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Citizen Empowerment and Innovation in the Data-Rich City



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Citizen Empowerment and Innovation in the Data-Rich City

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Preface

Cities are more than infrastructure; they are communities of individuals and families with different backgrounds, needs and aspirations. Properly understood, managed and planned, cities have the potential to provide great benefits, where cities can be part of the solution to many of today's challenges from an ageing population to developing sustainable strategies for water, waste, land use and energy. For example, cities where residents have easy access to convenient public transport, social gathering places, and shops and cultural amenities within walking distance, tend to be places with a significantly lower carbon footprint per capita, in part because the urban form does not necessitate daily car usage. Less driving and more walking can translate into less obesity in cities, and fewer deaths and injuries due to vehicle crashes. Likewise, access to more social activities tends to reduce social isolation and thus improves physical and mental health. The higher intensity of economic stimuli and opportunities encourages the search for enjoyment and self-expression.

If cities have the potential to be part of the solution, it is important to know more about what makes cities attractive or liveable places. Whilst part of this challenge is about improved technology, greener buildings, and energy efficiency, it is also about understanding how to make cities more liveable places for people. Of course, cities are not all the same; there are attributes and public policies that make some cities more attractive to live in than others. Given the importance of cities for the foreseeable future, there is an urgent requirement to go far beyond technocratic perspectives and understand how urban design, planning, public policy and management, and other aspects of the city affect or determine whether a city is people friendly. In other words, there is a need to clarify what makes a city most liveable so researchers can advise policymakers and others as to the "best practices".

In a world rich with digital data from street sensors, social media and municipal open data sources, it is crucial—in particular—to identify how this additional data might provide a more informed perspective on the needs and aspirations of city dwellers whilst promoting greater citizens' participation in urban planning and design. This should lead to cities being both "smart and liveable cities" that bring communities together and encourage social inclusion. Services, products and

places are needed to leverage on data richness to allow people of different backgrounds, ages, abilities, shapes and sizes to engage with their environment and with each other. To understand their needs, citizens need to be engaged in a dialogue about their cities and develop a sense of co-ownership not only of the hardware, but also of the software of cities. However, most of the practical questions on how to progress in this direction are still unanswered.

Part I

Some of these questions have been the topics of conversation and debate for the last three years as part of a European research network funded by the COST organisation attracting participation from 28 countries ranging from Iceland to Israel. This publication provides a snapshot of some of the innovative ideas emerging from the network. From the outset, the publication provides a radical view of cities through a Manifesto for Cities that challenges traditional approaches and argues the merits for a greater bottom-up model to compliment top-down city planning approaches. This is followed by a new framework for collaborative urbanism based on the concept of soft and hard city infrastructures as well as commentary on the mutual benefit of using both 'small' and 'big' data.

Part II

Given the importance attached to the subject of big data, the next section of the book focuses on the growing topic of crowdsourcing which is influencing local and national politics and by implication urban planning and design. The evolution of crowdsourcing is explored as spontaneous bottom-up socio-technological networks that produce non-planned forms of citizens' empowerment in urban governance. Self-empowering practices performed by social actors with the aim of improving the organisation and functioning of the city are here discussed.

The theme of technology is continued by examining urban design in the context of data-rich urban environments and networked society, focusing on human activities, experiences and behaviours. It does so by examining how urban design theory deals with social and spatial changes within network society, i.e. by examining urban design through the lenses of integral theory. In this context, a chapter is devoted to describing a case study for the City of Amsterdam that used visualisation tools and Planning Support Systems (PSS) to promote dialogue between planning practitioners, citizens and decision-makers as part of a collaborative process.

Another innovative approach presented is the so-called ModularCity that combines computer-assisted planning, geography and social work. The model allows planning representatives to analyse the socio-spatial context of future development projects by editing, collecting and visualising geo-referenced, objective, as well

as subjective, data in one planning tool. The focus is on the translation between stakeholders' different planning concepts, goals and languages in order to develop strategies of integration, visualisation to the translate demand in sustainable urban planning. In contrast, Time Quality Assessment (TQA) is presented in the subsequent chapter as a time–people–place-oriented approach to evaluate the quality of living environments. The model links quality of time spent for certain activity in certain place as an indication of the quality of living environments, based on the assumption that time is an universal expression and measure of quality of living that challenges the preconceptions of planners, decision-makers and city dwellers.

