3 On being smart about cities

Seven considerations for a new urban planning and design

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Smart cities or smart urbanism

Cities periodically experience transitions. There have been at least two in the past 200 years. In the nineteenth century, Western cities transitioned from medieval to industrial city structures. In Europe, motivated by taming discourses derived from the logic of industrialism, city planners tore down the city walls to make way for a new infrastructure of factories, railways and housing. They installed elaborate sanitary infrastructures to combat diseases. In the twentieth century, the invention of the car initiated a second transition. This time motivated by the taming potential of urban modernity, the resultant large-scale readjustments resulted in ring roads, high-rise tower blocks, central business districts and the 'suburb'. Today, there is a need, some argue, to re-tame the city by making a transition to eco-efficient city structures, or what some technology companies refer to as 'smart cities'.

The taming discourse of the 'smart city' promises an era of innovative urban planning. Information and communication technology (ICT) drives the discourse, aiming to make cities safer, cleaner and more efficient. Smart cities will then be able to 'sense' behaviour via 'big data' and use this feedback to manage urban dynamics. City planning will then become a continuous experiment, with cities serving as 'living labs' for new products and services. The optimism of this new taming discourse is captivating, but requires critical interrogation.

This chapter aims to assess whether this idea of smart cities possibly contributes to the quest for the sustainable and resilient urban system we need. It reflects on the motivations for and challenges of past transitions to appreciate the untameable complexity and multifaceted nature of urban transitions that the smart city discourse may be ignoring.

Urbanization is always the outcome of a process of discourse formation in which coalitions shape up and solidify around particular agendas, approaches and technologies. In that sense, studying smart cities is of paramount importance. It is a taming discourse that may well influence city development in the years to come.

What is new is that we now need to think about urbanization as a global phenomenon. Demographic calculations suggest that up to 70 per cent of people will live in cities by 2050, with most new urbanization taking place in Asia and sub-Saharan Africa. The reports of global consultancies such as the Boston

Consultancy Group agree with the World Bank's mind-boggling estimates of the US$30 to $50 *trillion* required in urban infrastructure investment over the next 20 years. This investment would extend infrastructure in the developing world and retrofit existing infrastructure in the developed world, some of which dates back to the nineteenth century.

While the consulting companies generate seemingly 'scientific' estimates of investment potential to activate the major financial institutions to participate in the new taming discourses aimed at modernizing rapid urbanisation, the smart city agenda suggests a way to spend this money. It proposes a digital upgrade to increase city efficiency without much reference to equity and social justice. It gives us a sense of déjà vu. The discourse of the modern, functional city that dominated twentieth-century planning promised a healthy urban life for all, with free-flowing traffic and electricity 'too cheap to meter', yet was not able to deliver. When it comes to smart cities, future possibilities look enticing but past failures are ignored because of the durability of suspect assumptions about how easily the city can be tamed.

The important debate on the future of cities deserves to be grounded in an understanding of the history of urbanism and the complexity of taming and untaming dynamics. This understanding can help frame a resilient and shared vision, without which investment is likely to flow into short-term agendas based on outdated twentieth-century urban planning practices.

Alternatively, if 'urban metabolism' is placed at the centre of the analysis, the potential for a harmonious transition becomes questionable. This chapter examines how we can infuse the smart city discourse with an understanding of the natural flows and particular histories of cities, their potential governance and institutional models, and the possibilities of organizing learning, both in and between cities. It argues that we need a 'smart urbanism' – a body of thought on urbanism that is powerful, integrative, action-oriented and sufficiently cognizant of the fact that there are severe limits to what can in fact be tamed in the rapidly expanding and transforming cities of the world.

The smart city as discourse

Urbanization is a crucial challenge for the twenty-first century. More people will urbanize in the next 40 to 50 years than in the last 200, according to the World Bank (Hoornweg and Freire 2013). This implies that in 'just 40 years cities will need to build the infrastructure for an additional 2.7 billion people' (2013: 125). China wants to rehouse 250 million people from rural areas to cities by 2030 (OECD 2013). The UN Department of Economic and Social Affairs (UNDESA) estimates that African cities will house an additional 800 million people by 2050 (OECD 2013: 33). This raises serious infrastructural challenges in terms of transportation, water and wastewater, solid waste and energy.

