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Future of cities: living in the city

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Future of cities: living in the city

Abstract

Report looking at how urban living may change over the next 50 years.

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Living in the city

Future of cities: working paper

Foresight, Government Office for Science

Living in the city

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This review has been commissioned as part of the UK Government's Foresight Future of Cities Project. The views expressed do not represent policy of any government or organisation.

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Foreword

The Future of Cities project is informed by working papers that are commissioned by the [Lead Expert Group](#) and written by authors from academia and industry.

These papers highlight the key challenges and opportunities facing cities in the UK out to 2065. The Expert Group will draw upon this evidence base to develop project outputs that will be published in 2014 and 2015.

These outputs will aim to inform near-term policy making in both local and central government, which achieves desirable long-term outcomes for UK cities.

Professor Sir Alan Wilson

Executive summary

This paper is concerned with what urban lives were like around 1980, are now like and might be like by the middle of this current century.

The paper is organised into five sections. First, we examine some classic efforts to characterise the very nature of living in the 'city'. Are city lives in some way distinct and if so what is it about them that engenders such characteristics? Second, we describe how cities in Britain developed over the past few decades, from the 1970s to the present day. Third, a brief account is developed of changing patterns of urban living from around the world over roughly the same period. Fourth, we establish a range of possible urban futures for the middle of this century drawing upon various kinds of research and evidence. Each of these is illustrated by a visualization to capture the main ways in which lives would be organised within each city future. The paper tries to address the following processes and activities at each historical stage: the movements of people, objects and communications; the changing nature and location of work; forms of leisure, consumption, and education; and family and friendship life. It should be noted that this paper does not consider in any depth issues of governance, finance, food and metabolism since these are examined in other Foresight papers being produced in 2014.

This paper was commissioned from John Urry whose thinking on these topics has been influenced by many other academics and intellectuals. These include those involved in the Intelligent Infrastructure Systems Foresight Programme that ran 2005-6, and especially Glenn Lyons and Andrew Curry. He would also like to thank many colleagues working in or connected with the Centre for Mobilities Research at Lancaster University, including the three co-authors here, as well as the Lancaster Liveable Cities team.

I. What is urban living?

We begin with briefly considering just what is distinct to 'living in the city'. Many artists, intellectuals and social scientists have puzzled over this issue and have tried to characterise the nature of *urban* living. Is there something about being in the city that produces lives that are different from rural lives and if so what might this be?

At the beginning of the last century, Simmel argued that the modern city provided space for the development of each individual and especially in enabling the peculiarities of their inner and outer development (Simmel et al., 1997). The spatial form of the city permitted the unique development of individuals able to interact with an exceptionally wide range of social contacts. But at the same time the richness and diverse stimuli experienced within the 'metropolis' forced people to develop an attitude of reserve and insensitivity to feeling. The urban personality Simmel argued had to become detached and blasé.

The modern city developed through the money economy was the source of its rationality and organisation. There was an increasing concern for precision and punctuality; urban dwellers had to be calculative about their activities and relationships. Simmel described how those in cities needed to be punctual and the way this came to be based upon pocket watches (and then the wristwatch). The watch and its division of time into smaller more precise units was key to early twentieth century city life, this small innovation being as significant as mobile telephony was more recently to the urban experience.

Empirical studies of urban living developed during the inter-war period especially at the University of Chicago. This involved various attempts to develop an ecological analysis of lives within the city. Burgess and colleagues argued that cities were organised into concentric rings: beginning from the centre with the central business district; followed by the zone of transition of mixed residential and commercial uses; the working class inner city; middle-class homes; and the commuter zone at the edge (Park, Burgess & McKenzie, 1967). Many researchers tried to apply this concentric rings approach to various cities around the world.

The most important theoretical contribution was Wirth's 'Urbanism as a way of life' (Wirth, 1938). He argued that there were three causes of the differences between urban and rural lives: size, which produced segregation, indifference and social distance for those living in cities; density, which caused people to relate to each other in terms of specific often functional roles; and heterogeneity, which meant that people participated in different social circles, none of which commanded their total involvement and which generated discrepant and unstable statuses. Wirth claimed that the organisation of space in terms of size, density and heterogeneity produced distinct urban lives. And these features were contrasted with the small size, low density, homogeneity and ascribed characteristics that characterised the opposite to living in the city, of 'rural' lives.

However, some subsequent research showed that there were not always such starkly defined patterns of urban (and rural) living. Within cities there were normally some close-knit urban communities, such as the 'working class village' of Bethnal Green famously researched in the 1950s. In such urban villages people experienced relatively homogenous lives characterised by very short range movement by cycling and walking, and normally involving much contact with nearby kin in this case within the local area of Bethnal Green (Young & Willmott, 1957).

At the same time it was clear that other city areas were becoming increasingly suburban. People's lives here were focussed less upon the neighbourhood and more upon the home. Patterns of living became car-based, enabling people to get to work and leisure sites and to see family and friends who were likely to live some distance away. Suburban patterns of life were found in both urban and rural areas, as during the last century petrol-based mobility generated a spreading out of the sites of employment, of family life and of leisure (Urry, 2013b). Also, in many countries after the Second World War new zoning regulations meant that there was more spatial segregation between different areas within cities and this increased the need for faster modes of transport so that people could move from one such 'zone' to another. Montgomery (2013) documents ways that such zoning makes people 'unhappy'.

Researchers also explored how people variably 'read' the cities in which they lived. According to Benjamin (1999) this was not merely a matter of intellectual observation but also one of fantasy, wish-processes and dreams. Cities were the repository of people's memories of the past. These memories embodied in buildings could be different from those meanings imagined by architects and planners. Even derelict buildings leave traces and reveal memories, dreams and hopes of previous periods and kinds of life. Wright (1992) documented such an array of meanings as he began his journey across Britain with interpreting an old toilet in Dalston Lane in East London.

And indeed, studies of urban lives have shown that cities have become 'spectacles' not only for residents but for many visitors from elsewhere. Visitors anticipated, read and remembered cities. Planners, architects and developers constructed new stage-sets within which goods and services were consumed and experienced, beginning with Haussmann's iconic restructuring of Paris in Second Empire France where boulevards were driven through the old working class living in the medieval streets (Berman, 1983). Cities came to be less places that people originated from and more known for the many goods and services that got consumed within them, such as coffee and croissants in the typical Parisienne cafe. Cities were transformed into sites for consumption and leisure practices and were less organised around production and manufacturing work (Urry, 1995). The first department stores opened in 1843 in Paris; many new cathedrals of consumption developed around the world and they provided models of urban development that were often copied and recycled elsewhere.

Williams (1973) argued that there have been many contrasts drawn between city lives and those experienced within the countryside. To think of the city either as a place of darkness and squalor or of enlightenment and cosmopolitanism normally rested upon presumed contrasts with its 'other', of rural lives and the countryside. Williams showed that there was no simple and unchanging city and hence no set of unambiguously city lives. Much thinking about living in cities depended on what the city was contrasted with, what the 'other' was to the city.

2. British cities since the 1970s

Many cities in Britain in the 1970s were still organised around their industrial base, of extractive and manufacturing industry. Predominantly male-based industry structured the lives of many of those in cities. There were many 'manufacturing towns and cities', some based on coal, shipbuilding and iron and steel, others organised around newer industries of chemicals, aerospace and car/vehicle production. These industrial cities possessed distinct characteristics: sizeable employment in male-based manufacturing plants located *within* the city; a strong division of gender in employment; leisure and family patterns reflecting dominant manufacturing employment; much short range mobility by feet, bike and bus especially for commuting; and significant levels of public housing built during the 1950s and 1960s as working class 'slums' were demolished (Harloe, 1995).

In most British cities many lower density suburbs developed. Suburbs normally involved a home-centeredness rather than a street or neighbourhood focus. Houses became increasingly full of electricity-based consumer goods especially in the kitchen and the sitting room. Many journeys to work and for leisure activities were car-based and there was less emphasis upon contact with kin and more with friends often located a distance away; and there was some sharing of household tasks and a less marked gender division of labour. Those living in suburbs often developed social movements to sustain the low densities of housing and population, protecting the size of their gardens and of green spaces (Saunders, 1979; Amin & Thrift, 2002). London's suburban living during the inter-war period was based more on collective forms of transport. Lives in London were distinct with higher levels of service employment, especially in finance, education, health and leisure.

Since around 1980 profound transformations have occurred in people's experiences within British cities which we will now document. First, many cities underwent **rapid 'de-industrialisation'**. Older industrial sectors declined and there was a relocation of manufacturing plants out of city centres and often out of Britain altogether. New 'spatial divisions of labour' developed; older workshops, factories and cramped city locations were often closed down and many became derelict (Massey, 1984). There was much 'restructuring' of male-based industry with manufacturing employment in cities often falling to less than 15% of total employment. The male-based leisure and consumption patterns characteristic of industrial cities were transformed especially with the shift from coal to gas and oil as the major forms of fossil fuel energy. Trade union and other working class organisations became less significant in organising work and leisure experiences especially in the industrial cities of central Scotland, south Wales and the north and midlands of England (Mitchell, 2011). According to Hobsbawm's prescient analysis the forward march of labour and of many labourist cities was halted (Hobsbawm, 1978; Lash & Urry, 1987).

