Not A Dashboard, Not A Sandcastle

Unpacking the smart city discourse

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This dissertation is submitted for the degree of

Doctor of Philosophy

Graduate College   July 2018

I would like to dedicate this thesis to the family members, friends, mentors, supervisors, and most specifically my mother for allowing me to explore my curiosity and colour outside of the box.

Declaration

I hereby declare that except where specific reference is made to the work of others, the contents of this thesis are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This thesis is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Publications List. This thesis contains fewer than 80,000 words including appendices, bibliography, footnotes, and tables. I also hereby declare that I am a little teapot, short and stout.

Ding Wang
July 2018

Acknowledgements

This acknowledgement is rather ordinary and it is always going to be ordinary compared to the people who I would like to acknowledge here.

I would first and foremost like to thank my supervisors, Mark Rouncefield, Nick Dunn and Paul Coulton for supervising me, mentoring me, supporting and indulging me with my flights of fancy.

I would also like to thank my family who have supported me all these years to pursue my dreams freely and supporting me unconditionally especially my grandfather who passed away earlier this year, who will always be the inspiration he was to me.

I would also like to extend the thanks to all of my friends for the coffees, pints, food, adventure, gigs, memories, experience, songs, tears, cycles, theaters, cinemas, phone calls, video calls, messages, voice mails, late nights, early mornings and the list goes on.

I'd like to extend an extra special thanks to Gordon Blair, Patrick Stacey, Cat Macaulay and David Prendergast for all of you had taken a chance on me, without that leap of faith you had in me, I would have never come to the UK to start the 3+1+1 programme or to complete my Master's degree with flying colours and never alone the doctoral one.

Lastly, I would like shout out to all the girls, not just girls, but whoever have had hearing this voice telling them you won't make it! Why can't you just be a girl?! Well, this girl has made it, so you too, can make it.

Abstract

While the idea of the 'Smart City' has attracted increasing attention from academia, industry, and government, this interest has largely had a technical and technological focus. This thesis explores the notion of the smart city in several different but related fashions. I first review and unpack the current research and literature on the smart city, as part of a Foucauldian emphasis on the notion of 'discourse'. My thesis then charts empirically some of the contours of this current discourse through ethnographic interviews and a form of grounded analysis to ascertain and identify some of the major themes and ideas. I then contribute to the current discussion and debate regarding the smart city by introducing a novel Foucauldian theoretical approach to features of this discourse, as well as considering Foucauldian notions of 'gaze' as applied to the smart city; and examining the extent to which the smart city might be considered as a Foucauldian 'heterotopia'. I conclude the thesis with design implications in terms of knowledge production, civic engagement and policy potentials. Ultimately this is an attempt to identify some of the important political and policy challenges facing the idea, the discourse, of a 'smart city' to optimise human computing interaction, computing supported collaborative work and design research input into the 'smart city' debate. In order to develop an empirical basis for my research, I conducted ethnographic interviews with both citizens from cities undergoing smart city transformation and experts who are either leading or previously involved in these smart city developments. The citizens were asked about their current experience with the cities they lived in, their understanding and expectations of a smart city and what they envisioned for their cities. The experts were asked questions regarding their prior experience with the "smart city", their understandings of what it means for a city to be 'smart', what policy potentials they've recognised in the smart city, the implications smart cities have on democracy and finally the knowledge production, dissemination and sharing in the smart city. The thesis first follows a sociological, 'grounded' thematic analysis of these interviews. It analyses and offers a synthesis of the responses collected throughout the research with the current policies concerning various smart city proximity, thereby providing a critical assessment of the values underlying the smart city. I then contrast this with a Foucauldian theoretical approach to analyse the discursive formation of the smart city, conceptualising the smart city as a heterotopia and then develop Foucault's

notion of 'gaze' to outline the different elements involved in what might be termed the 'smart city gaze'. In so doing I bring another critical approach to smart city discussion to demonstrate that the smart city concept is not a new novel approach to urban problems, it is a continuation previous attempt to deploy information communication technology (ICT) in cities with new add-ons such as data gathering, and internet of things features. In so doing I hope to highlight both the inherited issues facing such a technology deployment, such as digital inclusion and piracy ,and relatively newer issues that comes with the new features of the technology in general but of the 'smart city' in particular– concerns, for example, of the surveillance features embedded in the data gathering and internet of things approach that may both threaten privacy whilst providing for possibilities such as 'designing out' crime, or encouraging civic engagement. The thesis accordingly concludes by exploring the 'implications for design' and presents some of the policy possibilities for UK smart cities that are potentially useful for politicians, policy makers, planners, academics, and technology companies. I believe that these perspectives for policy development can be used to inform responsible development, spatially and socially inclusive technologies, and ultimately more resilient and liveable cities. The thesis is structured as follows: I begin by presenting the academic context and political status quo for this research, followed by an overview of the methods I used during the project, highlighting some of the challenges I encountered while applying these methods. This is followed by a discussion of the research results, as well as the implications of the results, and the limitations of the project. The thesis is concluded by outlining questions that were left unanswered for further research.