The notion of smart cities has emerged in this context from the major global technology companies as a logical way forward. According to the World Bank publication, applying smart city technologies could reduce carbon dioxide

emissions by 7.8 gigatonnes by 2020 (Hoornweg and Freire 2013: 9). To put this figure in context, in 2012 US national emissions were 5,194 megatonnes and China's were 9,864 megatonnes (Olivier *et al*. 2013). However, while combining the full effects of applying smart technology looks impressive on paper, implementation faces political and physical challenges that the smart city discourse hardly ever recognizes.

In policy and politics, often smart cities are understood as a set of devices, proposals and instruments to be adopted, installed and operated. Policy-makers see this as a programme that opens up space for corporate entities to sell technological solutions. These solutions would address problems such as health, traffic congestion, energy supply, water supply, waste management and environmental quality. This top-down and centralized perspective is then typically criticized from a bottom-up perspective, which focuses on 'smart citizens' and open platforms (Townsend 2013; Greenfield and Kim 2013). The debate risks getting caught in a dichotomy where *a priori* value preferences ('small is beautiful' or 'big problems require integrated solutions') determine the stance of various actors.

Real change comes about through the emergence of a coalition of forces that creates the necessary persuasive power. Actors in the coalition agree on a strategic orientation and share a language for discussing cities. They do not necessarily agree on all the details. 'Smart cities' can be represented as such a discourse, as a way of seeing and talking that highlights some aspects of the urban reality while phasing out those realities that are inconvenient, in particular the affordability of the envisaged urban systems for those who are not formally employed.

Discourse is defined as 'an ensemble of notions, ideas, concepts and categorizations through which meaning is allocated to social and physical phenomena, and which is produced and reproduced in an identifiable set of practices' (Hajer 2009: 59–60). In this sense, Keynesianism or neoliberalism is a discourse, as both offer ways of seeing that became institutionalized into rules and routines. This is why discourse analysis postulates that language matters. Through language 'some issues are organized into politics while others are organized out' (Schattschneider 1960). In this way discourses become the tools for how the taming of the city is organised. Counter-hegemonic discourses, however, give expression to that which cannot be tamed by the process of 'organizing out' inconvenient truths.

When it comes to smart cities as a taming discourse, concepts such as 'smart grids', 'big data', 'efficiency', 'infrastructure', 'system' and 'information' dominate. This highlights the first key aspect of the smart cities discourse – it is a managerial project with a focus on using ICT to solve urban problems. This dominance of ICT leads urbanist Mark Swilling to view the 'smart city' discourse as a form of 'algorithmic urbanism' (see Chapter 2).

Second, smart cities are typically discussed in new, cross-over fora in which business, government and knowledge institutes find each other. These meetings are important, as this is where the imagination of the possible futures shapes up.

Third, smart cities are oriented to a particular organizational idea featuring public–private partnerships. This has implications for how consumers pay for their urban services. A 'pay per use' approach will replace 'public works' financed

via taxation (Graham and Marvin 2001). While this provides an excellent private business proposition, the process neglects to examine how particular understandings of the 'smart city' relate to existing governance systems or civil society.

Fourth, smart city discourse approaches innovation primarily as a technological matter. It does not discuss the very *conditions* under which transition has to occur. The importance of looking at conditionalities has emerged strongly in one of the first comprehensive studies of a 'smart cities' partnership, the T-City in the German city of Friedrichshafen (Hatzelhoffer *et al*. 2012).

Fifth, smart city discourse is notably weak on the history of urbanism. Pointing at 'efficient' solutions is not new; the question is why technical solutions were often not seen as preferable and most had undesirable unintended consequences when implemented.