Second, this economic restructuring led to **much inner city deprivation** with often very rapid population decline, as experienced in Merseyside and in many coal mining, steel-making and textile-based towns and cities. Those people remaining in inner cities felt trapped there especially as the privatising of much public housing meant that there was less housing that was affordable (Harrison, 1985; Saunders, 1990). Such inner cities were made up of many older people, resource-poor single parent households, few people with higher education, many long term unemployed and semi-employed and ethnic immigrants. Also some outer estates, such as Kirby and Speke near Liverpool, began to

demonstrate similar features of decline and deprivation as post-war factories closed and shortages of well-paid skilled work emerged.

Third, some areas of inner city decline were **subject to gentrification**, beginning most notably in Islington in north London. Previously semi-derelict houses, flats and warehouses were bought up cheaply as developers and homeowners were able to turn them into newly configured places for urban living (Butler & Savage, 1995). Gentrifiers were normally well-educated; many worked in professional and managerial positions in education, cultural industries and advertising. A plethora of leisure, educational and arts services developed in these gentrified places; a new aesthetic emerged based upon the stylishness of refurbished brick, stone and wood; and such gentrifiers often formed and supported 'progressive' social movements. Some derelict areas under railway arches such as Castlefields in Manchester developed into centres of alternative gay, creative arts and party spaces (Degen 2008). Gentrification often led to the significant displacement of those originally brought up in that area who could no longer afford to live there or to enable their children to find housing nearby.

Fourth, some towns and cities experienced **large increases in service industry** and employment. This was most marked in London. Through a massive expansion of financial services following the Big Bang in 1986 London became one of the world's two global cities (New York being the other). This also involved high employment in cultural industries, education, fashion, healthcare, media, professional services, research and development, tourism and transport. London became more or less the world's most-visited city containing four World Heritage Sites as well as many new landmark buildings. It became a magnet for tourists as well as in-migrants (population of Greater London is just under 8m – see World Population Review, 2014). London now markets itself as a centre of cosmopolitan multiculturalism. UK public expenditure is disproportionately spent on London with one of the world's best public transport infrastructures. But its population does not appear to lead happy lives. Londoners are especially anxious stemming from very uneven levels of income, long commutes, perceived high crime rates and a low proportion of people aged over 65 who are more content (BBC, 2013).

Fifth, other areas outside London came to be **organised around fast road travel**. Especially significant was the M4 corridor that stretches west from London, but similar patterns were found around Cambridge, Warrington and the East Midlands. Increasingly research, manufacturing and service employment were located in factories and offices that were built on greenfield sites that had to be accessed by car. Many people working in those workplaces also often lived in newly built estates, some of which were in effect gated communities also mainly travelled to and from by car - see Yoo (2014) for an upmarket example. These parallel developments helped generate low density sprawl and long commuting journeys. Moreover, much research shows that the longer the commute, the thinner the social ties that people tend to possess. This in turn reduced people's 'social capital' and appeared to result in overall lower levels of happiness (Putnam, 2000; Montgomery, 2013).

Sixth, various former cities developed post-industrial strategies especially through **preserving their industrial and urban heritage**. Such a revaluation of the past resulted in what Hewison (1987) provocatively called *The Heritage Industry*. Various commentators noted the very rapid growth of museums and heritage centres especially in many northern cities previously unattractive to visitors. Urban experiences increasingly involved living in a kind of museum with sites of education, leisure and consumption often being housed within former industrial premises, beginning with the Wigan Pier Heritage Centre (now closed). There was significant employment in this heritage industry, with

examples of former coalminers becoming guides in 'mines' opened to the public (Dicks, 2000). Many 'entrepreneurial' cities developed cultural industry quarters located in former industrial premises, the iconic example being the Albert Dock in Liverpool. The central areas of cities increasingly developed as 'spectacles' where goods and services were especially consumed within refurbished heritage environments often now privatised (Cronin and Hetherington, 2008). And after dark these heritage environments became sites for partying with new night time economies developing in city centres based upon much more available alcohol and new kinds of legal and illegal drugs (Chatterton & Hollands, 2003).

Seventh, **cities went 'digital'**. Mobile telephony became almost ubiquitous with most cities having good coverage for texting, calling, accessing the web, emailing and moving about. Almost all indoor and outdoor public spaces were navigated by people connecting with others, many not being physically co-present in that space. There was less need for the punctuality that Simmel et al. (1997) pointed to, with people negotiating the times and places for meeting others (Larsen, Urry & Axhausen, 2006). Moreover, many places were available for accessing Wi-Fi so that cafes, bars, libraries and park benches became sites for informal working and networking (Mackenzie, 2010). Cities developed very many 'third spaces' that were full of people meeting, communicating, partying and working (including the phenomenon of the 'Coffice'). Workplaces and homes were increasingly connected by fast broadband which made possible some novel financial, publishing, media and travel enterprises. Many city-dwellers reported that these multiple forms of connectivity meant that they were 'always on', always available to others for work, family life and friendship. There was no escape from 'miniaturised mobilities', from those small light machines carried on or close to the body that made possible (if the batteries were charged!) most arrangements, music, deals, meetings, trends, gossip, news and location (Elliott & Urry, 2010).

Finally, according to Graham (2011) cities were increasingly 'under siege' and **centres of surveillance**. The city dweller came to be subject to a kind of digital dissection through CCTV cameras, radio frequency identification (RFID) tags, GPS, biometric technologies, public transport smart cards, customer loyalty cards, credit cards, passports, internet use, and mobile phone records (Amoore, 2011). Especially if these systems were interconnected, they enabled people's activities and movements to be digitally monitored and resulting patterns analysed through computer algorithms (Beer, 2013). Such systems were developed by companies mining vast digital data streams as they sought to identify risky bodies, doubtful transactions and suspicious movements. These techniques were trialled in Northern Ireland during the Troubles, in new shopping centres (such as the Metro or Trafford Centres) and in airports. They were then moved out and implemented within many British cities. There are nearly 2 million CCTV cameras, almost all of which are operated by private companies (CCTV User Group, 2013). This 'digital dissection' enabled the more detailed differentiation of various classes of the population. This generated what Graham and Marvin (2001) term a 'splintering urbanism'. Access to different types of housing, workplace, transport infrastructures and leisure sites came to be stratified by relative income as measured by various digital markers.

In the next section we briefly examine how lives in cities around the world developed over roughly this same period, especially noting developments in the developing world which is where the main growth of cities has been recently occurring.

3. World cities since the 1970s

The development of UK cities between 1750 and 1950 was part of a wider process of urbanization in north America and Europe whereby the share of total population living in cities increased from around a tenth to over one half (15 to 423 million) (Satterthwaite 2007). Many cities developed similar patterns of urban living and, then during the second half of the twentieth century, also experienced deindustrialisation, suburbanization, inner city deprivation, gentrification, decline of the industrial workforce and the rise of service industry (Lash & Urry, 1987). In some places affected by the reduction of social welfare, there was increasing civil unrest (Elliott & Turner, 2012). American cities such as Los Angeles, Las Vegas, Miami, Detroit, Chicago and New York, often exemplified in academic, literary and cinematic accounts many of the hopes and anxieties about forms of city living during the second half of the last century (Zukin, 1993; Culver, 2010).

However, some of the most significant developments during the last half-a-century occurred in the global South, especially Asia, during the second phase of urbanisation (Satterthwaite, 2007). In 1950 the world's urban population was 732 million, more than half of which lived in Europe and North America and a third in Asia (see table 1). By 2010 the world's urban population had increased to 3.5 billion but the relative significance of these regions almost reversed with Europe and North America accounting for less than a quarter and Asia increasing to one half of the total global population (Lee, 2007).

This shift was reflected in the number of large cities. In 1900 53 of the world's 100 largest cities were in Europe. By 2000 only ten were in Europe. In the early 2000s three quarters of the 100 fastest-growing large cities were in Asia and Africa (none in Europe). In Asia, this meant the recovery of its historical role as the region with most of the world's larger cities. In 1800 Asia possessed 64 of the largest 100 cities as India and China were the world's two largest economies. By 2000 49 of the world's largest cities were once again in Asia (Satterthwaite, 2007).

Table 1: Global population change, 1950-2010

Region	1950	1970	1990	2000	2010*
Africa	4.5	6.4	8.9	10.3	11.7
Asia	32.0	36.5	44.5	47.9	50.5
Europe	37.8	30.9	22.4	18.4	15.2
Latin America and Caribbean	9.6	12.3	13.9	13.9	13.6
Northern America	15.0	12.9	9.4	8.8	8.2
Oceania	1.1	1.0	0.8	0.8	0.7

Source: Satterthwaite 2007 (*estimated)

It is thought that these trends will continue into the middle of the twenty-first century with the global urban population reaching 5.6 billion by 2040, and the developing regions accounting for 93 per cent of the growth (UNFPA, 2007). By 2030 developing regions were expected to host 80 per cent of the world's urban population, most of which (seven out of ten) would be in Asia and Africa. In the period 2000 – 2030, the urban population in Asia was expected to grow from 1.4 to 2.6 billion, while in Africa it was likely to double (UNFPA, 2007).