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Chapter 1

Introduction – All strings attached

This thesis is about cities, or smart cities to be more specific. It is my attempt to unpack what it means for a city to be smart. . .

1.1   The first string – a personal one

I have always been a city lover. I grew up in cities and I grew up in a special time. I grew up in a time when China is/was going through a rapid urbanisation process such that my city, one of the poorest city of its size, located in the less developed north west of China managed to update and upgrade itself every 4 or 5 years. When I was in primary school, the building in which I went to pre-school was torn down and rebuilt; when I was in junior high school, the neighbourhood where my primary school was had a new road built leading to the demolition of a farmers' market right outside the school; when I was in senior high school, my junior high school had the third version of a playground and sports track re-installed within five years; and finally when I came back from college to visit my high school one year after graduating, I hardly recognised it. And now after living the in Britain for the past six years, I have trouble every single time finding my way when I visit home, which makes me wonder, if I could still call it home.

Before coming to Britain, I lived in one of the biggest, if not the biggest city in the world, Shanghai. The city is a miraclulous example of what rapid urbanisation and vast investment can achieve in just over a century. Shanghai, compared to all the other great cosmopolitan areas in the world is rather young, it was still a fishing village in the late 19th century. In the process of Shanghai becoming one of the most interesting cities in the world Shanghai has also become one of the most diverse. Due to its colonial past and situation between both the west and the east, Shanghai was made one of the economic and cultural centres of the Far East. This was also of great political significance. During the time I lived in Shanghai,

two specific experiences planted the interest in researching cities in me. During one of my second-year modules in my undergraduate education, the lecturer took us to the site of one of my first locations for empirical study and fieldwork. The module was about urban planning, or, to be more specific, sociological research for urban planning. As part of the coursework, the class was separated in groups and each group picked an area in the former colonial parts of Shanghai characterised by period architecture that often dated back to the early 20th century. During this research, we picked a complex of five to six terrace houses built by the British in the 1920s, originally for Republic of China officials and foreigners. By the time we studied it, it had gone through many changes in ownership, and was occupied by ordinary Shanghainese. In a similar fashion to how Victorian town houses in the UK are being divided into smaller flats, these building were separated into smaller spaces. To my surprise, many families were cramped into the shared building, often a family of three would only have a room as their lounge for the day and bedroom for the night. They had to share one toilet and one cooking area with four or five other families living the same former town house. The research was to gather stories of how people used these spaces, how they shared and perhaps didn't share. I could not recall any of the specific stories anymore but what was left lingering in my mind was the sharp contrast between their living situation and the accumulated wealth in their area, since where they lived, in poverty was, ironically, thelocation of three of the most luxurious shopping malls in Shanghai.

The second experience was one year after that, when I volunteered during the World Expo in Shanghai. Thanks to the serendipities of life, the pavilion I worked in, every day for two months, was the Urban Future Pavilion. Little did I know, urban future would be the theme of my research a few years down the line. Shanghai Expo in 2010 had a major emphasis on technology's impact on urban lives, featured in the theme "Better City – Better Life".[1] Countries and companies who participated in that expo had to demonstrate in their pavilions their interpretation of what *"Better city, Better life"* meant. Many of them chose to use technology as the medium and means to deliver this theme, suggesting that by employing various technologies in cities life would be made 'better'. I, as a volunteer, was fascinated by all these utopian visions, exhausted by the amount of visitors and intrigued by the theme – *"Better City – Better Life"*. How so I wondered?