When it comes to cities, there can be no fixed solutions. The notion that the city is untameable suggests that urban politics is about making difficult choices, often after lengthy (often unpredictable) public consultation processes (Barber 1984; Hajer 2009). For the advocates of smart cities the challenge may lie in avoiding the dichotomy between the taming intent of 'big' tech solutions and the untaming dynamics of bottom-up participatory planning. What is undeniable is that we cannot continue to build cities on the default twentieth-century model that assumed centralized control via large public and private bureaucracies. Today, governments are also more vulnerable, and lack the authority, legitimacy and funding to 'bend the trend'. We may need to invent and define a mode of collaborative smart urbanism through debate that recognises that the city can only be tamed to a point, beyond which a much more complex world exists – this more so than ever before.

Previous city transitions

The sanitary reform movement

The problems faced by contemporary cities, while daunting, are not without precedent. The period from the mid-nineteenth century onwards is particularly instructive, as in this era cities began to install public infrastructure. The first sanitary survey of New York City took place in 1864:

> The inspectors wrote about overflowing privies, slime-covered streets filled with horse manure, and slaughterhouses and fat-boiling establishments dispersed among overcrowded tenements. One inspector reported that blood and liquid animal remains flowed for two blocks down 39th Street from a slaughterhouse to the river.
>
> (Pizzi 2002)

Cities such as London, Paris and Berlin faced similar consequences of slum life. To tame these cities, city governments cleared the slums, installed sewage systems and provided good drinking water. This eventually put an end to frequent epidemics of typically urban diseases in Western cities.

With hindsight, the installation of this infrastructure seems a coherent exercise. However, the process involved political conflict, resistance from vested interests and coalition-building. Social reformers such as Edwin Chadwick and Charles Booth put the issue on the agenda, and journalists spread the message to a wider audience. Governments began to investigate the challenge. Those with vested interests were only persuaded once comprehensive statistical work showed the need for sanitation infrastructure. In effect, infrastructural works on both sides of the Atlantic resulted from a 'sanitary movement' discourse coalition that combined the social issue of urban blight (ethical values) with installation of new infrastructure (technical considerations).

This new sanitation discourse inspired planners and designers to envision alternative city futures. People such as Frederick Law Olmsted, Ebenhezer Howard and Patrick Geddes responded to the call for more liveable cities, and each invented forms of city planning designed to reconnect the city to its natural environment in ways that effectively allowed cities to tame the ecosystems upon which they depended (see Chapter 2 for how this worked in Kolkata). The possibility of a more harmonious world inspired their designs. While their influence was never direct, their ideas became elements in the discourse. These elements were shaped further by political ideology, new technological inventions and choices of organizational form. For example, Howard's garden city idea paved the way for the suburb, but stripped it of his societal idealism.

The history of the sanitary movement of the nineteenth century illustrates that technological solutions cannot be isolated from the broader socio-political dynamics that shaped responses to the public problems of the day.

The modern city

The 'modern' movement dominated urban planning in the 1920s, epitomized in the work of the Swiss/French architect Le Corbusier and influenced by thinkers such as Siegfried Giedion, Walter Gropius, Bruno Taut and J. J. P. Oud. Planners and designers used new materials and methods of construction, such as steel, concrete and prefabricated materials, as well as modern styles, to create higher buildings. The modern movement continued to aspire to the 'garden city' notion and socially utopian ideals. By linking architecture to urban planning, the movement could use new materials to overcome public health problems and show ways to improve living conditions. There was an emphasis on differentiating spaces for working, living and leisure – each according to tightly defined codes aimed at effectively taming the unruly and (in certain parts of the world) potentially revolutionary popular classes. In modernist planning, nature was rigidly conceptualized so it could be ruthlessly tamed. Planning focused primarily on air quality and adequate lighting.

The possibilities of science provided the foundation for the modern movement, which proclaimed the 'functional city' as a solution to the urban problems of the day. The movement used survey and statistical analysis to find efficient solutions, with an emphasis on zoning, rather than detailed design. Cities, with some exceptions, have never taken up these solutions in their entirety.

