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Will the real smart city please stand up?

Intelligent, progressive or entrepreneurial?

Robert G. Hollands

Debates about the future of urban development in many Western countries have been increasingly influenced by discussions of smart cities. Yet despite numerous examples of this 'urban labelling' phenomenon, we know surprisingly little about so-called smart cities, particularly in terms of what the label ideologically reveals as well as hides. Due to its lack of definitional precision, not to mention an underlying self-congratulatory tendency, the main thrust of this article is to provide a preliminary critical polemic against some of the more rhetorical aspects of smart cities. The primary focus is on the labelling process adopted by some designated smart cities, with a view to problematizing a range of elements that supposedly characterize this new urban form, as well as question some of the underlying assumptions/contradictions hidden within the concept. To aid this critique, the article explores to what extent labelled smart cities can be understood as a high-tech variation of the 'entrepreneurial city', as well as speculates on some general principles which would make them more progressive and inclusive.

Introduction

Debates about the future of urban development in many Western countries have been increasingly influenced by discussions of smart cities (American Urban Land Institute, 2007; Thorns, 2002; Coe *et al.*, 2000; New Zealand Smart Growth Network, 2000; Eger, 1997), and there have been numerous examples of cities designated as smart in recent years. In the USA, information and communication technologies (ICTs) are seen as major factors in shaping and ensuring the success of San Diego as a 'City of the Future', while in Canada, Industry Canada injected \$60 million into its nationwide 'Smart Communities' initiative, including Ottawa's 'Smart Capital' project involving

enhancing business, local government and community use of internet resources. In the UK, Southampton claims to be the country's first smart city by virtue of the development of its multi-application smartcard, while in south-east Asia, Singapore's IT2000 plan was designed to create an 'intelligent island', with information technology (IT) transforming work, life and play (Wei Choo, 1997). Numerous other examples abound from across the globe—from Bangalore, India's own Silicon Valley (Graham, 2002), Brisbane, Australia's 'sustainable' brand of smart urbanism, to a whole host of cities pursuing culturally-based initiatives emphasizing the arts (Eger, 2003a), digital media, and culturally creative industries more generally (Florida, 2005). These handful of examples are far

from atypical. The 1997 World Forum on Smart Cities suggested that around 50,000 cities and towns around the world would develop smart initiatives over the next decade.

While it is obvious that IT and creative industries can and indeed have transformed many urban areas economically, socially and spatially (see Graham and Marvin, 2001; 1996; Florida, 2002), it might equally be argued that the characterization of these changes through the use of the term smart cities can create certain assumptions about this transformation, as well as play down some of the underlying urban issues and problems inherent in the labelling process itself (Begg, 2002). Part of the problem concerns the manner in which and variety of ways the term 'smart' is employed. For example, while the adjective smart clearly implies some kind of positive urban-based technological innovation and change via ICTs, analogous to the wired (Dutton, 1987), digital (Ishido, 2002), telecommunications (Graham and Marvin, 1996), informational (Castells, 1996) or intelligent city (Komninos, 2002), it has also been utilized (not unproblematically) in relation to 'e-governance' (Eurocities, 2007; Van der Meer and Van Wilden, 2003), communities and social learning (Coe *et al.*, 2000), and in addressing issues of urban growth and social and environmental sustainability (Smart Growth Network, 2007; Polese and Stren, 2000; Satterthwaite, 1999). Further terminological confusion arises around the link between IT, knowledge, and the culturally creative industries (arts, media, culture), in discussions about the knowledge economy (Carrillo, 2006; Wolfe and Holbrook, 2002), and debates about creative cities¹ (see Eger, 2003a; Florida, 2002; Hall, 2000; Landry, 2000). Finally, it might be argued that the problematic mapping of the smart label onto a series of other seemingly progressive debates and concepts concerning the technological and creative city, creates not only definitional problems, it also hints at some of the more normative and ideological

dimensions of the concept/label. Not surprisingly, there are few analyses of smart city discourse from the point of view of more critical urban perspectives, such as ideas surrounding the 'entrepreneurial city' (Harvey, 1989), the growing domination of neo-liberal urban activities and spaces (Peck and Tickell, 2002), not to mention the existing literature on urban place marketing (Begg, 2002; Short *et al.*, 2000).

Due to its definitional impreciseness, numerous unspoken assumptions and a rather self-congratulatory tendency (what city does not want to be smart or intelligent?), the main aim of this article is to provide a preliminary *critical polemic* against some of the more rhetorical aspects of cities labelled as smart.² In performing this task, there are a number of important qualifications and caveats to make. First, the purpose of this paper is not to provide a clearer and more empirically verifiable definition of what a smart city actually is, but rather to explore how some of its underlying assumptions can result in a rather normative and celebratory evaluation of the label. Second, whilst alluding to some of the wider commentary and critique surrounding IT, cities and spatiality (see Graham and Marvin, 2001; Webster, 2002; Castells, 1996 for instance), rather than directly review or assess this wider literature, the paper specifically focuses its critique on cities which have been 'designated/labelled' as smart. As such, its purpose is not to empirically define or prove that smart cities do or do not exist, nor is it to assess to what degree such cities are successful or not at being smart. Such a task would require a measurable comparative³ and/or case study method. Rather, the focus here is on the 'labelling process' itself adopted by a range of smart cities, with a view to problematizing aspects of this so-called 'new' urban form, as well as question some of the underlying assumptions/contradictions hidden within this process. To aid this critique, the article also explores to what extent such labelled smart cities can

be seen as a 'high-tech' variation of urban entrepreneurialism (see Jessop, 1997), introduces a social justice element into the debate (Harvey, 2000), and hints at some general principles which might characterize a more progressive and inclusive smart city (Chatterton, 2000).