Part III

Of course real data from case studies are needed to verify and calibrate innovative tools and techniques for the future design of Smart and Liveable cities. With this in mind, a number of case studies are presented towards the end of the publication. The first of these is the development of a Social Urban Network called SUN4Matera for the Italian town of Matera. The methodology is based on a bottom-up citizen participation approach to collect and aggregate data from citizen interviews that feed into urban design decision-making. Continuing the theme of case studies, the experience of introducing Digi Tel digital tool is critiqued, where the City of Tel Aviv embarked on a collaborative urbanism prototype where citizens were invited to join the Digi Tel club. Registered citizens were awarded a membership card that provides access to certain municipal facilities and furthermore enables citizens to express priorities for future developments in the city.

In comparison, the digital tool called WAY is presented as a smart phone application linked to an iCloud Web service that facilitates citizens' participation in the planning and design of public parks and places as part of the Cyber Parks initiative. The tool was tested in the cities of Barcelona, Lisbon and Ljubljana. Lastly, the experience of introducing Web-based services for the Romanian city of Bucharest is described in the context of municipal administration.

In summary, by the very nature of collaborative urbanism, the book has attracted contributions from a wide range of disciplines. The resulting variety of perspectives on data-rich cities provides stimuli for a further consolidation of the field, which emerges as still in an early structuration phase. Yet all the concepts and methods ultimately aim to engage citizens more in urban planning and design in order to increase the livelihood and liveability of cities in the twenty-first century. We hope you find the wealth of information a valuable depository of knowledge and ideas to promote your own strand of collaborative urbanism.

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Part I
The Emergence of Collaborative Urbanism

Chapter 1

Manifesto for Collaborative Urbanism

Dick Gleeson and Mark Dyer

Abstract This chapter will consider some key factors affecting cities at the global scale, before addressing the forces at play in the contemporary ‘given-city’ This will provide a platform to review the emergence of the ‘Smart-City’ and consider how a radical approach to data may be required in order to enable a collaborative culture of citizen engagement to emerge.

1.1 Introduction

The European refugee crisis resulting from the war in Syria, the terrorist attacks on Paris, and the focus on the critical negotiations in COP 21 remind us that we live in a highly globalized world. The fact that the Paris Agreement took 21 years to achieve consensus, that this agreement is aspirational rather than binding, and relates to emissions and not to production of fossil fuels, indicates the relative weakness of the institution of national governments in tackling complex global challenges. However under the umbrella of national government, cities are also highly globalized and operate as relatively free agents to leverage their competitive edge in the external market place. While housing a majority of the world’s population and thus contributing to global environmental problems, cities have been able to keep a low profile in terms of their specific environmental footprints, and thus evade collective political responsibility. There is little doubt nevertheless that cities will have to provide the innovation and solutions for the future.

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While millions of citizens will have watched the media reports on COP 21, and perhaps felt themselves aligned with the NGOs and frustrated protestor groups lining the streets, they will also have felt largely detached from the governance and institutional processes that frame both national and city response to global crises. This sense of powerlessness and a perception that it is difficult to intervene and make a difference is perhaps nothing new when considering urban governance or the making of the city. Within this traditional frustration of feeling powerless, the widespread availability of the Internet suddenly opens the opportunity for ordinary citizens to connect with city institutions. As a result individual citizens have never been more connected and can interact through multiple personal devices that are increasingly more networked. The availability of web 2.0 enables open-source collaboration. These resources would suggest that the technology exists to build a new platform for a much more dynamic and active form of citizen participation. While there are interesting and inspiring examples happening in many cities, crowd-sourcing being one significant area, a culture of Internet inspired citizen participation has not entered the mainstream.