Technological development and social critique outpaced modernist design. Prospects for the urban world also changed after the Second World War. The mass availability of the car created new transport issues in cities (see Berman 1983). Urban planners such as Robert Moses were active in a complicated discourse coalition that included real estate interests, mobility management concerns and bureaucratic strife between different agencies.

The modern movement relied on its strong ties to city governments, and employed a persuasive narrative linking the application of the latest technologies and the realization of political interests. Just as the dystopia of urban blight propelled the nineteenth-century sanitation movement, the utopian vision of a clean and dispersed car-based city captured the imagination of political elites. The imposition of this modernist format tamed cities in their very essence, diminishing them as untamed places of exchange, of inspiration and openness.

Following the Second World War, city planners restructured cities to accommodate the car. The emergence of the car as a means of mass transport extended the socio-spatial scope of modern planning projects. It was also at this time that planners conceived of highway systems. The mobility provided by the car allowed people to live further away from work. The car enabled the materialization of the 'suburb', which became a cornerstone of the 'American dream' promising a new way of life for the middle class that became an aspiration for people all over the world.

Europeans saw 'suburbanization' as urban sprawl, and attempted to guide the overflow into newly constructed cities, such as Milton Keynes in the United Kingdom. These new cities connected to the main urban centres through prioritized public transport systems. The regional scope of the city found its new expression.

The story of the modern city is told mostly through descriptions of organized housing and transport systems. However, most modern post-war cities were supplied by centralized, fossil fuel-based energy systems that generated electricity and delivered it to homes via a grid.

The transition to the modern city illustrates how twentieth-century urban development was the product of a discourse coalition in which planners and designers only played one part in the taming of the city. The idealism of the modernist planner must be seen in the context of continued economic growth, the motor industry's push to make cars consumer goods, and the emergence of a broadly shared sense of a good life related to suburban living. Resource use and waste were not taken into account, as much of this happened outside of city perimeters.

Cities in the Anthropocene

Until recently, nature has functioned as a useful hinterland for cities, providing the necessary building materials, fuels, water and food. Simultaneously, nature also functioned as a sink to clear away our waste and emissions. The nature–society nexus has now become dysfunctional.

Cities run on fossil energy, which causes global warming; they extract too much drinking water and do not recoup wastewater and nutrients; and they pile up waste in landfills. The modern system allows non-renewable resources, such as phosphorus and nitrogen, to flow into rivers and seas, causing environmental havoc, and throws away precious metals into landfills.

In the early 1990s, Nobel Laureate Paul Crutzen suggested that our industrial way of living had *geological* consequences. He coined the term 'the Anthropocene' to express this (Crutzen 2002). Subsequent work by Rockström, Steffen and others reinforced this claim. The human species is crossing planetary boundaries (Rockström *et al*. 2009; Steffen *et al*. 2004) in terms of climate change, biodiversity loss and the nitrogen cycle, and is at risk of crossing others. It is now important to rethink how cities function based on the acceptance of natural limits to the way they use resources.

The failure to conceptualize the relation between the city and the natural environment in metabolic terms was one of the tragedies of twentieth-century planning. While the early 1920s planner Patrick Geddes followed an integrated approach to the city and its hinterland, the subsequent modernist influence was oriented to growth and driven by a belief in the superiority of engineering and science. Most twentieth-century cities are locked into fossil fuel-based infrastructures, and this lock-in is institutionally embedded, making it difficult to transition to an ecologically benign metabolism. Scientists speak of 'nexus' problems in which issues around climate change, energy consumption, land use and biodiversity loss are fundamentally intertwined. A metabolic approach brings out those connections.

The tragedy is that urbanization patterns in the new cities of the global South are mostly following the default trajectory of the West. This is most apparent in the cities of China. The 'airpocalypse' in Beijing and other cities creates serious health hazards, affects agricultural production and negatively affects the economy (*Guardian* 2014). The decontextual high-rise developments in African and Asian cities follow this model more broadly.