The first two sections of the paper critically interrogate some definitions and elements of smart cities by briefly exploring their roots in wider debates, as well as teasing out some constituent elements through reference to numerous examples of cities which publicly market themselves as smart. A third section further develops a polemical critique of these self-promotional examples by stressing their underlying pro-business and neo-liberal bias, including questioning their various assumptions about transformations in urban governance and rhetoric of community participation, as well as raising hidden questions about social justice and sustainability. The main argument advanced is that smart urban labelling plays down some of the negative effects the development of new technological and networked infrastructures are having on cities (see Graham and Marvin, 2001), whilst over-looking alternative critical analyses of urban development associated with the entrepreneurial city (Harvey, 2000) and the growing domination of neo-liberal urban space (Peck and Tickell, 2002).

Smart cities: difficulties of definition

In today's modern urban context, we appear to be constantly bombarded with a wide range of new city discourses like smart, intelligent, innovative, wired, digital, creative, and cultural, which often link together technological informational transformations with economic, political and socio-cultural change. One of the difficulties is separating out the terms themselves, which often appear to borrow on one another's assumptions, or in some cases, get conflated together. A second problem with such urban labelling is separating out the hype and use of such terms

for place marketing purposes (Begg, 2002; Harvey, 2000; Short *et al.*, 2000) as opposed to referring to actual infrastructural change or evidence of workable and effective IT policies. In essence, the disjuncture between image and reality here may be the real difference between a city actually being intelligent, and it simply lauding a smart label. A third problem with many of these terms is that they often imply, by their very nature, a positive and rather uncritical stance towards urban development. Which city, by definition, does not want to be smart, creative and cultural?

Many of these points appear to apply to the smart city discourse. For example, Komninos (2002, p. 1) in his attempt to delineate the intelligent city, (perhaps the concept most closely related to the smart city), cites four possible meanings. The first, concerns the application of a wide range of electronic and digital applications to communities and cities, which effectively work to conflate the term with ideas about the cyber, digital, wired, informational or knowledge-based city. A second meaning is the use of information technology to transform life and work within a region in significant and fundamental ways (somewhat akin to the smart communities idea in the literature—i.e. see Roy, 2001; Coe *et al.*, 2000). A third meaning of intelligent or smart is as embedded information and communication technologies in the city, and a fourth as spatial territories that bring ICTs and people together to enhance innovation, learning, knowledge and problem solving (the latter being related somewhat to the smart growth agenda—see below). Overall then, Komninos (2006, p. 1) sees intelligent (smart) cities as '...territories with high capacity for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their digital infrastructure for communication and knowledge management'.

While this definition of intelligent (smart) cities initially appears to be a useful way of categorizing and indeed combining different

aspects of the term, it also hints at some of the problems cited earlier. First, there is a clear problem conflating smart cities with a range of terms like cyber, digital, wired, knowledge cities etc., when in fact these various ideas themselves have somewhat different meanings. For example, wired cities (Dutton, 1987) refer literally to the laying down of cable and connectivity (not in itself necessarily smart), digital cities often infer virtual reconstructions of cities (i.e. like the virtual Digital City of Amsterdam, also see Ishido, 2002 on 'digital Kyoto'), and knowledge-based cities frequently focus on the relation of universities and academic knowledge and their links to the business world (Slaughter and Rhoades, 2004; Deem, 2001), relations which don't *only* depend on ICT infrastructure (although they often do, see Carillo, 2006). The use of the terms innovation and creativity in the above definition also hints at the relationship between IT, knowledge and media/cultural industries, problematically invoking at least some of the discourses of the creative city (see Peck, 2005). Second, while all of these terms imply that IT has a significant impact on cities, which it clearly does, they also emphasise quite different aspects of this relationship. For example, some aspects may be more technologically driven (i.e. cables and wires) and determinist (i.e. embedded systems of technology), others refer to types of information and human networks (i.e. academic knowledge, business innovation, etc), while still others emphasise more human capital approaches to do with skills, education, competencies and creativity.

Similarly the 'smart growth' agenda⁴ has been described as a rather wide-ranging approach which can be typified as those urban regions seeking to utilize innovative ITC's, architectural planning and design, creative and cultural industries, and concepts of social and environmental sustainability, in order to address various economic, spatial, social and ecological problems facing many cities today (see Thorns, 2002). Different aspects of this agenda have focused in on

innovative forms of 'e' or 'virtual' governance and citizen participation (Eurocities, 2007; Van der Meer and Van Wilden, 2003; Eger 2003b), smart communities and social learning approaches (Paquet, 2001; Roy, 2001; Coe *et al.*, 2000), and social and environmental sustainability in urban regions (Polese and Stren, 2000; Inoguchi *et al.*, 1999; Satterthwaite, 1999). Yet, even within more progressive sounding models of smart communities and smart growth there are inherent hidden assumption and ideological contradictions. For instance, the notion of IT transforming life and work within a region, found within the smart communities literature (Coe *et al.*, 2000; as well as in Komminos, 2002, second definition of intelligent cities above), not only begs the question 'how, and in what way is it being transformed?', but it also automatically assumes that there is some kind of community 'consensus' and involvement in the transition, and that such a change is inherently positive. Similarly, what if some smart initiative which started out as publicly funded and with social inclusion as a goal, become overtaken by private sector concerns whose goal becomes purely profit-making? What happens to 'balance' with the smart growth agenda, for instance, when community interests are superseded by developer's interests, or the requirements of capital accumulation do not easily square with environmental and social sustainability?