The reasons for this continuing disengagement with urban development are multiple. Firstly it is inherently difficult for the individual citizen to make sense of the contemporary city, with its complex weave of pattern, scale, function, and apparent disorder. Furthermore the city authorities have over time learned how to control the processes of city management and urban plan-making, work with a small number of 'trusted partners', and fear the opening up of the process will lead to paralysis and loss of control. There is also the difficult question of data and its relationship to the citizen, and how data is interpreted to produce knowledge, which feeds into decision-making and policy.

Whilst modern city planning rests on an evidence base which is derived from data, analytics and research; the reality is that the citizen is generally disconnected from the production of an evidence base through the lack of skill sets necessary to commission research and manipulate raw data. This fundamentally undermines any serious attempt to champion citizen engagement. The availability of technology alone however may not be sufficient to generate a culture of collaborative urbanism. Turning urban processes into ones which are people centric will require a fundamental re-positioning of relationships where the citizen can relate constructively to the scale of the planet, to the scale of the city and to the scale of the neighbourhood in order to understand the interaction and impact of economic, social and environmental dimensions operating at different scales.

The present book analyses the current transformation of the data-rich cities through inter- and trans-disciplinary experts' contributions, with particular attention paid to innovative people-centred solutions in urban planning and management. The purpose is to explore a new perspective on the actual possibility for technological innovations in urban infrastructure and functioning processes to effectively involve ordinary citizens in collective knowledge-production and decision-making processes. The included chapters explore ways to complement technical and procedural improvements of urban efficiency with an engagement towards social cohesion and cultural dialogue, green regeneration and

inclusiveness (including removing obstacles to participation). The rationale for intuitive and attractive user interfaces is thus reinterpreted to integrate smart systems into citizens' lives in a meaningful and easily accessible way. It builds upon the consideration that cities are multi-layered entities where a "physical layer" (i.e. urban infrastructures), a "meta layer" (i.e. the data layer in the on-line world) and a "control layer" (i.e. the real or virtual places where people make sense of data) are networked. Authors' contributions suggest that the alignment of these layers can be reworked in order to produce a collaborative form of urban planning, governance and management. Evidence-based and grounded-in-theory approaches not always converge, thus failing to provide researchers and practitioners with an adequate understanding of how to exploit opportunities from a data rich urban environment. To this end, innovative strategies are investigated through cases and examples in order to explore the mutable, multi-scalar and complex character of participatory processes (out of the formalism of traditional approaches) in both design, production and application of smart solutions. These can narrow the gap between research results and policy applications by bringing heterogeneous social actors to work together.

The following pages serve as an introduction to the book and, at the same time, advance the proposal of a Manifesto for Data-rich Cities. These exploit Internet capacity, and respond to citizens need to connect, communicate, collaborate, change and control by acknowledging and factoring this capacity into city governance, policy, and operational life. Moreover, this requires to review the emergence of the 'Smart-City' and consider how a radical approach to data may be required in order to enable a collaborative culture of citizen engagement to emerge.

1.2 Global Challenges

The historic distribution of the population across the great expanse of the globe tended to create an impression that the Earth was endlessly resilient. We now know this is not the case. The sheer impact of the numbers alone, 7 billion, with the demand for food, shelter and raw materials, combined with waste production from the daily process of living, is now stressing the planet's capacity to absorb such pressure. Our dependence on carbon and fossil fuels is linked directly to climate change, melting ice-caps and rising sea-levels. Climate change impact is felt in different ways, increases in inland temperature is drawing new population to coastal areas, for example along the east coast of Africa and along the coast of California, water scarcity is generating conflict at a regional scale and contributing to political instability, and population pressure on ecologically vulnerable regions has resulted in 20 % of the Earth's surface being described as degraded. The term Anthropocene has been used to denote a new geological era on Earth, equal in scale to past geological eras, except that in this instance it is caused by the impact of 7 billion people living on the planet, the majority of which now live in urban areas.

Levels of population increase, combined with the rate of urbanization and the upsurge in the scale of individual cities, means that cities are firmly in the dock in relation to the environmental crisis at the global scale. National governments tend to be the major players politically in the search for solutions, but have proven themselves weak in building a consensus towards effective and binding agreements. National governments however are happy to delegate significant freedom to cities to manage their challenges, seek out competitive edge, and develop their profile internationally. Many cities quickly realize that in tackling the complex challenge of sustainability, the global environmental focus quickly extends to include global economic and social dimensions. Cities operate within the framework of a global economy, with its cycles of high energy, decline and unpredictability.