Somehow the cities of the global South must find ways to leapfrog using available knowledge and technology and ways to reconfigure the urban metabolism of cities. Countries in the West introduced environmental protection and mitigation measures in the 1970s; however, the cities of the global South have not been allowed to leapfrog and they are now experiencing the same problems, but on a grander scale. For example, 3 billion people in the world still drink poor-quality water, and in India, only 160 out of 8,000 towns have both a sewerage system and a sewage treatment plant (Biswas and Brabeck 2014).

Smart urbanism: an agenda for planning and design

We are currently experiencing a discursive shift to create the new practices of twenty-first-century planning and design. In discourse analysis, we differentiate between 'discourse structuration' and 'discourse institutionalization' (Hajer 1995: 60–1).

Discourse structuration describes the process in which a particular way of understanding reality settles and becomes generally accepted. At this point, a particular sense of problems and solutions emerges. This discourse may become the new 'normal', and become institutionalized in new rules and routines, in laws, in new business models, in new roles for actors, and even in newly shared values.

Moments of discursive shift are moments of opportunity. The old institutionalized power relationships give way to debate. New actors often appear to discuss new issues in crossover fora. This is what is happening around the notion of a 'smart city'.

Let me share seven considerations that help smart city planning and design to break free from the assumption that it will be relatively easy and painless to tame the city.

'Decoupling' as the strategic orientation

In the next decades, we will need to decouple the rising prosperity of the city from ever-increasing resource use. For instance, we need to create our wealth using about a tenth of current greenhouse gas emissions. The UN Environment Programme (UNEP) International Resource Panel (IRP) *Decoupling Report* (UNEP 2013a) has brought this perspective into a wider urban agenda. Decoupling is a major break from the current 'urbanization by default' pattern, but if it is not achieved, cities will face increasing pollution, rising emissions, congestion and rising input costs, as prices absorb the downstream effects of resource depletion.

A persuasive story line about the future

Planning theorist James Throgmorton described planning as 'persuasive story telling about the future'. He argued that the essence of planning was not about ends and means, ordering and organization; rather, it was about a vision, a persuasive story with generative capacity. This persuasive story informs plan-making, restructuring, organizing and logistics (Throgmorton 1996) and confirms the central thesis of this book, namely that success today depends on ensuring that everyone is involved at all times.

We need new, persuasive ideas for the city that mobilize actors and resources, and that give city governors the confidence to make changes. The 'smart city' discourse mobilizes positive energy among elites, but it lacks a connection to the broader social reform agenda. Reconceptualizing the city must take into account the need for environmental sustainability, social justice and resilience to future shock. Smart technologies must enable cities to stay within a 'safe operating space' in terms of planetary boundaries; in addition, this space must be socially just (Raworth 2012). How to fuse these two 'spaces' is the heart of current debate on sustainable development goals. Creating separate goals for cities offers a way of linking urban development to the broader normative debate.

Smart cities are related to the concrete aspects of urban planning and policy-making, allowing for enhanced efficiency. This translates into the city being cheaper and easier to navigate, explore and exploit, as well as cheaper and easier to manage. Smart urbanism calls for a language that expresses more than efficiency and technology.

Urban metabolisms as a framework for strategic decision-making

Some aspects of good city life are very visible, while the metabolism of a city – the constant flow of inputs and outputs – is almost invisible. These metabolic flows comprise water, energy and food (UNEP 2013a; Ferrao and Fernandez 2013), building materials and wastes, among others. Inefficient metabolic systems will be vulnerable to the inevitable price effects of predicted resource scarcity, and they are likely to lead to negative feedback loops, such as smog.

Even the global North lacks statistics on its cities' inputs and outputs. Initiatives such as the Large Urban Areas Compendium by the World Bank and the Global City Indicators Facility are therefore timely (Hoornweg and Freire 2013; GCIF 2014).