The background to this substantial growth of cities was the restructuring of the world economy with a dramatic fall in agriculture's contribution, the emergence of newly

industrialised and export-oriented cities mainly in South East Asia, and the rise of a few 'global' cities – centres of finance and highly specialised services performing the 'command functions' of the new global economy (Sassen, 2001).

During the last four decades changes in manufacturing and services had major implications for the international division of labour. Following a process of subdivision and subcontracting of production, many (relatively unskilled) manufacturing jobs in cities of the industrialised North migrated to cities in the developing regions, while cities in the global North maintained high value, knowledge- and industry-intensive functions of the production process.

In developing regions, East Asian cities grew most especially through rapidly rising exports. In China in the 1980s the growth of export-oriented manufacturing cities was enabled by the designation of Special Economic Zones in Shenzhen, Shantou, Xiamen, Zhuhai, followed in 1984 by fourteen Economic and Technical Development Zones. These special status areas attracted foreign investment through suspending conventional taxation and labour regulations and through heavy investment in high-quality transport logistics (Zhu, 2004).

But relatively few cities were able to adapt to these structural economic shifts and deploy similar development strategies, and whole regions with little access to investment capital, skilled workers and transport infrastructures became marginalised especially in sub-Saharan Africa. However, in the 2000s and early 2010s cities in Brazil, India, Indonesia, Mexico, Turkey, Malaysia, Vietnam, South Africa, Ghana, and Uganda, developed sustained economic growth, as well as some reduction of inequalities and modest progress in terms of the Human Development Index (UNDP, 2013).

A crucial difference between the first and the second waves of urbanisation involved the changing role of states. In the first wave the state came to provide widespread access to electricity, health, sanitation, water and transport infrastructures. They came to be regarded as public goods and an expression of a modern urban life. The state was core to urban lives. In the second wave of urbanisation the state was often viewed as more of a regulator than a provider, a view enforced by agencies such as the IMF and World Bank. The arrival of migrants from rural areas with immediate housing needs was then met by a retreat from state provision and the development of a profit-oriented private sector providing urban services. This meant that investment often focused on high-profit, low-risk projects leading to the rapid segmentation of conditions of urban living between the poor and those able to pay for such private services (Graham & Marvin, 2001).

Such a 'splintering urbanism' was further accentuated by how many cities aspired to be globally competitive seeking to score high in the increasingly common ranking of cities. In their attempt to become a hub for knowledge-intensive firms, local governments with shrinking incomes tended to prioritise infrastructures that increased the connectivity of business, industrial districts and enclaves of professional knowledge workers, as opposed to providing basic services of water, sanitation, electricity and transport for the growing numbers of migrants and urban poor. There was the increasing juxtaposition of pockets of wealth and intense transnational connectivity sat alongside many expanding informal settlements of which the slum became the starkest expression. It is estimated that there are now around one billion slum dwellers (Davis, 2006).

In many parts of the South informal settlements became common. For a significant part of the population in Asia and Africa living in cities was associated with informality. In the early 2000s Asian cities hosted half of the world's slum population, while sub-Saharan

Africa had the highest rate of both urban growth (4.6 per cent) and slum growth (4.5 per cent) (UN-Habitat, 2003). Some analysts noted that in the coming decades all growth in slums would be located within the world's developing regions.

Living in slums had long been associated with poverty and marginality and analysts projected a dystopic future of failed slum cities throughout the global South. Davis indeed graphically writes of how: "the cities of the future, rather than being made out of glass and steel [...] are instead largely constructed out of crude brick, straw, recycled plastic, cement blocks, and scrap wood [...] much of the twenty-first-century urban world squats in squalor, surrounded by pollution, excrement, and decay" (Davis, 2006, p.19). See Adey (2013) on the peculiar 'atmosphere' of life in the megacity.

But by the end of the twentieth century researchers began to recognise that the habitus of the urban dispossessed was also marked by ingenuity, creativity, flexibility, pragmatism and entrepreneurialism. Rather than seeing slums as merely deprived reservoirs of idle labour, they began to be viewed as spaces of habitation, production, and politics, including even the basis for new kinds of slum tourism and 'favela tours' (Goldstein, 2003; Simone, 2010; Freire-Medeiros, 2013).

Researchers were thus reluctant to subsume diverse and complex social and spatial realities under the term 'slum' (Roy, 2011). São Paulo illustrates these complex social and spatial dynamics between formal and informal settlements. Between 1940 and 1980 the city expanded reinforcing the sharp contrast between a well-equipped city centre inhabited by the upper classes, and an expanding periphery of informal settlements occupied by migrants from Brazil's northeast. From the late 1970s the fear of crime and violence led the middle and upper classes to abandon the city centre and to retreat into fortified enclaves (monitored spaces for residence, leisure and work) often right next to the *favelas* on the city outskirts where new business poles were also emerging. The image of a well-equipped city centre and a precarious periphery was reinforced by a stark proximity of wealth and destitution.

At the same time the periphery became more heterogeneous with different levels of service provision and land and home ownership, from the most precarious, makeshift dwellings to upgraded settlements with road access, sewerage, sanitation and electricity often obtained after persistent pressure by social movements and NGOs working within the slums. Underlying these changes were rising levels of crime and a culture of fear reproduced through daily conversations and a media polarizing representations of inequality (including the simplification of the social and spatial complexity of the periphery under the pejorative term *favela*). There was the proliferation of walls, fences and barbed wire projecting a spectral image of a city literally and metaphorically under siege (Caldeira, 2000).

In these cities issues of mobility were central to the processes of fragmentation shaping everyday life. Since the Second World War urban land area in developed countries doubled while in developing countries it increased fivefold through population growth and the sprawling growth of residential and commercial spaces (UN-Habitat, 2013). Over the last four decades the state retreated from providing public transport or, as in much of sub-Saharan Africa, existing services were disbanded. Middle and upper classes increasingly relied on the car, which was often seen as a safer mode of travel through an urban landscape perceived as hostile and violent. The number of new cars sold annually increased from 39 million in the 1990s to 63 million in 2012 (second-hand cars not included), a growing proportion of which were sold in Asia, which in 2012 accounted for

40 per cent of global sales. The number of cars within Brazilian metropolises doubled in a decade, reaching more than 21 million in 2012 (UN-Habitat, 2013).

People without access to private cars or formal public transport had to walk or cycle, or use often dangerous informal motorised transport. Walking and cycling were the most common form of mobility in the global South, partly out of necessity and partly due to denser urban forms. However, while in many European and North American cities these mobility practices were beginning to be seen as an index of low carbon and healthy living, in the global South they were stigmatised and symbolised poverty and exclusion. In developing regions the spaces for walking and cycling shrank due to planning practices that favoured motorised mobility and sprawl. There were often no pavements or places of refuge and safety for those walking along the often disorganised streets of developing societies.

Without much public transport, motorised mobilities were provided by the informal sector, often organised by the same criminal gangs controlling drugs and the arms trade within the vast informal settlements (Soweto's population is 4 million for example). These informal mobilities were the main means of motorised movement. In many cities this informal transport may account for more than half of motorised trips and its significance continued to grow in the early 2010s.

Nairobi (Kenya) had the highest per capita use of informal transport with *matatu* minibuses making 662 trips per inhabitant each year. This constituted three quarters of public transport trips and over one-third of traffic volume. In Harare (Zimbabwe) informal transport represented 90 per cent of the market. In Cairo (Egypt) shared taxis increased their share of motorised trips from 6 per cent in 1987 to 37 per cent in 2001. In 2013 there were 15,000 unlicensed vans operating in Sao Paulo (Brazil) and since the 1990s 10-15 passenger minibuses displaced private buses in Rio de Janeiro (UN-Habitat, 2013).

Much mobility occurs beyond the administrative boundaries of cities, partly reflecting and reinforcing old patterns of material and personal exchanges with more or less distant places, a reality intensified by recent processes of intra- and international migration and the new international division of labour. Over the last six decades migration from rural to urban areas within the developing world constituted the largest ever movement of people in human history (Saunders, 2011). This had profound effects on how cities were lived and imagined with multiple identities scattered across extensive geographies within and beyond each city. Urban life became infused with myriad references to, and borrowings from, other cultures, economies and ecologies (Blunt, 2005; Blunt & Bonnerjee, 2013).

The growth of urban population was most visible in the rising number of megacities (those with more than 10 million inhabitants) and the stunning speed with which some such cities had grown. In 1950 only New York and Tokyo had a population over 10 million. By 2012 there were 23 megacities and it was estimated that there would be 37 by 2025 (UN-Habitat, 2013). Of these, all but eight will be in the developing world.

Nevertheless despite the visibility and significance of megacities, most urban growth took place and was expected to continue to occur within smaller 'ordinary cities', the sort often ignored by the media or indeed by academics (Robinson, 2006). Furthermore, most predictions made about the size of large cities by 2000 proved incorrect partly because the links between urban growth and economic performance were insufficiently recognised.