The evolution of the global economy over recent decades has expanded the number and scale of cities that have managed to create the competitive platforms necessary to compete internationally. In those cities where a global economy has anchored itself, a range of supportive infrastructure combines with a skilled and highly paid workforce to create class and wealth distinctions, exaggerate local disadvantage and poverty, and contribute to political tensions. The global economic recession from 2006 onward has deepened these structural faults across the city landscape with property values collapsing, a severe contraction in investment caused by a banking crisis, and city budgets unable to sustain service provision. What we are seeing in a range of global context is a deep-seated malign convergence of environmental, economic and social crises, leading to various levels of street protest and citizen anger.

The reasons for these problems exist at both the international and global scale and critically at the scale of the city. In terms of citizen perception however, the specific city context becomes the point of frustration and attack, the global forces too elusive, remote and non-tangible. A major challenge therefore is to forge collective citizen perspectives, which can begin to impact on the practice of large corporations, global economic networks and cities. Such citizen perspectives are likely to be strongly informed by value systems and a consensus on human need. In practice this means organizing the objective component of cities in the form of physical and institutional infrastructures to support the subjective qualities and value systems of citizens and communities. Furthermore, we are beginning to see how environmental performance is impacting on the reputation of companies in the market-place and prompting the adoption of more sustainable strategies. This responsiveness and sensitivity of the market-place to demands from citizens is likely to grow, with an increasing appetite from consumers for information on food provenance and the impact of food on health.

The city or city networks, sitting between the planet scale and the neighbourhood/citizen scale, may have to provide the joint platforms to solve problems at both the global and the city-scale. Harnessing the energy of citizens and creating an awareness of the inter-connectedness of fundamentally different scales is challenging. It may be more fruitful to work with citizens at the scale of the city, to find urban models that are more sustainable, while building more awareness and a

sense of responsibility towards the scale of the planet. A good starting point is to ponder on the question of who shapes the city, and how they do it.

1.3 The City Dimension

This question of who is allowed to shape cities is not an easy question to answer. A city is not a handbag, or a dining chair, or even a domestic house. It is more like a complex organism, built over time, constantly changing and evolving, the product of multiple hands and designers. In his acclaimed documentary-movie, 'Urbanized' (Hustwit 2011), Gary Hustwit explores a spectrum of challenges in 40 different cities across the globe, drawing in stories from hugely varying contexts and scales. While taking a clear line on what makes cities habitable, the movie comes down firmly on the need for citizen participation, revealing along the way the processes and decisions made by city designers and the impact they have on our day-to-day lives. Hustwit, who spent almost three years on the movie, realized early on that he would almost certainly fail in his 'grand-project', to make sense of cities; the topic was just too broad and complex. What he does achieve is a work of art and a fast-paced compelling documentary; weaving footage from multiple locations with live interviews and a great sound-track from the band Wilco. The central message is that if you don't have a say in how your city is shaped, somebody else will shape it for you.

While there are frequently some good intentions on the part of City Authorities, progress towards meaningful partnership with citizens is slow and is often frustrated by privileged stakeholder and interest groups who pursue narrow goals. Public engagement is often perceived as weak, as it often fails to deliver stated aims. The culture of citizen engagement is frequently hampered by the following;

- By polarization between top-down and bottom-up stakeholder groups.
- By a process which just pays lip-service to requirements for consultation.
- By a process which is quite technical and which is really only legible to specialist groups with the knowledge and skill of how and when to intervene.
- By agencies and regulatory bodies following a core brief, who don't see the need to interface with a wider picture.
- By a lack of any appetite or belief in the value of collaboration.