In attempting to pin down what is smart about the smart city, one finds that not only does it involve quite a diverse range of things—information technology, business innovation, governance, communities and sustainability—it can also be suggested that the label itself often makes certain assumptions about the relationship between these things (i.e. regarding consensus and balance discussed earlier for instance). The point here is not to try and offer a better definition, or argue that all smart cities are essentially the same. Nor is it to prove or disprove how smart they are according to some empirical criteria. Instead, the emphasis of the next section is to critically focus on numerous

examples of places using the label smart (designated or self-designated), in order to practically untangle some of the elements involved in making them up, and critically explore what the relationship between these elements is, or what they are assumed to be.⁵ This polemical exercise and analysis is deemed necessary to counter some of the taken for granted and self-congratulatory rhetoric of the smart-label bandwagon.

'Unwrapping' the smart city label

One of the key elements which stands out in the smart (intelligent) city literature is the utilization of networked infrastructures to improve economic and political efficiency and enable social, cultural and urban development (Komninos, 2006; Eger, 1997). While this involves the use of a wide range of infrastructures including transport, business services, housing and a range of public and private services (including leisure and lifestyle services), it is ICTs in particular that undergird all of these networks and which lie at the core of the smart city idea (see Graham and Marvin, 2001; Komninos, 2002). As Graham (2002, p. 34) argues, ICTs—including mobile and land line phones, satellite TVs, computer networks, electronic commerce and internet services—are one of the main economic driving forces in cities and urban regions, producing numerous social and spatial effects. Smart cities, by definition, appear to be 'wired cities', although this cannot be the sole defining criterion as it will later be argued. The Canadian city of Ottawa with 65 per cent of the population connected to the internet (not to mention its clustering of numerous software firms) is one example, while Blacksburg, USA, a university town of 38,000 which has a 100 per cent hook-up rate is another case in point. Andrew Michael Cohill, of Virginia Tech University and director of the Blacksburg Electronic Village project has argued telecommunications '...is the highway system of the twenty-first century' (cited in Evans, 2002), and many towns and cities across North America,

Europe, and in the developing world, are increasingly wedded to the idea that they have to be connected in order to be competitive in the new global economy (Graham and Marvin, 2001).

While there are numerous well-known examples of cities and regions developing through this route, including Singapore (Wei Choo, 1997), Silicon Valley and more recently San Francisco's 'Multimedia Gulch' in the US, and Bangalore (Asia's own Silicon Valley) (see Graham, 2002), the interesting thing is the degree to which many 'ordinary' cities have taken up the mantra that information technology equals urban regeneration. For example, Newcastle Upon Tyne's economic strategy reflected in the document, *Competitive Newcastle* (whose by-line is 'a dynamic entrepreneurial city at the heart of a knowledge based regional economy') has prioritized digital technology and the creative industries as one of its eight main business clusters. The idea of becoming an 'E-City' is also mentioned on the city council website, involving investing in broadband infrastructure, smart cards, e-commerce and portal based electronic service delivery, as is a joint £10 million partnership project between Newcastle City Council and Digitalbrain Plc to turn Newcastle into Europe's first 'Digital City' (Newcastle City Council, 2006). Another interesting North American example here is Halifax, on Canada's traditionally deprived East coast. In a speech titled *Smart Growth for a Smart City: A New Economic Vision for Halifax*, Brian Crowley the President of the Atlantic Institute for Market Studies states that location is no longer the key to economic success because '...the three most important things now affecting the future prosperity and development of human communities are technology, technology, and technology' (quoted in Siemiatycki, 2002). A final example here is San Diego. Because of its highly-educated workforce and mix of high-tech industry and recreational assets, a marketing consortium of high-tech industries has dubbed San Diego 'Technology's Perfect Climate' (City of San Diego, 2007).

A second element characterizing many self-designated smart cities is their underlying emphasis on business-led urban development. There is a general world-wide recognition (and indeed acceptance) of the domination of neo-liberal urban spaces (Brenner and Theodore, 2002), a subtle shift in urban governance in most western cities from managerial to entrepreneurial forms (Quilley, 2000; Harvey, 1989), and cities being shaped increasingly by big-business and/or corporations (Gottdiener, 2001; Klein, 2000; Monbiot, 2000). This is no less true for self-designated smart cities. As the Edmonton, Canada, Smart City webpage (City of Edmonton, 2006) states, a smart city is characterized by 'a vibrant economy where businesses want to locate and expand'. It is interesting to note that six out of the ten features mentioned on their web pages mention or imply 'business-led' or 'business-friendly' criteria. And under the category of smart business and industry, the Edmonton webpage focuses perhaps predictably on technology sectors, including things like information technology and bio-tech industries, as well as highlighting the advantages of having clusters of high-tech companies together and possessing an advanced telecommunications infrastructure. Another example comes from the economic development section of the city of San Diego's website, whose logo is 'San Diego—The Perfect Climate for Business' (City of San Diego, 2007). Even the progressive sounding smart-growth.org web-site admits: '...Only private capital markets can supply the large amounts of money needed to meet the growing demand for smart growth developments' (Smart Growth Network, 2007). Often this element is couched in terms of talking about business as a whole, including small- and medium-sized enterprises (SMEs) and through the language of businesses 'co-operation' and 'consultation' with local government ('public-private partnerships') and communities, rather than representing this relationship as one of potentially conflicting interests and contradictions (Harvey, 2000).

There is also a developing link between business-driven urban development, technology, and the changing role and function of urban governance (Harvey, 1989) in the smart city. While the UK city of Southampton's SmartCities project (part financed by the European Commission) focuses around a smartcard system of accessing local government services such as libraries and leisure services (Southampton City Council, 2006), and hence makes reference to issues of social inclusion, it also intends to create 'a unified interface between city, authorities, commercial organizations and citizens'. Furthermore, the contention that the '...integration of commercial applications, such as loyalty card schemes, will further develop commercial relations between citizens and private organizations' (Kirkland, nd) hints at a rather different type of market-led smart agenda. In Edmonton, high-tech business-led growth and development are seen to require local government support in terms of providing a 'strong pro-business environment', and 'reasonable taxes and low cost to live and to do business' (City of Edmonton, 2006) as well as a providing a highly skilled and educated workforce, and creating partnerships between education, business and government. San Diego ('Technology's Perfect Climate') boasts one of the most competitive sales tax rates in California (7.75 per cent) and its business tax rate is lower than any of the 20 largest US cities (City of San Diego, 2007). All examples here very much echo Harvey's (1989) discussion of the role of local government as civic boosters and aiding urban entrepreneurialism, through providing public-private partnerships and knowledge transfer through higher education institutions (Wolfe and Holbrook, 2002). It also ties in with the more peripheral literature on growth coalitions (Logan and Molotch, 1987); urban regimes (Stone, 1993; Elkin, 1987) and urban place marketing (Short *et al.*, 2000).