Understanding urban metabolism calls for a focus on potential, on transformation and on transition, as well as on monitoring and evaluation. It is a multi- and trans-disciplinary effort involving designers, planners, scientists and policy-makers.

Focus on the default in infrastructure

Connecting smart city discourse to a sustainable urban metabolism provides the discourse with a purpose. The IRP identified the crucial role of urban infrastructure as 'to promote resource efficiency and decoupling at the city level, as well as well-being and access to services of their citizens' (UNEP 2013b: 7).

Infrastructure is a deeply problematic field from a governance point of view, as it is mostly sunk, covered and static. It is the result of decades, sometimes centuries, of cumulative investment. Maintaining and changing infrastructure is complex because it is used daily. However, existing infrastructure sets the default via the existing hardware of urban networks and via the software that determines how we use them. Smart technology can contribute to change via the latter, as it is easier to change the way we use, for example, the roads than the roads themselves.

Rules and ownership of infrastructure present challenges. Policy-makers need to reflect on the social consequences of the rules they adopt. For example, smart meters and smart grids might serve citizens, but privilege companies.

The days of blueprint urban planning and development are over. A large part of the predicted urbanization will take place in weak states with low regulatory capacity. Peer-to-peer learning could compensate for this lower capacity for strategic forward planning. Decoupling might be more about learning and copying than about elaborate bureaucratic planning.

Beyond the notion of a 'smart city from a box'

The idea of 'smart cities from a box' – generic concepts that are imposed on cities – will not work because cities are inherently untameable. Experimental cities such as Songdo in South Korea, Masdar in the United Arab Emirates and Dongtan in China have not lived up to their sustainability promises. They are the twenty-first-century equivalents to Brasilia, Abuja, Melbourne and Chandigarh, and clearly demonstrate what happens when governments plan for sustainability, but use outdated twentieth-century concepts (Kuecker 2013; Townsend 2013; Ferrao and Fernandez 2013: 131 ff.; Premalatha *et al*. 2013).

Engineers cannot decouple resource use and rates of economic growth in cities on their own, as technology and society are linked in complicated ways. For example, a car cannot be analysed as technology in isolation; it feeds into a broader system encompassing motorways, parking garages and out-of-town shopping malls to create the very idea of the commuter lifestyle. It is also central to a powerful industrial complex that creates jobs, generates knowledge and drives innovation. The importance of placing technologies in context cannot be overestimated. *Social innovations* can often bring about change. Examples of untamed technological innovations in the social sphere include community websites that organize sharing of tools in services.

It is most likely that a new blend of social innovations, new technologies and new business models will provide the disruptive force required to shift the dominant modern system.

A new open and collaborative politics

The notion that the twenty-first century will be shaped by 'decisive acts' by an elected city council is misguided. Innovation in the spheres of technology and social forms of organization outpaces the capacities of classical-modernist forms of government to implement taming strategies (cf. Hajer 2009, ch.1).

In *Seeing like a State* (1998), anthropologist James Scott studied the failure of schemes aimed at improving the human condition. He noted that when a state is overconfident in its reliance on science and technology and a civil society is too weak to raise questions or provide resistance, the state implements disconnected plans. These plans then place an undue burden on the state to execute the scheme, which often results in the adoption of authoritarian methods. This weakens the possibilities of joint implementation and learning.

Smart urbanism is about constant learning, inspiration, measuring, analysing and readjusting

It is necessary to rethink how public administrations operate within increasingly complex untameable environments. A well-educated civil society raises astute questions and demands, and the classical 'decide, announce, defend' model is vulnerable in a world of constant learning. ICT brings 'protoprofessionalization'

within reach of many, and governments now face an 'energetic society' (Hajer 2011) that they can either embrace or antagonize. The art of urban planning must become the process of facilitating the untamed intelligence of a given city's citizens.

The ideas of John Dewey and the subsequent writings of Don Schon on learning, and the rethinking of public policy by authors like Majone and Wildavsky, who saw implementation as a phase of continuous learning (Pressman and Wildavsky 1984), align with the notion of an untamed 'energetic society' enhanced by access to and use of technology.