During the twentieth century it appeared that economic performance was the main driver of urban growth, and economic success explained much urban growth in Southeast Asia. Yet over recent decades in Europe urban growth was small or even negative in some places, with many smaller cities and areas that could be described as 'semi-rural' enjoying sustained economic growth. Thus economic success did not necessarily generate ever-growing urban centres (Satterthwaite, 2007).

Some successful cities in the new global economy developed 'extreme' forms of urbanism, such as Dubai (Davis & Monk, 2007) and Shanghai (Gidley, 2010). Life in these cities was partly defined by the unprecedented *speed* of social, economic and architectural change. In Dubai developments included two palm islands extending the coastline by 120 kilometres; a string of new islands shaped like the world; vast shopping complexes; a domed ski resort and other major sports venues; the world's tallest building, the Burj Khalifa; the world's largest hotel, the Asia-Asia with 6500 rooms; the world's the first 7 star hotel, the Burj Al Arab; and world's largest single urban development. Dubai is the world centre of monumental excess with more or less no planning regulation and based upon the supply of poor workers imported from Asia who possess almost no rights (Urry, 2013b).

Shanghai's three decades of persistently high economic growth had been generated by manufacturing but in the 2000s the city rapidly moved towards advanced service industries (Keith et al., 2013). About 20 million square metres of new space were expected to be built every year. This involved expanding living space per person (doubling since 1990 to 15 square metres per resident in 2003). By the mid-2000s the city was still dense with about half of Shanghai's population living in an area covering less than 5% of its surface area. In 1980 there were no skyscrapers in Shanghai but by the end of the 2000s there were said to be twice as many as in New York. Although cycling is still significant (30% of all trips in the late 2000s), there were active governmental policies to limit it, facilitating car-based social practices (LSE Cities, 2005; Urry, 2013b).

Cities characterised by high density living were often seen and imagined as places of poor health and low quality of life. However, research suggests a more complex picture. At the beginning of the twenty-first century cities offered some of the worst *and* some of the best environments for healthy living. Those living in large and dense wealthy Asian cities such as Singapore, Hong Kong and Tokyo enjoyed long life expectancy. Overall data showed a health benefit from living in cities (in terms of child mortality and malnutrition) partly due to the concentration of health infrastructures (Dye, 2008; Meyer, 2013).

However, more detailed data showed that the urban poor were often not counted within these censuses. When they were included, stark differences within cities were masked by the process of 'averaging' (Burdett & Taylor, 2011). For example, Hong Kong scored high in various health indicators despite having a very high urban density. However, significant variation existed between the wealthy residential areas and peripheral populations living in 'cage-homes' (some 800,000 people).

There was also strong evidence of how inadequate infrastructures generated infectious diseases. Slum dwellers were especially vulnerable to communicable diseases, malaria, respiratory and gastrointestinal diseases as compared with other urban dwellers, but addressing this was as much a matter of better infrastructures as of new practices. The urban advantage of living in cities in terms of health diminished when these socioeconomic factors were controlled for (Satterthwaite, 2011; Meyer, 2013). Other

commentators also argued that the health advantage of living in cities may be compromised by the dramatic increase in connectivity by land and air travel between cities and between cities and tropical forests hosting some yet unknown, highly transmissible viruses with relatively long incubation periods (Wolfe, 2011).

While megacities were often associated with poor living conditions, new city rankings examining the quality of life directed attention to cities that managed to decouple wellbeing from high resource use. Many of these cities possessed good and reliable public transport, high human density, and high quality public spaces facilitating walking and face-to-face encounters. Montgomery (2013) shows how these contribute to producing what he provocatively terms 'happy cities'.

Some cities gained a reputation as places of hope that inspired similar transformations happening elsewhere. Curitiba in southern Brazil developed a four-decade experience of integrating urban planning with transportation. 70 per cent of commuters used the Bus Rapid Transit (BRT) system. Compared with other Brazilian cities, Curitiba consumes 30 per cent less fuel per capita, and users of the BRT spend a smaller portion of their income upon transport (UN-Habitat, 2013). Curitiba inspired similar initiatives in many cities of the developing world, such as Bogotá in Colombia (UN-Habitat, 2013).

Vancouver (Canada) is another example where long-term planning, a fifteen-year long investment in multimodal transport, and an open attitude towards migrants made it lively and culturally diverse. It was characterised by high density, many face-to-face encounters, and extensive possibilities for walking through extensive public spaces. Many of its tall, slender buildings were mixed-use so as to ensure that streets within the city centre were still lively in the evening (Glaeser, 2011; Montgomery, 2013).

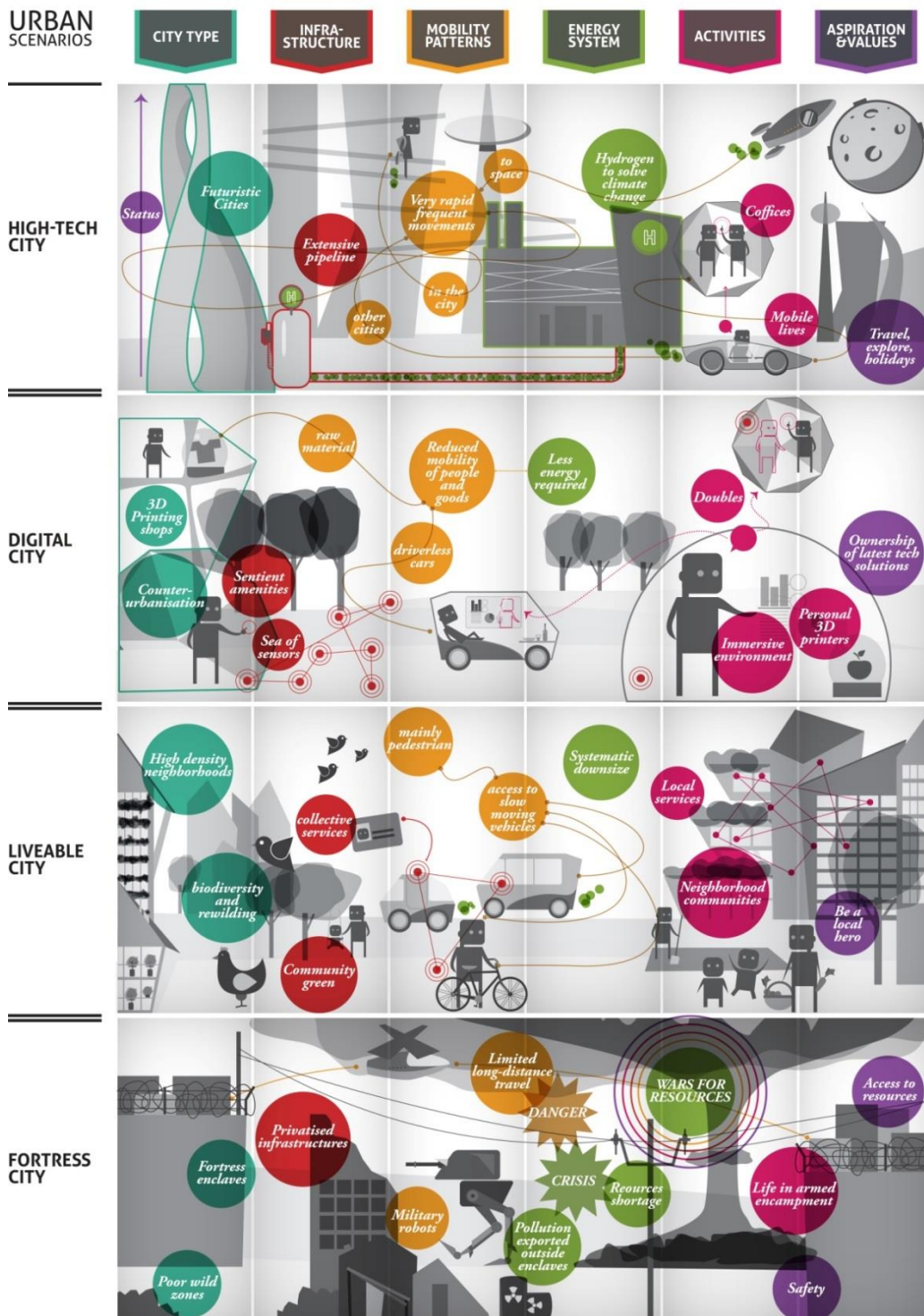
The idea that cities could become 'intelligent' places and more efficiently address transport, health, energy and water supply and economic development gained prominence by the early 2000s. Since then many cities have been blanketed with digital devices providing a flexible, almost sentient infrastructural basis for new forms of identity, communication, mobility, business and cultural production (Kitchin & Dodge 2011).

Although in most cities sentient environments involved retrofitting existing built infrastructures, some brand new cities such as Masdar in Abu Dhabi and the business district of Songdo in South Korea attracted much media attention. These expensive, living laboratories were criticised for privileging a centralised, top down approach to developing networked infrastructures and neglecting other ways in which technology and the environment can come together to facilitate livelier and more resilient urban lives (Sassen, 2013).

4. Future city lives

In this section we examine four possible transformations of city lives over the next few decades. We think it necessary to ‘think’ out possible future city system which means not merely extrapolating from existing trends. However, current trends are useful in envisaging some elements of the ways in which future cities will be structured. We avoid here the language of ‘drivers’ of the future since this does insufficient justice to the systemic, emergent character of possible future cities.