Of course there exist other models of e-governance that are more directed towards intra-city co-operation, while others lean

towards social learning, inclusion and community development. For example, with respect to e-governance, the European Digital Cities (EDC) programme which started in 1996, was designed to share information and good local government practice amongst European cities through common internet portal sites (Komninos, 2002). Eurocities now has working groups on e-citizenship and e-governance, and is clearly committed ‘...to ensuring that everyone can have access to ICTs and participate in the Knowledge Society’ (Eurocities, 2007). The latter emphasis on social learning/community development is best represented perhaps in the idea of smart community initiatives in Canada (Coe *et al.*, 2000). Komninos (2002, p. 188) describes smart communities as where business, government and residents use new technology to transform life and work in their region, while Roy (2001, p. 7) defines it as ‘...a holistic approach to helping entire communities go online to connect to local governments, schools, businesses, citizens and health and social services in order to create specific services to address local objectives and to help advance collective skills and capacities’. The key question such interesting initiatives raise is how to effectively balance the needs of the community, with both those of local government and the needs of business, particularly corporations (Monbiot, 2000).

While two of the main aspects of designated smart cities are the use of new technologies and a strong pro-business/entrepreneurial state ethos, a related concern is with particular high-tech and creative industries such as digital media, the arts and the cultural industries more generally (see Florida, 2005; Eger, 2003a; Hall, 2000; Scott, 2000). In Europe, the work of Landry and Bianchini (1995) has emphasised the issues for the creative city of the future will focus upon its ‘soft infrastructure’, including such things as knowledge networks, voluntary organizations, safe crime-free environments and a lively after dark entertainment economy. Similarly, in the USA, Richard Florida’s creativity schema is popularly

represented by the three ‘t’s’ of economic development—tolerance, technology and talent, and his concern with catering for the creative classes lifestyles and needs (Florida, 2002). Although Florida includes a technology measure here, and discusses various fractions of the creative classes working in IT, science, and the digital media, he broadens the notion of creativity to the cultural industries more generally. He also emphasizes the importance of other characteristics of the population including diversity, tolerance and even ‘bohemia’ (defined as the concentrations of writers, designers, musicians, and artists in a city—see Florida, 2002). In essence, the bulk of writers in the creative city discourse emphasise the social and human dimensions of the city (see Landry, 2000), as much, if not more than, the technological emphasis at the core of the smart city. There is also generally more of a focus here on how alternative cultures can help fuel urban growth (although see Peck, 2005 for a trenchant critique of Florida’s work here), rather than relying on new technology or corporate businesses (although some emphasise how the arts/culture environment can also contribute to the ‘new economy’ of cities, see Eger, 2003a, pp. 14–15).

This more ‘humanist’ emphasis ties in with other related discourses of smart communities, including the importance of social learning, education and social capital for developing the smart city (Eger, 2003b). For example, the City of Brisbane, has adopted a 10 year Smart City vision aimed at addressing and promoting the following: information access; lifelong learning; the digital divide; social inclusion and economic development (Siemiatycki, 2002). Coe *et al.* (2001, p. 13) also generally admit while the emphasis of smart cities is very much on economic growth, they ‘...are not possible outside of the development of smart communities—communities that have learned how to learn, adapt and innovate’. Similarly, the role of social capital, defined as the construction of social relations and networks of trust and reciprocity (see Carley *et al.*, 2001), is considered necessary in

order to engage all stakeholders to participate and engage with a smart city. Connection rates are only a limited measure of success. It is also recognized that technology has to be utilizable and understandable by the communities that it is supposed to serve (Evans, 2002), and that ordinary people and communities need to have the skills necessary to utilize ICTs.

Finally, present within some smart city agendas is a concern with both social and environmental sustainability. Social sustainability implies social cohesion and sense of belonging (Carley *et al.*, 2001), while environmental sustainability refers to the ecological and 'green' implications of urban growth and development (Gleeson and Low, 2000; Inoguchi *et al.*, 1999). With respect to the first type, it is recognized by some that the smart city has to be an inclusive not just technological city (Helgason, 2002). As Coe *et al.*, (2000, p. 21), argue, '...local community partnerships—not wires—are the fibres that bind' smart communities'. With respect to the second type of sustainability, it is equally recognized that while cities may be drivers of economic growth, they are also great consumers of resources and creators of environmental waste (Low *et al.*, 2000; Satterthwaite, 1999). For example, it is estimated that urban areas consume around 75 per cent of the world's resources (80 per cent of fossil fuels) and produce most of its waste (Baird, 1999). All told then, self-designated smart cities project different emphases and can mean different things to different people. However, it might also be suggested that not all the elements mentioned here have equal weighting in the labelling process. The next section provides a critique of the interplay between these various aspects by looking deeper into some of the self-designated smart cities already discussed.