The City Authority itself of course, also encounters deep challenges in building a collaborative partnership with the citizen. There is often embedded silo thinking within its own ranks. The need to strictly meet legislation and policy requirements also tends to result in rigidity and lack of spontaneity and flexibility. The over-use of external consultants, due to scarce internal resources, breeds a culture of dependency and hands the initiative elsewhere. Authoritarian top-down is seen as less risky in terms of retaining control and ensuring the genie is not let out of the bottle. Communicating the story of the 'big-picture is challenging in a context where local issues are the only game in town politically.

We can see therefore that cities are complex and stubbornly resist simplification. Many disciplines, however, dealing with the urban context feel the need to define a specialist viewpoint, and this can often develop into a silo mentality. A holistic approach therefore, will help to acknowledge complexity, and create awareness and need for systems thinking in order to meet the multiple challenges facing the city. A systems approach to cities will try to create a framework, which can include a consideration of city issues from multiple themes and perspectives. Urbanism is a philosophy that nurtures and celebrates the complexity of cities and the need for a multi-disciplinary approach and awareness. Urbanism also supports the need for collaborative processes and is committed to using and developing new tools and methodologies in tackling issues arising in complex urban contexts.

1.4 The Neighbourhood

Despite an increasingly globalized economy, the Internet, and multiple platforms for communication, specific local place and physical context are still the primary reference for urban dwellers. The local neighbourhood with its familiar physical and social infrastructures is complemented by other city locations, sourced for culture, recreation, retail, or as the destination for a daily job commute. From these various city contexts, citizens build a platform from which they extract a range of services to support a daily life. Increasingly the internet and user-friendly software is changing the manner in which the individual citizen relates to an urban context, firstly in providing a powerful new way to access local services and secondly in terms of communication and the construction of new social networks.

However the neighbourhood has proven to be a very enduring concept and is built around our idea of place. It is usually characterized by a particular street pattern, land-use mix, architectural style, and by the communities that dwell or do business within its spatial area. Most people have a very strong affinity with their own neighbourhood and when probed about city issues, tend to list concerns about their local area, rather than articulate strategic issues. While the scale of the city neighbourhood is well suited to building a culture of engagement, urban governance tends to operate at the larger city scale, and is challenged to harness local citizen energy. Things may be beginning to change however. There is now evidence of a widespread trend of urban interventions being initiated from the scale of the neighbourhood, with or without the support of the formal City Authority. These local neighbourhood projects are often driven by a small number of committed champions, using social media to generate profile, and gaining community support in the imaginative way they respond to perceived gaps in the city infrastructure. A feature of these local initiatives is their tendency to be temporary in nature, to draw in the pro-bono support of artists and local resident professionals, and to colonize vacant, derelict, or under-used property. While there may be some revenue generating activities there is usually a strong community and culture focus with

a programme of events designed to attract local residents. The presence of such innovative energy in the local context can prompt a questioning of the status quo, and generate a sense of new possibility about what can be achieved at the local level. Rather than accept the generic and predictable top-down process of occasional local plan review, bottom-up neighbourhood initiatives can release a surge of creative thinking, generating confidence and a feel-good factor which strengthens local community capital, and creates the capacity and confidence to challenge the top-down city narrative.

If we refer to the city of today as the ‘given city’ we could argue that the ordinary citizen has had an extremely limited role in its production. Nonetheless the citizen gets on with the challenge of a daily life, mining a personal biography from both the physical context of the ‘given city’ and the new technology of the Internet. What of the future city? Could we imagine a future in which the citizen could be a co-producer of the city, both its hard infrastructure of building fabric, utilities, and landscape, and its soft infrastructure of facilitating institutions and responsive citizen focused software. In this future city, the citizen would play a central role in shaping the city and in ensuring its weave of infrastructures would respond more directly to human need. Today urban planning and governance remains hugely challenged in building a culture of citizen participation.

Digitization and innovative Internet technologies are providing a new urban context. Can the power of a user-friendly Internet help harness the creative energy of citizens to share in the design and making of more people-centric cities? How can a platform be achieved to facilitate this possibility. To do this we will need to reflect on how the ‘given city’ has been shaped to date, on the role of the city and various crises that need new direction and an urgent response, and how exemplars in specific locations are prompting new urban models around the theme of people-centric urbanism.