Figure 1: City futures scenarios



We term these possible city futures high tech city, digital city, liveable city and fortress city (see figure 1). We examine the conditions that would mean that by 2050 one or other of these was dominant in the UK and/or around the world. It should also be noted that none of these city futures is simply the ‘best’ or ‘ideal’. All involve significant personal and social costs. There is no future city which resolves all contradictions. These notions of future cities have in part been derived from previous formulations of future scenarios, such as, Costanza 1998; Foresight, 2006; Urry, 2013b; and Forum for the Future, 2013.

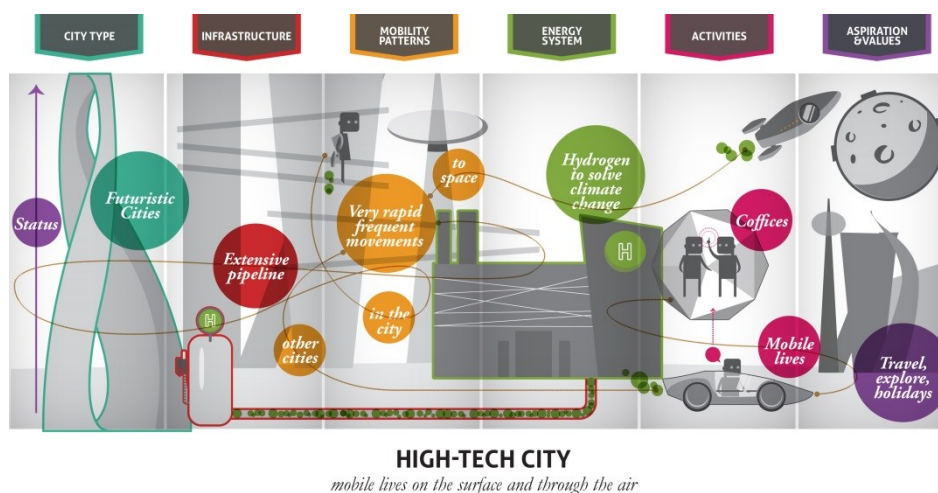
The nineteenth and early twentieth century saw the spreading of the ‘industrial city’, while the ‘post-industrial city’ became common in the latter part of the last century. We consider which of these four new ‘cities’ will become the dominant city model by the mid-twenty first century? We take 2050 as our end-point partly to relate our analysis to the time-scale used by Porritt in *The World We Made*, an innovative attempt to imagine one possible future (2013).

We especially emphasise the importance of how ‘movement’ is organised and resourced within future cities. If there is something special about cities it is that they are characterised by an exceptional scale of connections, networks and flows of people, information and objects (Bridge & Watson, 2011) - see Graham & Thrift (2007) on cities as centres of repair and maintenance. Cities are places of multiple contested mobilities, of intense, overlapping and resource-dependent flows. Underlying that movement is energy: ‘much of the city’s existence is concerned with energy flows taking place on different levels: from water and sewage through to electricity and information, from people and animals, to machines and vegetables’ (Amin & Thrift, 2002).

In particular the dynamism of modern city lives experienced on the go depends upon the ‘liquid civilisation’ of oil. What will develop in future cities depends upon what happens to these flows and in particular to oil, its price and supply and the degree to which its burning will be constrained by future climate change policies (see Carbon Tracker 2013; Berners Lee & Clark, 2013). Former Government Chief Scientific Adviser David King maintains that oil shortages and price rises engendered the financial crash that began in oil-dependent sub-prime American suburbs in the mid-2000s (see Murray & King 2012; Rubin, 2009; Urry, 2013b). All four scenarios outlined below deal in different ways with the problematic future of oil and other resources upon which mobile city lives utterly depend.

High-tech city

Figure 2: The high-tech city



This city involves people experiencing ever-more speedy and extensive mobile lives (Elliott & Urry 2010), see figure 2. People would be on the move within cities and very rapidly between them. The forms, scale and intensity of globalisation will be much enhanced. Current futuristic cities emerging in developing societies, such as Shanghai, Dubai, Qatar, Hong Kong, Rio, Seoul, and Singapore, will provide models of desirable urban development around the globe.

Movement is central to each people's 'persona'. Social status is acquired through one's own travel and consumption as well as that of one's children and friends. Average citizens travel for up to four to five hours a day rather than the hour or so at present (known as the 'constant travel time' hypothesis). Astonishing new consumer experiences become globally available as the planet really does develop into a supermarket of goods, services and friendships. Much work, friendship, family life and leisure activities occur 'on the move' with many 'devices' making most aspects of location almost irrelevant to daily experience. Education and work are globalised with much on-line but also with rapid frequent movement so 'talk' can happen; cities according to Amin & Thrift (2002) 'hum with talk' and this will be so especially in the high tech city.

We can anticipate the further growth of 'coffices' as sites for meetings and itinerant work (Garside 2014). Organisations are already facilitating informal 'unoffices' or 'jelly', where spontaneous meetingness can take place amongst casual co-workers. People meet for face-to-face engagements with multi-sensory communication. Carefully choreographed spaces not unlike airport lounges or hotel foyers will enable brief exchanges within ever-more extensive, fragmented and accelerated 'mobile lives'.

Such cities would exploit the potential of the space above the city's surface (Bridge, 2013; Elden, 2013). The high tech city would be more vertical and increasingly orbited by many kinds of manned and unmanned aerial vehicles. Already helicopters are commonplace in contemporary Sao Paulo and some other cities so that richer residents and visitors can avoid the traffic and crime down below (Cwerner, 2009; Budd, 2013). Many light personal vehicles are now available and legally permitted within urban areas. Micro-light flying is a familiar sight on urban fringes as a form of extreme leisure (Laviolette, 2012). Space-scrapers might come to be built so large that they would require aerial vehicles and other vertical forms of transport to access them (Lehto, 2013).

Recently Amazon has speculated about the possibilities of using drones to distribute their packages to customers. Freight could thus travel above the city so reducing surface traffic. Overall unmanned drones are getting smaller, with some are even designed to mimic the flight characteristics of insects such as hawk moths. These micro-drones have come in from the pages of science fiction and are getting up close, even being able to land on a window sill. Drones will also be increasingly able to swarm and so the high tech city will involve airspace as much as road space. Also regular trips into space via whatever Virgin Galactic spaceships morph into over the next few decades will become commonplace (space travel insurance is already available - see The Local, 2011).

It is also possible that vertical farms made up of high rise towers could house animals and crops rather than just people (Despommier, 2009). The push for verticality in urban planning and infrastructure design will be generally driven by elites, keen to escape the masses through unhindered aerial mobilities and high-rise living. Increasing social inequality is likely to bolster the desire for and development of the *vertical* high tech city.

This kind of city will though only develop through the emergence of a new post-carbon energy system innovated and implemented around the world. Such a system would

enable the mobilities of peoples and objects to be so much more extensive and frequent. Doomsday futures turn out to be wrong and some problems of future energy supply and climate change can be fixed through a new zero emissions sociotechnical energy system (Geels, forthcoming). High tech city requires such a new system emerging and spreading fast upon a global scale.

Such a system to move people and objects on the scale necessary to replace the energy provided by oil would need to be present now at least in embryo form. It would have to be similar in scale and significance to what followed the world's first oil gusher that occurred at Spindletop, Texas, in 1901. That gusher led to the dramatic upscaling of 'mobile' lives and large cities over the course of the last century, enabling the vast development of oil-based cars, trucks, aircraft, and military and container ships (oil accounts for 95% of transportation energy – Urry, 2013b).

Historically new clusters of socio-technical systems take decades to go global. In order to develop a new system of mobility for cities to impact within the next two decades this system must be already developing. The US National Intelligence Council (2008) summarises the time-scale involved here: "An energy transition from one type of fuel (fossil fuels) to another (alternative) is an event that historically has only happened once a century at most with momentous consequences" (p.xii). Any new system likely to make such a future high tech city by 2050 would need to be well-established and gaining global traction within the next couple of decades.

The only possible energy form that by 2050 that could substitute for oil in terms of transportation energy is hydrogen power. Indeed a decade ago it looked as though hydrogen would be the basis of a major alternative to oil, gas and coal. Hydrogen makes up 75% of the universe and in theory could provide a virtually unlimited source of especially transportation energy (within a broader post-fossil fuel mix). Rifkin (2002) described the hydrogen economy as an 'energy elixir' producing zero emissions. Many research programmes began in the 1990s exploring how hydrogen could provide this alternative energy system. Companies developed large hydrogen research teams and certain city governments set about becoming hydrogen-based (Chicago, Hawaii). In 1999 Iceland announced that it would be the first 'hydrogen society'. Significant research expertise was built up to develop the high tech city organised around hydrogen power.

However, hydrogen is not a free floating resource like fossil fuels. Hydrogen is an energy carrier that is more like electricity; it has to be produced, stored and distributed. At least half the hydrogen so far produced as energy required natural gas. There are non-carbon forms of hydrogen production but so far these are many times more expensive and rarely used (Romm, 2004).