Critiquing self-designated smart cities

In order to further assess the labelled smart city, it is important to step back and look more

critically at some of its main assumptions, and query the positive spin given to its main elements. For example, in unproblematically adopting some of the assumptions from the IT model of urban development (Eger, 1997), some smart cities might be critiqued as being technologically determined. In a word, undue influence can be attributed solely to urban technological advancements in explaining what happens in cities and how they are currently being shaped. While there is no denying the impact of ICTs on the urban form (Graham and Marvin, 1996), and of course this process may be viewed critically (i.e. see Graham and Marvin, 2001; Webster, 2002), there can be a more conservative application here that implies that somehow information technology itself will deliver the smart city a priori—a kind of technological 'Field of Dreams' scenario (see Eger, 1997; Dutton, 1987 for instance).

However, some recognize that smart cities have to be more than just broadband networks. As Chris Wilson of the University of Ottawa Centre on Governance has argued 'Being connected is no guarantee of being smart' (quoted in Evans, 2002). Similarly, Paquet (2001) suggests that although technology is an enabler, it is not necessarily the most critical factor in defining the smart city. One of the best examples of the mismatch between developing technologies and low take up comes from Graham's (2002) discussion of the South American city of Lima. Despite increasing rates of telecommunication diffusion, in 1990 less than half of all households in the city had a phone and only seven per cent had access to the internet, with the poorest 50 times less likely to have the internet (Graham, 2002, p. 43). In other words, having the technology does not always lead to its take-up, nor are take-up rates always equitable. Technological determinism with respect to ICTs, through advertising and magazine articles, suggest, argues Graham (2002, p. 35), some 'value-free technological panacea offering instant, limitless access to some entirely separate and disembodied on-line world'. A less charitable analysis might suggest that it

offers up yet another urban form dominated not by industrial capital this time but by technological and knowledge capital. The main idea here is that the technological smart city becomes a smokescreen for ushering in the business-dominated informational city.

For example, while local governments from around the globe all stress they are concerned with how residents and communities utilize the new technologies, their 'bottom line' economic imperative appears to be to attract capital, particularly knowledge and informational capital to their city. For example, despite the fact that much of Ottawa's economy is derived from government sources, even it acknowledges that '...individual companies drive a city's prosperity' (City of Ottawa, 2006). In San Diego's General Plan for the city they state: 'Economic prosperity is a key component of quality of life. The structure of the City of San Diego's economy influences the City's physical development and determines the City's capacity to fund essential services' (City of San Diego, 2007). And yet, while much of rhetoric about business and capital in the smart city is linked to small scale IT companies and providing local employment opportunities, the fact of the matter is that huge chunks of this industry are controlled and dominated by multi-national firms which are highly mobile (Shiller, 1999).

The history of Singapore's IT revolution is a good example of the ideological shifts smart cities can undergo. It has been suggested that such a revolution unfolded in three phases (Wei Choo, 1997). First, a public sector funded IT initiative from 1981–85 to computerize government ministries, improve public services and produce a good stock of computer experts. Second, a shift from the public to private sector through the National Technology Plan (1985–90) designed to '...develop a strong export-oriented IT industry and to improve business productivity through IT' (Wei Choo, 1997, p. 48). And finally a third phase begun in 1991 entitled the IT2000 masterplan in which the city/state was to be transformed into an 'intelligent island',

where IT permeates every aspect of the society—home, work, and play. The stated goals of the masterplan are to enhance national competitiveness and to improve the quality of life of citizens (Wei Choo, 1997, p. 49). What is interesting about this example is first the financial shift from the public to the private sector and second, a more ideological shift towards merging business competitiveness with social well-being.

The 'ideological turn' expressed here, has an effect on the development of the urban form, as cities can be seen increasingly to serve global mobile IT businesses as opposed to looking after stationary ordinary citizens (Amin *et al.*, 2000). As Graham and Marvin (2001) put it, the diffusion of information technology across cities is actually having an effect which can only be described as 'splintering urbanism'—a fragmentation and polarization of whole urban regions, both economically and socially. While the effects are numerous, Graham (2002) provides a host of examples such as the targeting of particular information technology services to 'high end' wealthy customers and the creation of fortified high-tech enclaves in places like Sao Paulo, Kuala Lumpur, Bangalore and Singapore, as well as the development of gentrified urban neighbourhoods to house smart workers, such as in San Francisco.

This latter point leads to a further critique of smart cities along similar lines to that of the creative city (i.e. see Peck, 2005). While the creative city envisioned by Florida (2005) consists of trying to recruit and retain the 'creative classes' generally (see Florida, 2002), the idea of the smart city is to presumably attract and cater for smart workers. One of the inevitable by-products of either urban form, by definition, is social polarization (Harvey, 2000). For instance, despite being a relatively rich country, aided partly through its advanced technological infrastructure, Singapore's poverty level is estimated to be in the region of 25–30 per cent of the population. Perhaps even more telling is that during the height of its information technology boom, the city/country became even more

polarized. In 1990 the richest 10 per cent of households earned 15.6 times more than the poorest 10 per cent, but by 2000, the gap widened further with the richest earning 36 times more than the poorest (Singapore Democratic Party, nd). Similarly, poverty rates in San Diego, despite it having relatively high labour force participation rates and low levels of unemployment over the past decade, have actually risen during their so-called high-tech boom, suggesting that rhetoric about the digital revolution reaching everyone is wildly optimistic. For example, child poverty rates (under 18 years of age) in the city actually increased from 1990 to 2002 from 15.6 per cent to 17.5 per cent (City of San Diego, 2007).

