrastructure, coupled with creating a living laboratory for developing and testing new products and services.

Manchester established a dedicated agency to develop an integrated digital strategy for the city and its surrounding region, of which several smart city projects have been launched with particular focus on enabling individuals and community groups to become involved.

The Future City Glasgow initiative similarly exemplifies mainstream smart city thinking, integrating big data management and social media application with a focus on urban sustainability performance, particularly relating to urban energy and travel.

In Europe, 6AIKA: Open and Smart Cities Strategy is a notable example: a joint initiative of six major cities in Finland (Helsinki, Espoo, Vantaa, Oulu, Tampere, and Turku), developed with support from the Finnish government and to be implemented in 2014–2020 (Connected Smart Cities Network, n.d.). One of its core objectives is to promote openness, accessibility and community. Hence, while technological systems are a main enabling tool, the smart city is more overtly defined in terms of open governance. A related, second key objective is to enhance co-operation between cities, by promoting the wider city-region as the main innovation hub. The smart city concept here gains added significance in that service interoperability is not only to be enhanced across services at individual city level, but crucially between the six cities in support of city-regional development.

India caught global attention when its government launched the 100 Smart Cities initiative in 2014 (allocating $1.2 billion in the 2014–15 budget alone). Notably, this is to include the construction of some 20–30 brand new cities, such as Dholera in Gujarat and a string of new smart eco-cities in the Delhi-Mumbai Industrial Corridor, as well as satellite towns around existing cities, alongside the upgrading of existing urban centres. Arguably the most advanced smart city projects to date can be found in South Korea, which has been at the forefront of promoting the smart city concept since the early 2000s and has since developed several new smart cities, including Sejong and Songdo.

Glasgow Future City 'the UK's first smart city'?
(Image credit: kilnburn/Wikimedia Commons)

5. Outlook

There is no doubt that smart city is currently one of the main buzzwords in urban policy and planning. There is a great deal of enthusiasm and optimism expressed about the prospect of addressing key urbanisation challenges, and in particular enabling economic development and urban growth while at the same time promoting regenerative sustainability. And yet, the jury is still largely out on just how well smart city initiatives respond to these challenges.

Apart from the ongoing need for achieving greater conceptual sharpness, the practical implementation of various smart city strategies in the coming years will need to demonstrate effective engagement with the following three issues if the smart city is to be more than a mere technocratic proposition for how to plan and govern cities.

First, frequent claims that citizens/residents/users are to be at the forefront of technology deserve critical attention; there is an evident tension here between the top-down technocratic governance stance at the heart of much of current smart city conceptualisation and the citizen-centric bottom-up approach routinely pledged by protagonists.

Second, the promise of data access and openness will need to be put to the test in practice. Questions about how data is defined, how it is generated and where it is processed and stored, and not least who monitors and owns it, all require careful thought and transparent answers, not least given the central involvement of private organisations.

And perhaps most critically, third, to answer the charge that smart cities are mainly a business opportunity benefiting large technology firms, in-depth analysis will need to assess outcomes to determine whether these initiatives in reality do lead to significantly improved urban sustainability and better, more enabling services for citizens.

_____

The paper should be referenced as follows:

Joss, S. (2015). 'Smart cities: from concept to practice', in Joss, S. (ed.), *International Eco-Cities Initiative Reflections Series,* Issue 9*.* University of Westminster. Online: https://www.westminster.ac.uk/eco-cities/reflections

References

Birmingham Smart City Commission (2013). Smart City Vision. Establishing Birmingham's roadmap to a Future City. Online source (accessed 15 January 2015): http://s3-eu-west-1.amazonaws.com/digitalbirmingham/resources/Birminghams-Smart-City-Commission-Vision-FINAL-VERSION.pdf

British Standards Institution (undated). Smart Cities. Online source (accessed January 2015): http://www.bsigroup.com/en-GB/smart-cities/

Connected Smart Cities Network (undated). 6AIKA. Open and Smart Cities Strategy. Online source (accessed 15 January 2015): http://connectedsmartcities.eu/6aika-open-and-smart-cities-strategy/

Connecting Bristol (undated). Online source (accessed January 2015): http://www.connectingbristol.org/

Department for Business, Innovation & Skills (2013). Smart Cities. Background Paper. Online source (accessed January 2015): https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/246019/bis-13-1209-smart-cities-background-paper-digital.pdf

European Commission. Smart Cities and Communities. Online source (accessed 5 January 2015): http://ec.europa.eu/eip/smartcities/about-partnership/what-is-it/index_en.htm

Future City Glasgow (undated). Online source (accessed 15 January 2015): http://futurecity.glasgow.gov.uk/

Future City Glasgow. Online source (accessed 5 January 2015): http://futurecity.glasgow.gov.uk/.

Greater London Authority (undated). Smart London Plan. Using the creative power of new technologies to serve London and improve Londoners' lives. Online source (accessed 15 January 2015): http://www.london.gov.uk/sites/default/files/smart_london_plan.pdf

International Organisation for Standardisation (2014). 'Smart Communities Infrastructures. Lessons Learned.' ISO Briefing Note. ISO TC 268/SC1 Online source (accessed January 2015): http://www.iso.org/iso/executive_summary_iso_37150.pdf

Lee, J-H. and Gong Hancock, M. (2012). Toward a framework for smart cities: A comparison of Seoul, San Francisco and Amsterdam. Seoul: Yonsei University. Online source (accessed 18 December 2014): http://iis-db.stanford.edu/evnts/7239/Jung_Hoon_Lee_final.pdf

Manchester Digital Development Agency (undated). Online source (accessed 15 January 2015): http://www.manchesterdda.com/smartcity/

Moir, E., Moonen, T. & Clark, G. 2014. 'What are future cities? Origins, meanings, uses.' Report compiled by the Business of Cities for the Foresight Future of Cities Project and the Future Cities Catapult. Online source (accessed 5 January 2015): https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/337549/14-820-what-are-future-cities.pdf