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[1]Townsend argues that the expo that year Shanghai maybe one of the most important event in the smart city history. [210]

1.2   The second string – a contextual one

The United Nations' [212] updates their projection this year that by the year 2050, the world's population will grow to between 8.6 and 9.8 billion people. According to an interactive map An Urban World[2] by UNICEF, 70 percent of world population will be accommodated in urban areas by 2050. In particular, should this projection prove to be accurate, China would have 1.5 times of its current urban population by 2050 and India would have more than double its urban population living in cities. Cities today drain most of the global resources, have a major impact on the environment, and attract an increasing percentage of the world's population. As the World Bank reports [225], cities drain 70 percent of the global energy resources, and emitt 80 percent of greenhouse gases. More importantly, we build urban developments that are likely to stand for at least half a century, and the present economic situation does not allow us any tabula rasa (ibid). Several studies have shown that over population, resource scarcity, and climate change are just a few of the many nightmares casting a shadow on our future (e.g. [91]). It is high time to take a pause and reflect upon our current paradigms. As Whitehead points out, understanding cities does not simply mean understanding physical constructs, rather it is to capture the essence of the dominant patterns and values of our society [224]. Harvey's studies on cities shed light upon the connections between the urbanisation process and underlying ideologies, arguing cities are in fact spatial recipients of leading economic and political doctrines [104][105].

   Accompanying the fast-growing urban population and urbanisation is rapid technology advancement, especially the proliferation of Information Communication Technology (ICTs). Thrift notes that "through history and around the world, innovations in transport and communications have been heralded as proof positive that the world was speeding up and that places were moving closer together in time, that the world was shrinking."[205] Rheingold [180, p. 11] too notices the profound impact ICT has on our society, in his words "adolescent mating rituals, political activism, and corporate management styles have mutated in unexpected ways." Indeed, with the popularisation of social media, the increasing affordability of smart mobile devices and better coverage and easier access of wireless internet and mobile data plans, we have already witnessed how ICT has revolutionised society. The next "Killer App", according to Rheingold [180] is neither hardware device nor software programme but forms of social practice. From the Arab Spring to the 2016 US election, from Facebook, twitter to WeChat, from the net neutrality debate to the controversy over the social credit system in China[3], we have seen both the positive and the negative impacts of technology in society.

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[2]https://www.unicef.org/sowc2012/urbanmap/
[3]https://en.wikipedia.org/wiki/Social$_credit_system$

1.3 The third string – a topical one

The smart city came handily under this circumstance. On the one hand, we are increasingly dealing with growing environmental, urban, sustainablility issues, on the other hand technologies promise to provide a solution for these situations, so what we have here apparently is a match, a fit and a smart city. Giffinger et al's definition considers 'smart' as performing in a forward looking way [85]. The forward-looking development approach to a smart city considers issues such as, awareness, flexibility, transformability, synergy, individuality, self-decisiveness, and strategic behaviour. In other studies, a smart city denotes an instrumented, interconnected, and intelligent city. Instrumentation enables the capture and integration of live real-world data through the use of sensors, kiosks, meters, personal devices, appliances, cameras, smart phones, implanted medical devices, the web, and other similar data-acquisition systems, including social networks as networks of human sensors[102][103]. Interconnection means the integration of those data into an enterprise computing platform and the communication of such information among the various city services. Intelligence refers to the inclusion of complex analytics, modelling, optimisation, and visualisation in the operational business processes to make better operational decisions. In contrast, the Natural Resources Defence Council defines 'smarter' in the urban context as more efficient, sustainable, equitable, and liveable. Toppeta emphasises the improvement in sustainability and liveability [209]. Washburn et al. view a smart city as a collection of smart computing technologies applied to critical infrastructure components and services [223]. In summary, the smart city as a concept embraces and absorbs definitions that feature the word "smart": intelligent city, ubiquitous city, digital city, sustainable city, resilient city, liveable city etc. Despite these endeavours that attempt to define a smart city co-exist, none as yet have been universally acknowledged, accepted or agreed upon [1][114].

1.4 The fourth string – the HighWire one

It was through the HighWire Centre for Doctoral Training (CDT) that I first encountered the phrase as well as the concept of 'post-disciplinary research' and it is important to highlight this institutional 'post-disciplinary' influence HighWire had on me and my research. It was quite a paradox in itself that despite the claim and aspiration to be a post-disciplinary research centre, HighWire consisted of three main disciplines – computing, design and management. And as a HighWire student or a HighWiree, we were required to select at least two disciplinary bases for our research, and for me it was computing and design. This choice in turn determined both the input of my research (i.e. the supervisions I had, research

methodologies I adopted and literature I read, etc.) and the output (i.e. the venues for publications, the style in which I write and the audience I intend to write for, etc.) and this, in my opinion, is to be expected from any institution that we join. HighWire's influence on me though was something much more profound in that it was an ideological influence. As research students we were encouraged to be critical and creative, we were challenged to question and to innovate, and most importantly we were supported throughout these exciting, scary and at times strenuous processes. And the support didn't just come from the centre, the directors, the supervisors but also from the peers. As the name entailed, it was indeed like standing on a high wire, that there's the possibility of falling but there's also the support system well set-up which makes this the balancing act seemed achievable. Aim high and act firm was the spirit. So it was not a mere coincidence that for my research I picked a complex and challenging topic to question, to reflect, to experiment with and to offer alternatives.