It is by no means obvious that cities will follow this track. The alternative option is that governments follow the established classical modernist model and aim for big contracts with a single party or a consortium of parties. It would then be easier to control upgrades of city infrastructure in terms of contract and performance measurement, but most likely far more difficult to learn and readjust.

Elsewhere I have argued for *radical incrementalism* in using the enhanced collective intelligence of cities to move towards a sustainable future without resorting to traditional tools to tame the city (Hajer 2011). This requires an open format to stimulate the entrepreneurial spirit. It assumes that infrastructure is conceived as a backbone to 'new' city life and that there are possibilities for continuous learning on that backbone. For example, open fibre-optic cable networks could facilitate entrepreneurs in providing new services.

It is important to consider the governance of infrastructure transitions. We need a strong coalition to make the transition; however, the organizations currently promoting smart cities are so powerful that they often exclude citizens from the process. Amsterdam's 'smart city' agenda provides an interesting blend of high-end, high-tech interventions and a scattered set of experiments that involve citizens, along with collaborative projects that implement decoupling at street level (ASC 2014).

Collaborative governance implies openness to different outcomes. It is not effective if viewed solely as a tool to facilitate the implementation of a fixed set of predetermined goals. True coalition-building allows participants a voice, which then leads to creative conceptualization and implementation. It may seem counterintuitive as the process adds complexity, but this allows collaborative governance to find the best solutions. This, in turn, reinvigorates the idea of local democracy and demonstrates how to work with rather than against the untamed dynamics of the city.

Create a globally networked urbanism

The task of the twenty-first century might be to recognize the inherent untameability of the city by bringing back the ideal of cities as places of exchange, inspiration, social mobility, enhanced quality of life, inclusion and connectedness to nature.

As stated previously, the twenty-first-century city cannot work from a linear blueprint model. We can now use complex learning networks to speed up

the sharing of information. Examples of emerging horizontal networks include C40 Cities, ICLEI, UN Global Compact, Global Initiative for Resource Efficient Cities, and the International Human Dimensions Programme (IHDP) Sustainable Urbanization Initiative. But these fora need to spend more time on actual policy analysis showing *why* certain interventions worked and under what preconditions.

Given current challenges, cities need to be able to adapt, readjust, copy and add on to existing practices and knowledge. Modernist thinking relied on coordination, with a linear division between thinking (science), deciding (politics) and execution (implementation). In contrast, it is more likely that city-level decoupling will be achieved if key actors stage (creative) 'co-opetition', which would encourage cities to excel, but also encourage them to share experiences and knowledge.

A global networked urbanism requires the development of a science of 'transplantation'. This would help identify the conditions under which schemes such as smart grids, rapid bus transit systems and solid waste management systems are successful, and their potential for replication.

The exciting possibilities presented by big data can obscure the importance of political debate, urban conflict and the expression of interests. Deliberative policy-making (see Hajer and Wagenaar 2003) aims to connect these issues.

It is most likely that twenty-first-century planning will not be about figurehead personalities, but rather about networks. Smart city urbanism is most likely to succeed if, as a configuration, it can constantly change and adjust. In a sense, it should not be a top-down techno-fix but rather *a project of projects*, creating the conditions for ongoing learning, reflection and adjustment through analysis and knowledge-sharing.

Conclusion

City-level decoupling is arguably the task of the century. The sanitary reform movement of the nineteenth century provides a sense of what is required to bring about the required shift, as does twentieth-century urban modernism. Both involved coalition-building to achieve specific goals. The current transition will need a broad engagement, 'a social movement that enlists science, the humanities, and us all to address the challenges we face building a planet of cities that can survive' (Townsend 2013: 320). To achieve this, the smart city discourse needs to connect to a societal context and correct its current technocratic orientation by recognizing that there are severe limits to what can be tamed. While cities contribute the most to carbon dioxide emissions and resource use, they are also the most capable of innovation and change.

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