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# Getting smart about urban mobility – Aligning the paradigms of smart and sustainable

Glenn Lyons

Centre for Transport & Society, Faculty of Environment and Technology, University of the West of England, Frenchay Campus, Bristol BS16 1QY, United Kingdom

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## ABSTRACT

The digital age continues its advance, bringing with it remarkable technological possibilities. Such possibilities are founded upon an increasingly fine-grained electronic connectivity of people, places and objects allied to powerful data gathering and processing capabilities. Urban mobility of the future could be transformed, with developments such as: new forms of propulsion; new forms of vehicle control; changing business models of ownership and use; mobile technologies that equip and empower individuals; and opportunities to undertake activities without the need to travel. ‘Smart’ is the order of the day. Smart urban mobility conjures up a sense of new opportunity; of progress. However, what is really meant by smart? This paper examines this question, revealing a lack of consensus in terms of smart cities and a paucity of literature seeking to make sense of smart urban mobility. The paper considers how smart relates to sustainable, raising concerns about potentially dichotomous constituencies of commentators and discourses. Critical commentary associated with smart includes caution that large corporations are exerting significant influence in the era of smart in pursuit of goals that may not strongly align with those of urban planners concerned with social and environmental sustainability as well as economic prosperity. The paper puts forward and explores the following definition of smart urban mobility: “connectivity in towns and cities that is affordable, effective, attractive and sustainable”. This is intended to help draw the paradigms of smart and sustainable closer together towards a common framework for urban mobility development.

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## 1. Introduction

Society is facing an urban renaissance. A growing proportion of the world’s population is located in urban areas and this is projected to reach nearly 70% by 2050 (UN, 2012). This presents challenges in terms of a growing concentration of people and the associated flows of resource required to support economic prosperity and social wellbeing, as well as addressing the resultant waste. An important component of this ‘urban metabolism’ (Clift et al., 2015) is mobility – in particular the movement of people. This has major energy and emissions implications. Such mobility has also been a long-term challenge for urban authorities faced with limited capacity (and capacity to invest) and substantial demand, with upwards pressure from urban population growth. Making urban mobility sustainable has been a longstanding pursuit. Lam and Head (2012) summarise sustainable urban mobility as being about “the ease, convenience, affordability and accessibility of travelling to one’s destination with minimal impact on the environment and others”. They suggest that accessibility and convenience

E-mail address: [Glenn.Lyons@uwe.ac.uk](mailto:Glenn.Lyons@uwe.ac.uk)

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can be increased “with good urban design, behaviour change, advance technology, supportive policies, economic incentives, and city engagement and leadership” (Lam and Head, 2012: 359).

While congestion and crowding in a heavily used transport system are products of the motor age, the digital age has advanced rapidly in the past two decades bringing with it remarkable technological possibilities (Castells, 2010). Such possibilities are founded upon an increasingly fine-grained electronic connectivity of people, places and objects, allied to powerful data gathering and processing capabilities (Miorandi et al., 2012). Urban mobility of the future could be transformed, with developments such as: new forms of propulsion; new forms of vehicle control; changing business models of vehicle ownership and use; mobile technologies that equip and empower individuals; and opportunities to undertake activities without the need to travel.

Where once the lexicon of transport professionals and urban planners centred upon sustainable urban transport and sustainable cities, this has now shifted in attention, or expanded, with reference to smart cities and smart urban mobility – reflective of digital age possibilities. (One wonders what in future will follow ‘smart’.) While smart is the order of the day, it appears to be a contested notion that rather defies clarity of definition. This is surely a matter of concern given the extent of emphasis and resources being devoted to smart as a means of shaping urban futures. Accordingly, this article draws upon existing literature to critically examine what lies behind the terminology, and set out an interpretation of smart which ensures that it joins and strengthens (rather than detracts from) sustainable in relation to urban mobility.

The paper has four main parts. Section 2 offers critical consideration of the notion of ‘smart’ and similar terms in relation to cities/urbanism and more particularly in relation to mobility. Section 3 puts forward a suggested definition of smart urban mobility as a means to then articulate what are felt to be some of the important aspects of ensuring that urban mobility is appropriately developed. The definition has connectivity at its heart. Section 4 goes on to examine in more detail, aspects of connectivity – particularly those enabled through digital technologies – that contribute to the pursuit of making urban mobility smart. Section 5 concludes the paper by emphasising the importance of a sociotechnical perspective and an approach to urban mobility which brings the paradigms of sustainable and smart closer together.

## 2. Making sense of smart

We are now in the ‘era of smart’ – smart phones, smart watches, smart televisions, smart meters, smart refrigerators, smart cards and so on. Yet definitions of smart appear rather elusive. Wikipedia offers the following in terms of smart devices: “an electronic device, generally connected to other devices or networks via different wireless protocols such as Bluetooth, NFC, WiFi, 3G, etc., that can operate to some extent interactively and autonomously”. Brenner (2007) makes the distinction between ‘dumb’ and ‘smart’ technologies. “[A]n active, intelligent human being “uses” passive, “dumb” technology (a simple tool or mechanical device)” (Brenner, 2007: 4). She suggests we are moving from using dumb technologies (e.g. a road atlas or telephone) to *interacting* with smart technologies (e.g. personalised journey planning apps on smartphones) that “exist to help us, serve us, to make our lives easier and more interesting” (Brenner, 2007: 4).

Moving beyond notions of smart devices and applications, is the need to consider what is meant by smart when applied at a systems level – be that the urban mobility system or the wider urban system. The former is integral to the latter (POLIS, 2015).

### 2.1. Smart cities

Growing attention appears to be devoted to smart cities in the literature in terms of documenting efforts to define and interpret meaning and indeed motivation behind ‘smart’. Nevertheless, commentators point to a plethora of definitions that result in a common understanding of smart remaining elusive (Hollands, 2008; Caragliu et al., 2011; Albino et al., 2015; Goodspeed, 2015). Albino et al. (2015) document 23 different definitions of a smart city from sources dating from 2000 to 2014 and note that “[t]here are terms analogous to “smart cities” that add to the cacophony of terms relating to this phenomenon” (Albino et al., 2015: 8). Across such definitions they observe that interpretation now extends beyond being technology-centric to (also) recognising people and community needs. Across the collated definitions, sustainability is often but not always referred to. This follows from, and contrasts with, the genesis of the term in the 1990s when digital technology innovations were pointing to ways forward in the future of urban development (Caragliu et al., 2011; Albino et al., 2015) (see also Papa and Lauwers (2015)).

Nevertheless, several commentators observe the hype and utopian tendencies (characterised for instance as “inherently transformational and positive” (Luque-Ayala and Marvin, 2015: 2109)) in depictions of smart cities and their association with the vested interests of big technology corporates (such as Cisco, General Electric, Google, Hitachi, IBM, Philips, Siemens and Toshiba) in what is an evolving and lucrative new industry that could be said to be seducing urban authorities keen to place themselves on the global smart cities map (Hollands, 2008, 2015; Albino et al., 2015; Goodspeed, 2015; Luque-Ayala and Marvin, 2015). Luque-Ayala and Marvin (2015), while noting some exceptions, argue that “current understandings of SU [Smart Urbanism] lack a critical perspective compounded by an undue emphasis on technological solutions that disregard the social and political domains” (Luque-Ayala and Marvin, 2015: 2107). Hollands (2015) points to concern about smart cities being driven by corporate power and commercial interest at the expense of understanding the consequences for social and urban development “which is crucial to the liveability and sustainability of these cities” (Hollands, 2015: 68). This

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