1.5 All strings attached

With all these strings, the personal interest, the contextual status quo, the topical ambiguity and the HighWire post-disciplinary I invite you to delve into my research journey to unpack and understand the smart city. To better illustrate the structure and the content of the thesis I created a map of strings and dots to guide you through (see Fig. 1.1). In this map, the different coloured strings indicate the different approaches I took and the circles stands for the chapters in the thesis. As you can see the circles are of different sizes too, the size of the dots is indicative of the length of the chapters. Hence the mass of the thesis lays in the two data chapters.

So after this introduction, it is the Literature Review chapter – Not a sandcastle, nor a dashboard. In this chapter I review the key literatures concerning the smart city to capture the state of art in the smart city research. In addition, I also review some other key topics that influence how I structured my research and field work, such as the discussion around democracy innovation and policy creation. Following the Literature review, I present both the methods for data collection and data analysis and the rationale behind these choices in the Methodology chapter. After the methodological discussion, I present the two data chapters, one following a more sociological empirical thematic analysis of the data and one is more analytical and theoretical employing a Foucauldian approach. Finally, in the conclusding chapter – 'How to recognise a smart city when it lands on you', I summarise the arguments I make in the data chapters and conclude the thesis with thoughts for future work.
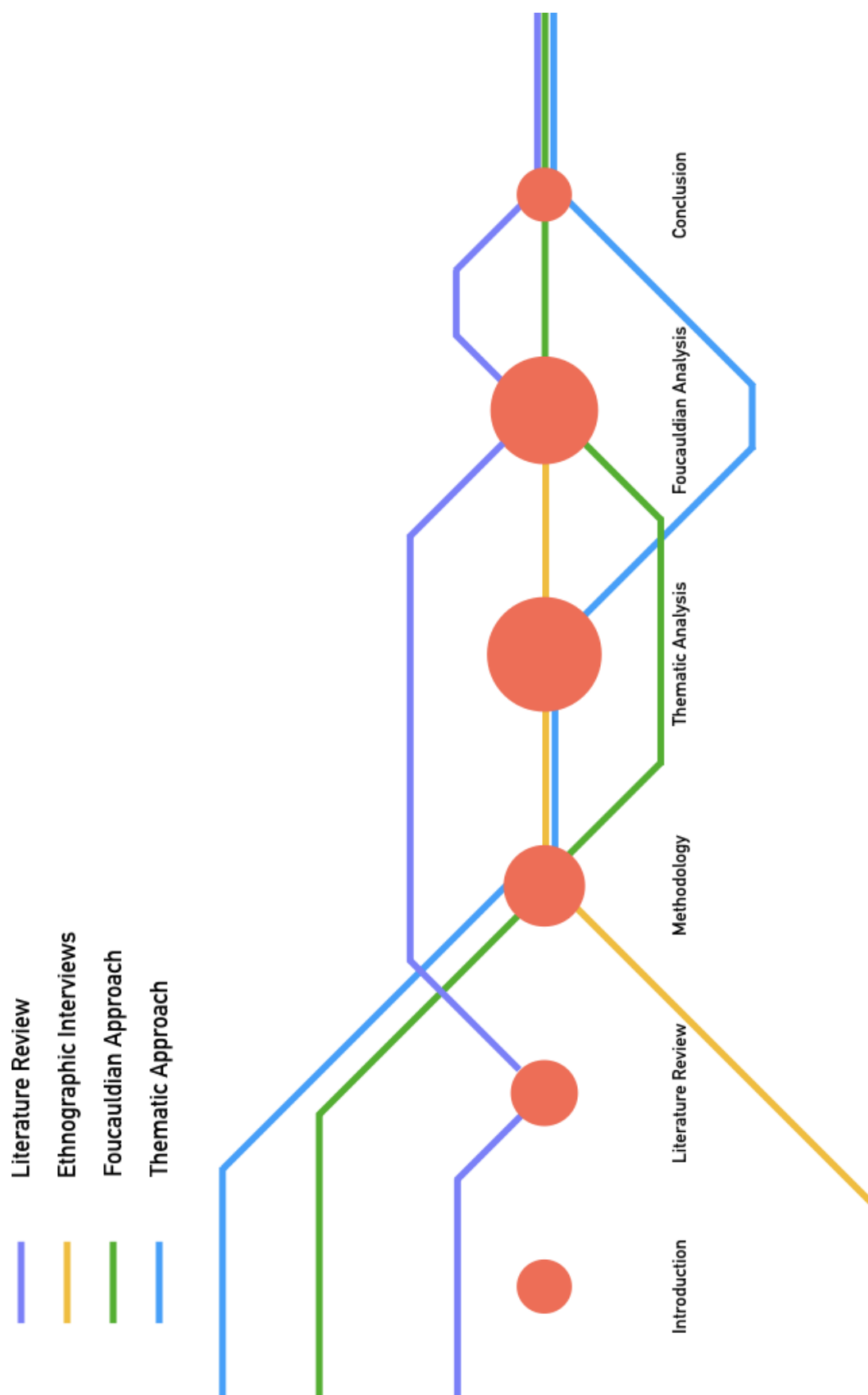
Fig. 1.1 Thesis Map