The smart/creative city can become not only more economically polarized, but also socially, culturally and spatially divided by the growing contrast between incoming knowledge and creative workers, and the unskilled and IT illiterate sections of the local poorer population (Peck, 2005; Smith, 1996). Urban gentrification in this regard, refers not just to housing and neighbourhoods as it once did (see Butler, 1997), but increasingly to consumption, lifestyle and leisure in the city (see Chatterton and Hollands, 2002). Chatterton and Hollands (2003), for example, have studied the gentrification and social polarization of UK nightlife, tracing it back to changes in the urban economy, including the impact of IT and service employment on cities. For instance, the transformation of the UK city of Leeds from a manufacturing city to a service-based urban form, has resulted in the creation of a range of up-market bars and nightclubs, which work to exclude whole sections of the local population (Hollands and Chatterton, 2004). The impact of the gentrified smart/creative city then goes far beyond creating inequalities of work, housing and neighbourhood, and extends to areas such as inequitable city space (Byrne, 1999) and entertainment provision (Chatterton and Hollands, 2003).

Despite representations in smart city discourses about the importance of local communities and social learning, an overall

emphases on business-driven technology and gentrification could be interpreted to imply that this urban form is relatively unconcerned with class inequality (i.e. particularly the uncreative classes, see Peck, 2005), inclusion (Byrne, 1999), and social justice (Harvey, 1973). Even the more humanist rationale of the smart/creative city is predicated on attracting educated people by providing a creative infrastructure of work, community and leisure (Florida, 2002). Edmonton's smart city approach here is to offer 'an exceptional arts and entertainment scene' (City of Edmonton, 2006), presumably mostly for the middle classes. Eger (2003a, p. 14) quoting the National Governor's Association in the US, states that arts programmes contribute '...to a region's 'innovation habitat', thus improving quality of life—*making it more attractive to the highly desirable knowledge-based employees...*' (my emphasis). The issue here is how does this provision relate to the 'less' smart/creative sections of the local population? What can the smart city offer them? And what impact does catering for knowledge-based employees have on arts provisions for the less well off? So while smart cities may fly the banner of creativity, diversity, tolerance and culture, the balance appears to be tipped towards appealing to knowledge and creative workers, rather than using IT and arts to promote social inclusion (Solnit and Schwartzberg, 2000; Sibley, 1995).

Part of the response to this dilemma lies in some of the discussion surrounding smart communities in North America (Coe *et al.*, 2000) or various inclusion measures through ICTs in the USA (Phipps, 2000) and the UK (Talbot and Newman, 1998). While many of these measures appear progressive and there are numerous examples of 'successful' participatory IT projects, looked at more critically, many of these programmes could be viewed as neo-liberal attempts to incorporate the local community into the entrepreneurial city (Harvey, 1989). Notions of smart communities and the importance of social learning/social capital, in this view, seem less progressive and more ideological. Education

within capitalism has always been necessary to reproduce the workforce. In this instance, it has simply been re-oriented towards the new information economy, primarily through training local people to serve the needs of the new creative and informational classes (Peck, 2005). The irony is that many such social learning and training programmes, often funded by national and local government money, may actually work to subsidize the training needs and requirements of multinational companies which cities hope to lure to town (Harvey, 2000). The emphasis of smart cities looked at in this light, shifts from discourses about inclusion and human capital to more of a 'culture of contentment' idea (Galbraith, 1993), with unskilled local labour servicing the leisure and lifestyle needs of the new incoming knowledge and creative workers.

Finally, what can one make of those self-designated smart cities which emphasise environmental sustainability as their smart feature? The key question here is to what extent are economic growth and environmental sustainability compatible (Gleeson and Low, 2000), and is the information city automatically all that eco-friendly? As Graham (2002, p. 34) perceptively points out, despite notions that ICT work can potentially conquer space through increased 'home-working', this practice is relatively rare, hence information workers still have to get to the office. Therefore, at least two of the outcomes created by urban ITC clusters—transport and car parking space—are not particularly environmentally friendly (Newman and Kenworthy, 1999). Additionally, the information technology revolution is perhaps not as clean as it initially appears. Researchers at the UN university in Tokyo, for example, have estimated that the production of a new computer demands ten times its weight in fossil fuels and chemicals, as opposed to two times for the production of an automobile, and in the future the world could face a computer 'waste mountain' as people constantly upgrade their technology (Sample, 2004, p. 2).

Brisbane, Australia is a useful example of some the contradictions between smart cities being committed to economic growth and the environment, simultaneously. For example, the city has utilized the smart label in conjunction with notions of the 'sustainable city' with regard to a unique water recycling programme (Local Government Focus, 2004). Yet as the city website makes explicit: 'Brisbane is a great place to do business. It has low taxes and charges, excellent infrastructure, great support networks and a forward thinking local administration to support you in your business venture' (Brisbane City Council, 2005). The key question is what happens when there are not enough resources to cater for both of these things? Or what happens when the focus on environmental sustainability itself begins to be seen as a new branch of capitalistic opportunity? For example, Smart-Cities.net is a web-portal site which currently promotes urban sustainable development by providing a platform for information exchange and interaction between Asian Cities and European environmental solution providers (Smart Cities.net, 2002). While its focus on urban environmental challenges is laudable, its website might also be 'read' as a future stepping stone for ecological business opportunities. The question is can cities accord the same priority to all aspects of the smart city agenda, or do some elements automatically take precedence over others? (i.e. business needs over environmental ones, see Gleeson and Low, 2000; Inoguchi *et al.*, 1999).

Underneath the rather self-congratulatory surface of self-designated smart cities are some unspoken assumptions and continuing urban problems. Issues concerning the splintering effects of the informational city, the limits of urban entrepreneurialism, problems created by the creative classes for local communities, including deepening social inequality and urban gentrification, not to mention the conflict between environment sustainability and economic growth, loom in the background behind the smart city label. The conclusion picks up on some of these

issues and discusses how the smart city discourse might be moved in more progressive directions.

Conclusion: towards more ‘progressive’ smart cities?