Hydrogen can either be used within a fuel cell or can be 'pumped' directly at filling stations as a gas or as a liquid. The hydrogen fuel cell used in a vehicle system is basically a box that takes in hydrogen and oxygen and produces electricity and water as outputs. Fuel cells convert energy through a chemical reaction and produce electricity similar to how a battery functions. This development promises near-zero carbon emissions. Unlike batteries, fuel cells are not recharged and produce energy for as long as the fuel is provided. The type suitable for transport is known as a proton exchange membrane fuel cell and requires very pure hydrogen. Current models, however, supply the hydrogen from converted natural gas or oil with an energy efficiency of around 35-40% which is similar to an internal combustion engine (Lichterhan & Seetharaman, 2013).

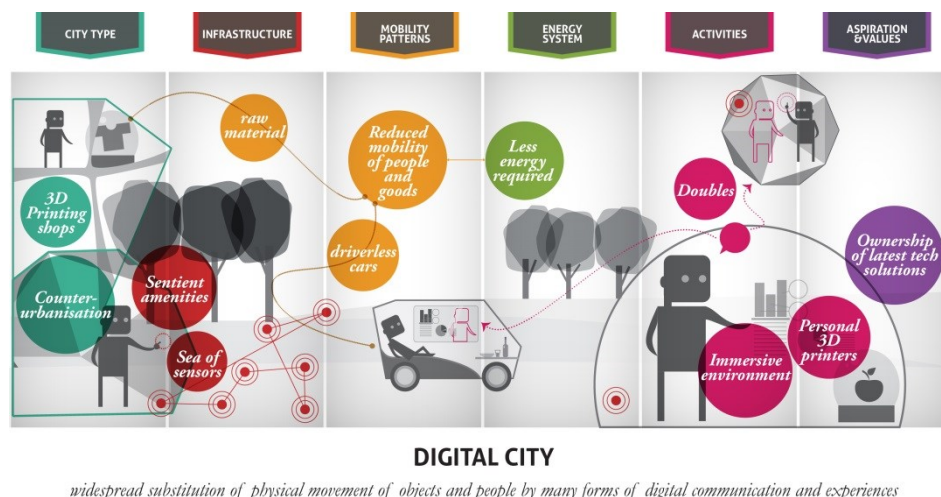
If hydrogen is directly pumped a whole new production and distribution infrastructure is required in cities. The pipelines would also need to allow for high leakage and for the tendency for hydrogen to evaporate. At room temperature hydrogen takes up more space than normal petrol fuel. Cylinders would thus have to contain a gas that is prone to leaking and to withstand all high-impact crashes. Another way to transport hydrogen would be in liquefied form in tankers but because liquefaction of hydrogen occurs at the astonishingly cold temperature of -253°C , refrigerating the gas in this way is hugely expensive.

There is thus no doubt that hydrogen-based cities would require exceptional levels of investment by both the private and public sectors, as well as many further innovations including future aircraft and ships being hydrogen-based. A hydrogen-based city would need really massive rebuilding, while the existing oil/gas infrastructure and vehicle would become relatively valueless.

Other commentators examined whether nuclear energy could substitute for oil. However, the oil currently burnt each year mainly for transportation energy is equivalent to the energy annually produced by 2500 nuclear power stations. There are currently only around 400 such stations with many coming to the end of their economic life; and after Fukushima there is little likelihood that new ones are going to be built on such a scale (Vadén, 2010). This would also necessitate an extensive reengineering of transport systems towards electric vehicles. Nuclear energy may become more extensive but there is no doubt that it would entail increased surveillance of populations so as to prevent the risky sabotage of nuclear power plants.

Digital city

Figure 3: The digital city



Digital cities would involve the widespread substitution of the physical movement of objects and people by many forms of digital communications and experiences, see figure 3. In this future 'digital lives' could develop into life instead, so that there is very little need for travel. Software would 'intelligently' work out the best means of undertaking tasks, such as meeting up, getting to some place or event, or bringing the activity to fruition through

virtual connections. Overall digital worlds would be utterly central to work, friendship and social life.

This would entail a very dramatic change in the nature of cities. So far many different kinds of 'meetings' are held in cities that are essential for human life. Crucial to meetings is talk along with food, drink, music and a shared space. Certain cities are thought to be conducive to particular kinds of meetings. Such meetings enable 'tacit knowledge' to develop, the kind of knowledge that is not easily codified. According to Storper (2013) such co-presence and its role in coordination is central to city lives. Cities gain their 'buzz' in part because of the scale of collegial, family and friendship miles that are travelled to realise such co-presence (Elliott & Urry, 2010). But establishing and maintaining meetings is costly in terms of money, time and the emotional work involved in terms of often very lengthy and tiring travel.

In the digital city there would be nothing special about these 'physical meetings' and the sites for those meetings. Thus people would say that we can know someone although they had never 'met' them, never shaken their hand nor kissed them on the cheek. Rather the virtual meeting would be regarded as good as meeting face-to-face. Likewise people would be able to say we have been in a particular place because they had 'travelled' there virtually and that it was felt to be as good as the 'real thing'. By the middle of this century immersive environments will effectively simulate meetings and the experiences of other places (Amin & Thrift, 2002; Montgomery, 2013). Moreover, physical environments would themselves be 'smart', so producing a convergence of the real and the digital. Such a smart background senses, adapts to and transforms people's lives more interactively, especially as people move around urban environments (Cooper, 2010).

We might also anticipate that meetings occur in which both physically present members and 'telecommuting' distant members operating remote-control 'doubles' in real-time participate (Weiss, 2012). Doubles project the controller's face onto a small tablet or display screen and utilise an on-board video camera to stream events live providing a microphone and outward video-camera for two-way correspondence. The double moves about the physical space and interacts with other participants, both virtual and physical. The emulation of meetingness is also made possible by ubiquitous energy charging facilities that allow doubles to move around the urban space spontaneously and without interruption or disconnection due to sentient amenities including 'smart' furniture, pavements and utilities (Shepard, 2011).

Some forerunners of this digital city are to be seen in the practices of young people in the global north. Central to rising car use in the past was the tendency for each new generation (especially young men) to be more licensed to drive and more likely to own a car. But now owning a car is less valued than owning a smartphone. It is digital lives that seem increasingly significant to young people (Geels et al., 2012). German research shows that the car is no longer a 'must-have' status symbol (Siemens, 2011). In the US, 46% of 18 to 24-year-olds would choose good internet access over owning their own car, while this is true for only 15% for baby boomers (Wheeler, 2011).

A digital city would be one based around living 'on the screen' as Turkle (1995) expresses it. The typical American citizen now spends eight and a half hours a day looking at screens, often more than one at a time (Carr, 2010). Each screen can interrupt the other so there is little enduring thinking; digital cities will involve lives of multiple interfaces, multitasking and overloading. Digital lives seem already to be altering human brains which will increasingly undertake many different kinds of tasks simultaneously (Carr, 2010).

Various futurists expect that by the middle of this century there will have been an exceptional 'intelligence explosion', what some refer to as the 'singularity' when the computing power of all computers exceeds that of all human brains (Kurzweil, 2006). This argument draws on Moore's Law, that computing power doubles every eighteen months. Kurzweil maintains that computer processing capacity will soon outstrip that of the human brain and that humanity and technology will merge with advances in computing, genetics, nanotechnology and robotics.

Digital cities will also build digital security into their infrastructures through ubiquitous computing and a 'sea of sensors'. Individual behaviour will be monitored and identified, as people leave 'traces' of movements, purchases, communications and their lives. And as databases are interdependent, so it will be possible to piece together separate digital traces of which there will be thousands per day for each person. Thus each person in the digital city will be remade as a reintegrated 'digital' self across different databases stemming from billions of computers and sensors, some of which can be as small as smart dust. There could be a network of one trillion sensors covering the world and delivering data to anyone who 'needs' it (Siegele, 2010; Graham, 2011). But with more devices, there is more vulnerability of systems with few firewalls erected between them and subsequently major possibilities of system breakdown (Eisen, 2014).

We might also think that with the digital city many people will no longer live in 'cities' as such but will visit them fleetingly. We can expect a trend of 'counter-urbanization' where some in the digital city might no longer live anywhere in particular. The Bufalino, designed by Cornelius Comanns, is a single-person apartment on wheels within a three-wheel economic and fuel-efficient vehicle designed for digital nomads. Also there are capsule hotels, first introduced in Japan for long-haul commuters, enabling affordable, brief bursts of city living (Macdonald, 2000). People might live in various places in a distributed fashion, commuting semi-regularly and also productively. People would rely on co-present digital technologies for communication, such as remote control doubles that utilise the latest camera and network technologies alongside telepresence and digital avatars to emulate meetingness. People may not commute daily or weekly, but instead elect to dwell in personal mobile homes, as the city becomes a stop on a journey rather than a destination.

Driverless (or 'digital') cars also point to experiences where the productive use of time in transit supersedes the often taxing task of driving (Laurier & Dant, 2012). Indeed, car computerization to 'drive-by-wire' offers many benefits for irregular commuters in this world beyond the avoidance of accidents from human error. Driverless cars would reduce fatigue in long-haul commutes and at the same time offer options for commuters to make their travel time productive (Sharon, 1983). Driverless cars could develop into places for meeting as people are freed from operating the vehicle, although obviously this requires some new source of transportation energy (BBC, 2014).