For example in the case of the Dublin City, the years following the economic downturn from 2008 onwards witnessed the emergence of multiple bottom-up initiatives across the neighbourhoods of the inner city of Dublin ranging from neighbourhood social enterprises located in otherwise prohibitively expensive development zones to young professional community start-ups providing work and leisure opportunities (Aliperti et al. 2016).

1.5 Smart City

The discussion so far has revolved around the need to engage citizens and communities in the future decision-making about cities and especially their neighbourhood. In this context, the term Smart City might suggest a capacity and commitment to marshal a collective civic intelligence to tackle city challenges via the presence of so-called Big Data created on the Internet through social media or increasingly by the internet of things. The phenomenon of Big Data is now an inherent component of modern complex cities, an essential element of

infrastructure, underpinning the functionality of city systems across the spectrum of both the public and private sectors. The term ‘data-rich city’ might seem initially to be something wholly desirable, conjuring up a consolidated platform and an image of bountiful supply, and perhaps generating an assumption that this vast resource will be put to good effect.

The critical debate is currently attracting a growing interest in scientific international and interdisciplinary communities that are trying to answer questions such as “do people really need more data to live better in cities? or is data richness compatible with the centrality of people in the urban environment?” In recent years, “smart city” rapidly turned into a buzzword that has been used with reference to almost any technology-driven urban initiative, encompassing a broad range of urban life aspects (e.g. quality and welfare, sustainability, social cohesion, economic growth, etc.). This makes the concept itself ambiguous and difficult to be operationalized. Moreover the interest for the technical improvement of city infrastructure and technological application of data-driven solutions, often disregards the evidence that although these are important, they are not endpoints in themselves. This book provides some critiques and speculation on this theoretical perspective as well as practical implications that emerge from the analysis of lighthouse experiences. Certainly there are numerous everyday examples of real time data being used to practical effect e.g. traffic management and flood defence to name two, while competitive economic participation in the global market place relies on sophisticated frameworks of constant data generation and analytics. However not all urban stakeholders enjoy equal opportunity in terms of capacity to access and exploit data platforms. The ordinary citizen in particular has a very poor relationship with data, seeing the term as abstract, unsure of its neutrality in terms of personal freedom, and not at all optimistic that it can become a day-to-day resource available through user-friendly channels. This detachment of the citizen from data is worrying. Data is the basic raw material used to generate an evidence base in order to engage with other stakeholders, influence policy, and negotiate with urban governance.

In order to understand this detachment from data, we need to look at the wider urban system. In doing so we need to recognize that technology and data are not ends in themselves but are available as powerful infrastructures to serve a range of goals emerging from a complex landscape of urban stakeholders where the citizen is often billed as a key player but is frequently side-lined. In which case the term Big Data might be better used when linked explicitly to promote a people and citizen perspective and prompt us to reflect on the relationship between citizens and data. So for example even though the terms Data-rich Cities and Smart Cities have a close relationship, neither of these terms could be considered to align comfortably with the concept of ‘People-friendly Cities’. One of the reasons might be that the evolving terrain of Smart-City activity has colonized the sphere of urban data, where commercial/technical interests, seek close working relationships with City administrations to deliver smart infrastructure, in a context where there is little incentive to create any meaningful role for the citizen. Another reason might be the abstract nature of data, and a history of detachment of the citizen from urban research.

This tendency of the Smart City to leave the citizen out of the loop is perhaps not surprising. Urban governance and city planning has been challenged for decades to harness the energy of citizens in the making of better cities. It is curious however that at a time when the infrastructure of the internet is creating optimism about openness, communication, and connection, that the 'black-box' technology of Smart Cities might be consolidating a status-quo where the citizen remains an outsider. This suggests a need not only to review the concept of Smart Cities but also to consider a much wider frame of reference where the citizen is placed at the centre of urban challenges, and is facilitated to read the city in terms of its complexity, sectorial interests and multiple scales. While data will constitute a 'red-thread' critical to forging a bedrock of evidence, the theme of 'people-centric Urbanism' better describes the thrust of the chapter. A central question will be a consideration of the critical scales relevant to the achievement of a platform.