This paper began with a critical interrogation of the concept of smart (intelligent) cities, and through an analysis of a range of (self) designated examples has subjected the idea to a polemical critique. Many cities from around the globe have been keen to adopt the smart city mantle and emphasize its more acceptable face for self-promotional purposes. In addition to assuming there is an automatically positive impact of IT on the urban form, the smart city label can also be said to assume a rather harmonious high-tech future. However, it might be argued that beneath the emphases on human capital, social learning and the creation of smart communities, lay a more limited political agenda of ‘high-tech urban entrepreneurialism’. Analyses of some designated smart cities here reveal examples of prioritizing informational business interests and hiding growing social polarization (Harvey, 2000), features more reminiscent of the ‘entrepreneurial city’ (Jessop, 1997), and ‘neo-liberal’ urbanism more generally (Peck and Tickell, 2002). Of course this assertion requires further study and in-depth analyses of specific urban cases. All cities differ somewhat in their history, economic and political makeup, and cultural legacy. They are also influenced by national boundaries and indigenous government policies and laws.⁶ However, the apparent ascendance of the entrepreneurial city (Quilley, 2000; Harvey, 1989) and its high-tech variant (i.e. the smart city), belies a set of underlying shortcomings and contradictions.

First, is the urban problematic revealed by Harvey’s theoretical notion of the global ‘spatial fix’. As Harvey (1989) argues, capitalist investment in urban infrastructure, while necessary, is no guarantee to further capital

accumulation. And while such investment may temporarily act to boost an area’s profile and create employment, it can also mean a diversion of public (welfare) resources to help lure in mobile global capital thereby creating social polarization. Furthermore, the ‘spatial fix’ inevitably means that mobile capital can often ‘write its own deals’ to come to town, only to move on when it receives a better deal elsewhere. This is no less true for the smart city than it was for the industrial, manufacturing city. Investment in ICTs, human capital, social learning and smart communities, while seemingly laudable aims for any city or urban region wanting to regenerate, also holds no guarantees. Public-private partnerships and investment in these areas may in fact backfire, as information technology capital may flow elsewhere depending on what advantages are available to aid further capital accumulation. Perhaps one of the best illustrations of this process concerns the city of Ottawa and its boom-bust cycle of high-tech industries. While the Canadian government has poured some C\$6.4 billion into the Technology Partnerships Canada program (effectively loans to multinational companies), it is expected that only about a third of that money will have been repaid by 2020, which is in effect a public subsidy (Aubry, 2002). At the same time, it is now felt by some that the city is losing control of its high-tech industry, reverting to its former role as a technology research and development site servicing multinationals based elsewhere (Bagnell, 2003; Hill, 2002).

Additionally, as the previous analysis shows, self-designated smart cities face the interminable difficulty of how to deal with the issue of widening inequality and social polarization, a problem brought on partly by its own ‘success’ so to speak. Rather than raising standards of living for all urban dweller, information technology has been shown to deepen social divisions in cities (Graham, 2002). The attraction of educated, mobile, middle class professionals and IT workers (part of the ‘creative classes’, Florida, 2002), can result in the production of highly

gentrified neighbourhoods and leisure/entertainment provision, thereby excluding traditional communities and poorer residents. Furthermore, it is often understated that smart cities requires a sizable secondary workforce needed to service the entertainment and leisure needs of professionals and information workers (Peck, 2005), thereby contributing to entrenched labour market inequalities. So while much of the smart city discourse gives emphases to the creation of smart communities and the raising of everyone's access to urban information technology, education and governance, ironically it can actually contribute to the two speed or 'dual city'. The dominance of the entrepreneurial version of smart cities does not of course preclude the existence of different smart urban forms or examples, or the future development more progressive models. The remainder of the conclusion briefly explores what aspects a more progressive smart city might strive for.

First and foremost, progressive smart cities must seriously start with people and the human capital side of the equation, rather than blindly believing that IT itself can automatically transform and improve cities. To some extent this is already recognized (see Eger, 2003b). As Paquet (2001, p. 29) has argued regarding the creation of smart communities, 'The critical factor in any successful community has to be its people and how they interact'. The important aspect of information technology is not its capacity to automatically create smart communities, but its adaptability to be utilized socially in ways that empower and educate people, and get them involved in a political debate about their own lives and the urban environment that they inhabit. As Raymond Williams (1983) always reminded us, while technology (of any kind) is never neutral, it has the potential and capacity to be used socially and politically for quite different purposes. In this vein, perhaps some of the best instances of where ICTs have been utilized most progressively would be the development of community telecentres, particularly those

ones that attempt to link up information technology to socially marginalized groups (see Graham, 2002, p. 50). While there are numerous world-wide examples to draw upon (see Phipps, 2000; Talbot and Newman, 1998), perhaps one of the most revealing cases concerns Rathgeber's (2002) study of community telecentres in Africa to help women, in particular, to enhance their job prospects and opportunities. The most telling aspect of this research was that because initial attempts to set up such telecentres were 'technological' (about hardware/software) and business-led, rather than social and people-led, they were largely ineffective and inaccessible, and hence failed. Rathgeber's (2002) study showed that such centres were seen rather as a social resource by the target group of African women to help run their daily lives, rather than as a technological/economic resource. This specific example demonstrates the pressing need to start with people's existing knowledges and skills, not with technology *per se*.

Second, the progressive smart city needs to create a real shift in the balance of power between the use of information technology by business, government, communities and ordinary people who live in cities (Amin *et al.*, 2000), as well as seek to balance economic growth with sustainability. As Coe *et al.* (2000, p. 13) argue, while the emphasis on smart cities is very much about economic growth, and competitiveness in the global knowledge economy, smart communities can also '...provide an opportunity for enhancing citizen participation in and influence over local decision making'. In a word, the 'real' smart city might use IT to enhance democratic debates about the kind of city it wants to be and what kind of city people want to live in - a type of virtual 'public culture', to redefine a term from Sharon Zukin (1995). Zukin basically defines public culture as where all possible interests and priorities of a whole range of citizens are placed on the agenda and discussed and debated. While IT might make the conditions for developing a 'virtual public culture' possible, there must

be the political will to make this happen and the digital divide must be addressed.