A crucial element of the digital city would involve the new manufacturing system often known as 3D printing. This was initially developed during the 1980s and 1990s to produce prototypes of an object before tooling up a workshop or factory to produce thousands or more copies of the 'real' object. As 3D printing developed, it was realised that many shapes and materials could be produced in quantity and not just one-off prototypes. Something like one-fifth of additive manufacturing is now of final products and this will rapidly increase (The Economist, 2011). Such a digital manufacturing system has potential cost savings: customising objects for particular consumers, printing or manufacturing on

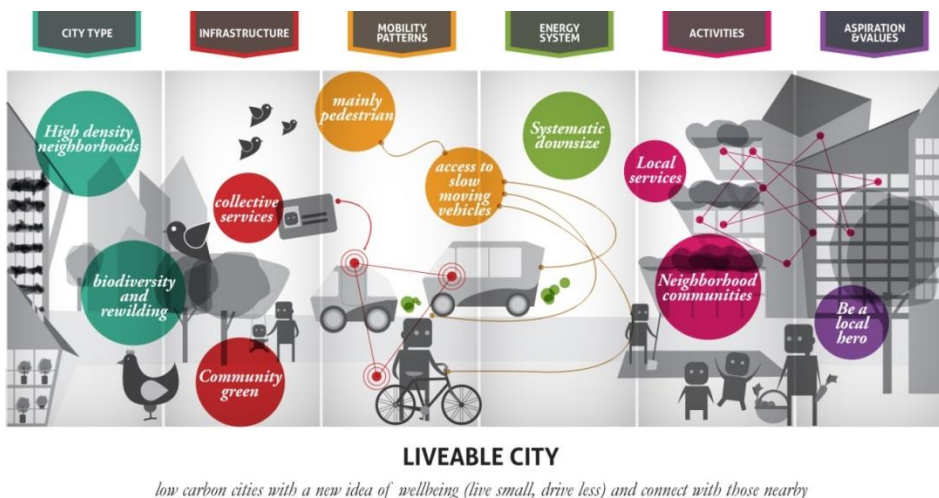
demand, being able to make small modifications to products at almost zero cost, saving on raw materials since little gets thrown away, the local adaptation of design so as to suit particular environments, and significant possibilities of recycling both unused powder and existing objects.

But the biggest transformation here is that objects can be manufactured close to or even by consumers with their own 'printer' (Birtchnell & Urry, 2013). 3D printing shops could proliferate on streets, on high streets and shopping centres. There would be the much greater localisation of manufacturing within cities. For some products the capacity to scan the object and then make endless copies by or near consumers would produce large cost savings and reduce transport-related emissions and oil use, assuming that roughly the same number of products was manufactured worldwide.

The widespread growth of 3D printing could turn the high street into a more of a manufacturing street and this would transform lives within cities. Cities would once again hum to the sound of many kinds of manufacturing, as envisaged in Anderson's, 2012, *The Makers* (Birtchnell & Urry, 2013). This would be a little like the way in which manufacturing was organised within cities in the early years of the industrial revolution in northern Europe.

Liveable city

Figure 4: The liveable city



The 'liveable' city involves lives based upon a dramatic 'powering down' that reduce the carbon footprint of residents, see figure 4. This city future would develop from often local innovation in thinking and practice undertaken by scientists, NGOs, entrepreneurs and think tanks. High energy movement machines would be much less significant. This city would involve more of a less connected, smaller scale system of neighbourhoods, indeed a fragmentation of cities into neighbourhoods. Those cities based upon a 'centre-sprawl' model would go into decline. The transition towns programme developed in *The Transition Companion* documents the necessary stages of such an 'energy descent' within towns and cities. The process should be viral, open source, self-organising, iterative and fun according to Hopkins (2011), the 'founder' of the transition movement (Social Life, 2014).

Such a powered down city would be one with reasonable levels of wellbeing although in terms of normal economic measures most people would be measurably 'poorer'. There is

much difficulty in measuring 'hidden wealth', such as good social interactions or low carbon lives that is not effectively captured by the growth or decline of a city's share of GDP (Halpern, 2010). GDP measures the sum of measurable market transactions and this figure can rise even though some of what is counted is unproductive of individual wellbeing and the environment. Such transactions do not represent high levels of wellbeing, as interestingly shown in the video which shows how the 'good life' is not the same as the 'goods life' (YouTube, 2011). Indeed increases in GDP can go along with worsening emissions and reducing levels of happiness and well-being. Hence efforts have been made to develop alternative measure of what makes a liveable city such as the happy planet index (Happy Planet Index, 2012).

Liveable cities would involve re-designing places to lessen energy use especially for transportation through enabling various social practices on a much smaller scale. This redesign must foster higher density living, heighten the use of slow travel alternatives and shift towards social practices that are more local and smaller in scale. This could, as Latouche (2009) brings out, provide more opportunity for face-to-face talk and maintaining good relations with others.

Many studies following Jacobs' (1992) *The Death and Life of Great American Cities* show the attractions of neighbours living close together, residences mixing with businesses and the lack of zoning, much use of slow modes of travel and an absence of extreme differences in income and wealth of those living near to each other. Sprawl creates sprawl. 'Post-suburban' social lives need to develop, systematically reversing the processes that generated 'sprawl' (Owen, 2011). Owen argues that the greenest city in the US is New York (or at least Manhattan) since it provides many local connections while making it almost impossible to own and use private cars. He advocates a threefold policy for promoting green metropolises: to live smaller, to live closer, and to drive less. Long commutes are bad for almost all aspects of social life and so reducing the scale and impact of commuting is essential (Putnam, 2001; Montgomery, 2013).

In such a liveable city there would be many, dense forms of localised movement, a mixed flow of slow-moving micro-cars, bikes, hybrid vehicles, electric bikes and pedestrians, with mass transport integrated into networks of physical and virtual access. Vehicles would be electronically connected through information, payment systems and physical access with collective or mass forms of transport (Owen, 2011). Examples of schemes that could be scaled up include Vélib', Autolib', Zipcar, CAR2GO and so on.

Liveable cities thus presuppose all its elements powering down and reinforcing each other in a virtuous circle. Friends would be chosen from neighbouring streets, families would not move away at times of new household formation, households would not live apart and any distant family members could not be regularly visited. In such a city status would be re-localised and based upon contributions that people made locally. High status in a liveable city would need to stem from not possessing extensive connections with others around the world. Re-engineering the nature of 'success' in societies involves emphasising the achievements of those living relatively 'local lives', being what we can call 'local heroes' (Urry, 2013a).

This requires analysis of the complex social organisation and alternative normative structure that liveable cities would develop over the next few years (Peters, Fudge & Jackson, 2010). There would have to be many transformations across all systems, enhancing what Jackson (2009) characterises as the 'capabilities for flourishing' rather than 'income'. Many analyses such as Montgomery's (2013) Happy City detail how that

after a certain level of income has been reached extra goods, services and income generated within unequal cities generate more unhappiness and less capacity for 'flourishing'. Thus extra resources are in effect 'wasted'. There is a happiness paradox.

There are various examples of liveable cities where some social practices have been effectively downsized and localised. These cities include parts or aspects of Bogotá, Copenhagen, Curitiba, Delft, Hong Kong, Portland, Totnes, Vancouver and Växjö (Owen, 2011; Montgomery, 2013). For example, Bogotá has developed many innovations including central areas of streets for bikes and pedestrians with cars located at the margins. Copenhagen developed an infrastructure which protects cyclists from road users. Delft initiated the shared-space concept. Vancouver as noted above has the lowest carbon footprint of any major north American city through high density building, little sprawl, many journeys being by bike, feet or public transport, and the provision of many green spaces and open views.

Växjö is developing a 'fossil fuel free future' in the context of a national plan that involves 'Making Sweden an oil-free Society' by 2020. It is almost halfway there without sacrificing lifestyle, comfort or economic growth. In the underground car park of local government, there are no private vehicles, just a communal green-car fleet. Staff who cycle or take the local biogas buses to work book ahead for the green-car fleet. Carbon emissions in Sweden are heavily taxed since the plan is to reach zero carbon emissions within the next few decades (Government Offices of Sweden, 2006).

Part of this process has been developing low carbon living around 'green' spaces, community gardens, and nature corridors. Indeed we might anticipate rewilding being introduced into urban settings to encourage biodiversity within the urban core. Liveable cities somehow manage to introduce 'green' spaces and more diverse flora and fauna while keeping cities relatively dense and avoiding sprawl. Neighbourhoods would be crucial site for city lives that would be less obviously 'urban'.

Fortress city

Figure 5: The fortress city



FORTRESS CITY

rich societies break away from poorer in fortified enclaves. War for resources.

The Fortress City is one where the development of 'gated societies' is taken to the extreme, see figure 5. Richer societies would break away from the poorer into fortified enclaves. Those able to live in gated and armed encampments would do so, with much

privatising of what were once at least in some societies, public or collective functions (Leichenko, Thomas & Baines, 2010; Graham, 2010).