Continuing with this line of thought, there is widespread deep concern among a range of professional disciplines regarding the current trends in Smart City development. Murakami (2015) considers Smart City as the archetypal urban form of the data-driven society. These pervasive distributed sensor networks, generating big data for forms of centralized urban management, bring together previously unconnected infrastructures such as video surveillance, met stations, traffic-lights and sewage systems, and while presented as largely civic, corporate and managerial, these systems have a parallel history in military strategic thinking and policy. Murakami reflects on the capacity of diverse human beings to flourish in cities where people are increasingly monitored and managed as logistical flows. He argues that if smart cities are to truly serve human flourishing, they need to be detached from narrow techno-economistic purposes and more truly grounded in social ecological thinking.

Likewise Bates (2015) is concerned with the increasing use of data analytics to gain insight in how to manage cities. She suggests that instead of seeking the truth of cities in data, we might better illuminate the flows of power and influence in the contemporary urban environment through close critical examination of these emerging, intersecting local data cultures in practice. Similar to Sassen (2012), Bates argues that by focusing on the complex and contested assemblages of political, economic, social and cultural processes that data product and flow are embedded within, we begin to understand data practices as specific articulations of social platforms situated within time and space.

Ruppert (2015) has also raised questions about smart city and data and the implications for citizens. If we are to increasingly know experience and enact cities through data, then we need to understand who are the subjects of that data and the space of relations they occupy. In a world where the Internet of things connects everything, and where data is produced about movement, location, activities, interests, encounters and public relationships, and where conduct is being governed through myriad arrangements and conventions, we need to question how data subjects become data citizens. Ruppert goes on to challenge the separation between the real space and the virtual space. In doing so she defines cyber space as a space of social struggles, a space of transactions and interactions between and among bodies acting through the Internet. She asserts that these struggles constitute part and parcel of the programmable city.

These concerns about the need to contextualize data is raised by Thatcher (2015) who investigated data provenance and the need to critically frame data. He states that data sources and existing data appear in the literature as uncritical, pre-existing, de-contextualized representations of the world, and the dimension of provenance recedes into a technical issue. The intentionality of data is not signalled and the inscription of meaning that goes into data objects as socio-technical, emergent indicators is left out. The data is therefore taken to represent the world as objective reality.

The role and nature of data in cities has received the attention of Kitchin (2015) who explores citizen related data privacy/protection, arising from the development of smart cities in Ireland. Kitchin refers to a consistent link between the generation of data and various kinds of data informed urbanism. However, he contends that data informed urbanism is being complemented but increasingly replaced by another form of data generation termed data-driven networked urbanism. Whilst cities are becoming ever more instrumented and networked, with vast amounts of big urban data being generated and used to manage and control urban life in real time, Kitchin asserts that data driven networked urbanism is the key mode of production for what has widely been referred to as 'smart urbanism'. In doing so, he raises valid concerns about the politics of urban data, data ownership, data control, and data convergent access. Whilst data-driven networked urbanism purports to produce a common sensical, pragmatic, neutral, apolitical, evidence form of responsive urban government, it is nonetheless selective, crafted, flawed, normative and politically inflected. Hence data-driven networked urbanism provides a set of solutions for urban problems within limitations and in the service of particular interests.

1.6 City Futures

The debate about the future creation of Smart Cities has increasingly attracted the attention of both new technology driven companies and more tradition engineering design companies. Recently the company Arup (2010) outlines a very optimistic and enlightened view about how cities can benefit from smart technology. They define a smart city as one 'where the seams and structures of the various urban systems are made clear, simple, responsive and even malleable. The implication is that the networked connection between everyday objects provided through the 'Internet of Things' will provide all the necessary tools to deliver smart cities. However, this perspective raises the question about how can we harness the power of these emerging technologies in order for the individual citizen to take co-ownership of the issue not just traditional stakeholders. Otherwise the informed users of smart cities are in danger of developing architecture in which technology evolves solely to provide spaces for global players to create economic value, and start-ups to innovate.

For this economic argument to be relevant it must be complemented by an articulation of a strong vision for the role of citizens in future cities. This is a