Such shifts, would involve the progressive smart city addressing issues of power and inequality in the city (Harvey, 2000), as well as begin to seriously respect diversity and build a democratic urban pluralism (Sandercock, 1998). Part of the difficulty here undoubtedly concerns how one understands and comes to term with the variety of inequalities that exist in cities (Keith and Pile, 1993; Fincher and Jacobs, 1998; Harvey, 1989). One thing that is patently clear however, is the degree to which cities have become more unequal through IT (Graham, 2002), the processes of globalization (Harvey, 2000), changes in urban labour markets (Peck, 2005), and increased gentrification (Smith, 1996). While the smart entrepreneurial city ‘successfully’ caters for the rich, mobile, creative businessman, through the creation of corporate informational portals and services, not to mention through luxury hotels, restaurant, bars and global business transport links, by definition, it also simultaneously ignores the welfare needs of its poorer residents (Graham, 2002; Byrne, 1999). And while these economic hierarchies are not in dispute, urban feminists and multicultural theorists argue that they differentially impact on gendered and ethnic populations. For example, while the entrepreneurial smart city might cater for the small number of professional and creative females working in the IT sector, the majority of working women are left to service the largely male business city—waiting on, cleaning and servicing its dominant male make-up (Jarvis, 2005). Furthermore, according to theorists like Sandercock (2003), our urban ethnic minorities and migrants are simultaneously feared, ignored or exploited, rather than viewed as a social and cultural resource. Finally, the talents of many young people in cities are wasted under the rubric of a social problem discourse, rather than seen through the lens of cultural creativity (see Chatterton and Hollands, 2003) while many alternative political groups such as environmentalists, squatters, third sector groups and co-operatives and/or urban political

movements such as ‘reclaim the streets’ and ‘critical mass’ go un-noticed or are seen as public nuisances (Chatterton, 2000).

In essence the smart progressive city needs and requires the input and contribution of these various groups of people, and cannot simply be labelled as smart by adopting a sophisticated information technology infrastructure or through creating self-promotional websites. Cities are more than just wires and cables, smart offices, trendy bars and luxury hotels, and the vast number of people who live in cities deserve more than just these things. Because the smart city label can work to ideologically mask the nature of some of the underlying changes in cities, it may be a partial impediment toward progressive urban change. Real smart cities will actually have to take much greater risks with technology, devolve power, tackle inequalities and redefine what they mean by smart itself, if they want to retain such a lofty title.

Notes

- 1 While the discourse of smart cities has certain parallels with that of the creative city, and hence is open to similar criticism (see Peck, 2005), it is distinguished by its particular focus on information and communication technologies as the driving force in urban transformation (Eger, 1997), rather than creativity in a more general sense (see Florida, 2002; 2005). However, as I shall go on to argue there are selective borrowings in some of the smart city discourses regarding the role IT increasingly plays in the arts, culture and media (see Eger, 2003a).
- 2 As such, I would liken the aim of this paper to Peck’s (2005) critique of Florida’s (2005; 2002) work on the creative city, albeit it is critiquing a somewhat different literature. In other words, the point of both articles is not to prove or disprove the existence of the creative or smart city, but rather to critically explore some of the assumptions and rhetoric behind these labels as well as examine some examples of cases where the term is applied.
- 3 There are methods developed which claim to help measure smartness/intelligence and innovation—see Intelligent Community Forum (2007) which lists the five main elements of intelligent communities and the OECD and Eurostat (2005) *Oslo Manual*

designed to provide guidelines for measuring innovation. As this is not the purpose of this paper, I do not really make any further reference to these measurement criteria.

- 4 While there is clearly some overlap here between the use of the term smart in relation to smart cities and the smart growth agenda (particularly as they both relate to ICTs and how these can transform work and life in a region), the two terms should not be completely conflated. The smart growth agenda is a somewhat more wide-ranging urban approach, with a strong emphasis on policy prescriptions and problem-solving. There are also specific national variations, such as the smart growth agenda emanating out of the USA (American Urban Land Institute, 2007), which has developed in response to specific urban problems such as sprawl, inner-city decline and a lack of community in suburban areas (see Smart Growth Network, 2007). Despite these differences, I would content that smart cities and the smart growth agenda tend to share some similarities when it comes to emphasising the underlying importance of IT and business-led initiatives when solving urban problems. In this paper I reserve the term smart cities to refer to those urban regions which publicly label themselves as smart, whilst focussing in on the labelling process they adopt.
- 5 In this regard I examine a range of cities from around the world that have been designated (either through award or competition) or have self-designated themselves as smart cities. In examining this labelling process I look particularly at city websites as this is one of their main promotional vehicles and hence reveals what kinds of things are emphasized and which things are hidden from view.
- 6 It is generally recognized that North American cities in particular have always been more shaped by pro-business influences, so it is hardly surprising to see smart city discourses here more nakedly influenced by 'neo-liberalism' (for example in the case of San Diego and Edmonton). At the same time, it is clear that the Smart Capital initiative in Ottawa Canada did partly achieve a balance of IT initiatives that cut across business, government and community interests (Ottawa Centre for Research and Innovation, 2007), hence the need for more specific case studies. European cities, by contrast, have historically, at least, been more welfare-oriented in their urban policy-making and generally been more concerned with social inclusion, although as Harvey (1989) argues, they too have embraced urban entrepreneurialism in the last couple of decades (see also Quilley, 2000), and many are competing with one another via various creative indexes (see Florida

and Tinagli, 2004). Meanwhile, political transformations in Eastern Europe have meant rapid change in cities such as they have made the rather rapid transition from a socialist to an entrepreneurial urban form (see Sykora, 1999).

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