Those outside the enclaves would be living in 'wild zones' which the rich and powerful would pass through or over as fast as possible. Systems of secured long range mobility would disappear except those used by the super-rich. Those outside the enclaves would be unable or unwilling to travel far. Long distance travel would be risky and probably only undertaken if people or machines were armed. The rich would mainly travel in the air in armed helicopters or light aircraft, a pattern prefigured in Sao Paulo (Cwerner, 2009). This future involves 'fortressed' walled cities and an extensive 'security-isation' of populations, similar in some ways to cities in the medieval period which provided protection against raiders, invaders and diseases.

Thus in such a city, as futurists Gallopin et al. (1997) argued: "the elite retreat to protected enclaves, mostly in historically rich nations, but in favoured enclaves in poor nations, as well [...] Pollution is also exported outside the enclaves, contributing to the extreme environmental deterioration induced by the unsustainable practices of the desperately poor and by the extraction of resources for the wealthy' (p.34). Versions of this can be seen in the contemporary world with the 'offshoring' of waste and emissions to poorer, developing societies (Urry, 2014).

In this 'barbaric' future, oil, gas and water shortages and intermittent wars would undermine production, mobility, energy and communication connections and critical infrastructures (Froggatt & Lahn, 2010). Given energy shortages many infrastructural systems would collapse with increasing separation of production and consumption between different regions. There would be the increasingly localised recycling of bikes, cars, trucks, computers and phone systems. Much of the time these systems would not work with little capacity within such cities to organise systems of 'repair' (Graham & Thrift, 2007). The infrastructure would be left to rust away when it no longer worked.

Such an energy-starved city would involve a falling standard of living, the ever-greater focus upon the 'products' of the increasingly privatised security industry, probable re-localisation of mobility patterns, towns and cities built for visitors deteriorating into ghost towns, and an increasing frequency of resource-related wars. These would be increasing frequency of what have been described as 'new wars' (Kaldor, Karl & Said, 2007). These involve private mercenaries as well as statist military forces; de-professionalised armies (sometimes made up of 'boys'); the use of weapons bought through the market/internet; an asymmetry of military force with no fixed 'fronts' or treaties and peace processes; the military targeting of civilians through *inter alia* suicide bombing and drone attacks; the role of warlords who combine entrepreneurial and military skills; and the tendency for such wars to last interminable periods of time. Lives in the fortress city would be conducted with the continuous spectre of warfare, of the militarisation of young men and the raping of women and girls a constant threat to a decent life.

These new wars would develop in the context of failing states where there is no monopoly of physical coercion in the hands of legitimate national states, especially given the growth of 'private warlords' (Woodbridge 2004). Such new wars are especially likely around energy and related resources, involving states, corporations, NGOs, terrorists and many other non-state networks. And new wars make states more likely to fail and render the conditions for extracting, transporting and refining resources exceptionally troublesome (this would reduce effective energy reserves even further).

This is a kind of 'neo-Medievalist' vision of cities of the future. As in the Middle Ages, there would be little democracy, limited powers of states to govern legitimately, many non-state bodies with a mix of military and ideological powers, much illegal movement of peoples across borders, various empires, many new wars and intense conflict over scarce resources. City lives would be as in Hobbes's *Leviathan*: "solitary, poor, nasty, brutish, and short [when 'place-hacking the [apocalyptic] city']" (Garrett, 2013, p.60-1).

Former NASA scientist Lovelock (2006) rather similarly asked of the future: 'is our civilization doomed, and will this century mark its end with a massive decline in population, leaving a few survivors in a torrid society ruled by warlords on a hostile and disabled planet?' (p.151) Lovelock along with others thus points to the generalised 'peaking' of oil, gas and water, as well as 'western life' more generally that seems to be occurring in the early years of this century. These shortages will make economic production and social lives more local than appeared likely during the increasingly mobile twentieth century.

Mad Max 2 depicted such a dystopian violent future. This movie was conceived of following the 1973 OPEC oil price rise when various doom-laden futures were envisaged in the 'west'. This movie presented a vision of a bleak impoverished city facing breakdowns of civil order resulting from oil and other shortages. Power rested with those able to access oil or to improvise new mobilities such as being able to get airborne (see Budd, 2013, on the growing significance of private air travel).

Some commentators argue that the rise and dramatic fall of Detroit is a harbinger of such developments. By the 1950s, the city was home to almost 2 million people with very many employed within the American car industry. But Detroit's population has now fallen to less than 750,000 and has been described as a forgotten place. The film/DVD *Detroit: The Last Days* shows rusting hulks of abandoned car plants, empty freeways, blackened corpses of burnt out houses, trees sprouting from the tops of deserted skyscrapers, half the children living below the poverty line, and almost half adults functionally illiterate (Temple, 2010).

This may thus provide lessons as to what might unfold more generally if fortresses get established elsewhere, while places like Detroit are left to die. Indeed places left to die may be subject to a 'rewilding'. The city is not only 'multicultural' but also 'multinatural' (Lorimer, 2012). We might anticipate the spreading of many 'invasive species' that are dangerous for urban liveability. Innovations could permit the growth of a rewilded 'urban jungle'. This future world would involve herbivores to predators living within the midst of the city outside the fortress and contributing to the extensive rewildness of such zones (Monbiot, 2013).

Even more striking is the possibility of four-limb, battery-powered 'walkers'. US company Boston Dynamics are progressing with their robotic 'mammal bionic quadruped' walkers (Ackerman, 2011). These robots as well as others are modelled on animal movements and can through sensors and artificial intelligence self-correct their patterns of movement in response to their environment (Li et al., 2011). Also able to carry heavy payloads these 'mammal bionic quadruped' walkers could transport humans, enclosed or not, across variable terrains and be more conducive to wild landscapes, allowing interaction with predators and de-domesticated animals outside the fortress city.

5. Living in the city

In this paper we documented some ways in which living in the city has been organised and reorganised over the past few centuries. Obviously this is a vast topic and we have been selective in our treatment. And we have had to range over many different determinants of such lives, considering the energy, engineering, design, economic and political bases of life in cities within Britain and elsewhere. The paper tries to address at each historical stage the movements of people, objects and communications; the changing nature and location of work; forms of leisure, consumption, and education; and family and friendship lives, although the form these may take in the four city scenarios are sketchy.

We began by examining some early formulations of the nature of city lives, asking in what ways cities generate distinct patterns and why. We particularly noted the Simmel's account of life in the metropolis and also that of later analysts. This included research carried out on the nature of urban villages, the significance of suburbanization and the ways in which cities are not just lived in but are also centres of tourism and consumption.

Second, we described how cities in Britain developed over the past few decades, from the 1970s to the present day. We noted the shift from manufacturing towns and cities to various kinds of 'de-industrial' or 'post-industrial' cities. British cities experienced inner city decline as well as gentrification, of service growth and suburbanisation, of digitisation and surveillance. We noted some differences between London and the rest of Britain.

Third, we documented the changing patterns of urban living around the world over this same period. We especially noted the global shift of city populations from North America and Europe to the developing world. In the latter there has been a striking growth of people living in informal settlements, but that these are not just places of loss but of new kinds of activity and practice. We noted some significant efforts to develop new forms of liveability within various cities outside the UK.

Finally, we set out and visualised four different 'cities' that are possible by the middle of this century drawing upon much research and evidence relating to varied futures. These are the high tech city, digital city, low carbon city and fortress city. There are two crucial questions: are these coherent futures which could plausibly get to be sedimented; and if we backcast from 2050 which of these city futures are the most likely to be realised? What sets of events and processes would have to materialise in order that one or other such city future would develop and become dominant?

Clearly many different shocks to the city system will occur over the next few decades. In Porritt's (2013) somewhat analogous *The World We Made* these shocks include water riots in the Middle East, the peak oil moment, cyber-terrorist attacks on nuclear power stations, implementation of an International Financial Transactions Tax, hurricanes that produce total devastation across the US, the 'Great Famine', an EV with a 500 mile range, global food riots, spectacular climate change disasters and so on. He examines how these and other shocks interact over time and may come to result in varied outcomes although he considers that a benign solution will successfully emerge by 2050.

The four city futures outlined above presents hugely different sets of lives for future residents of cities, from high tech ultra-mobile lives, to a digital convergence of machines and humans, to a powered down liveable city with a major reversal of existing systems, to a bleak dystopic world of city fortresses, wild zones and feral invasive species. A

further exercise would be to backcast from each type of city and examine what set of interdependent 'shocks' would have to occur in order that a particular city type would emerge.

Obviously these different city types may come to be geographically concentrated in one or other region of the world although we would anticipate one being likely to be the most common.

Finally, we do not think that the kinds of shocks to the systems would necessarily result in the benign outcome that Porritt (2013) elaborates. And whatever we may like to plan for is not going to emerge in any simple unfolding process. Indeed all ways of living in the future will involve many costs as well as benefits; none is simply best or ideal. None of the four futures is without many significant costs. So while maybe three-quarters of the world population will live in 'cities' in some sense in 2050 many of their lives will be 'nasty, brutish and short'.

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