Chapter 2

Background

In the past decade, research and news stories about the smart city have become pervasive. Since IBM proposed the concept of smart city as what we know it today it has grown exponentially.[1] Academics, technology companies, public administrators, journalists and marketing agents have celebrated, critiqued, bought, sold, re-imagined and re-defined the smart city concept[1][93][114][115][190]. As stated in the very beginning of this thesis the smart city embraces and absorbs definitions that features the word "smart": intelligent city, ubiquitous city, digital city, sustainable city, resilient city, liveable city etc. Many endeavours that attempt to define a smart city co-exist, but none as yet have been universally acknowledged, accepted or agreed upon[1][114].

The emergence of the concept of the smart city is not accidental. Ever since the latest years of the 20th century, we have been witnessing two interesting phenomena that have significant impact on the genesis of the smart city: rapid urbanisation and the widespread proliferation of information and communication technologies (ICTs). The technological advancement and economic growth has fostered urbanisation, on one hand, offering many opportunities in terms of work, education, social life and so on. On the other hand, it also led to some negative impact such as the progressive abandonment of rural areas towards greater cities and metropolis [12][225] contributing to a series of other urban problems including traffic congestion, greenhouse gases and CO_2 emissions and waste disposal which would cause health-related consequences [225][45]. In addition, there is also the high demand for energy and national resources in city dimension, the impact on greenspace and wild lives caused by urban sprawling and the need of adequate infrastructures. In this landscape, we started to look for solutions and alternative urban imaginaries. Some examples of these imaginaries

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[1]One simple search of news on Google, revealed 17,300,000 smart city related news items. In 2017 alone, there are 132,000 Guardian articles addressing the smart city, ranging from the intersection of smart city and climate change to urban sprawl in Hong Kong

are: Digital City, Wired City, Knowledge City and Green City, "which often link together technological informational transformations with economic, political and socio-cultural change" [114]. The smart city concept, meanwhile emerged in the wake of the narratives of the sustainable/resilient cities and of the informational/intelligent city [218][126]. It implies a community-driven reaction to solve traffic congestion, school overcrowding, air pollution, loss of open space and skyrocketing public facilities cost [159]. However, what indeed is a smart city? With this question in mind, I started my search for the meaning of a smart city through reviewing various literatures concerning this very topic. In addition to the academic papers, articles, books and blogs that presents the state of art of the smart city development and research, I also reviewed literature that offered a more reflective perspective on the smart city (e.g. [218][93][210][45]). These reflective pieces demonstrated the importance and relevance of a more diverse discussion in the realm of the smart city. More importantly, they shed light upon several underlying discussions that we also need to have in smart cities in addition to the urban development discussion and ICT implementation debates. For example, the discussion regarding relationship and interaction between space, knowledge and power. And the discussion in the same vein as 'the right to the city'[2].

2.1   The best 'worst subject' ever

Rhetoric surrounding smart cities falls broadly into two categories: marketing material from large IT companies such as Hitachi [113] and IBM [119][78], and academic literature relating to technological interventions in the urban environment [10][222]. Smart city literature is being published at a fast pace, but as yet there has been very little produced in the way of critical discourse in this area [78]. Prevailing discourses around smart cities have until recently been largely positive and self-congratulatory [114], with a primary focus placed upon technological solutions to the complex issues cities face [114][93][210]. These discourses appear to neglect the inhabitants, historical legacies, and spatiality of cities that face such interventions from technology companies [115][127]. More recently however, discourses have begun to move towards human centric and inclusive approaches to technologies within the city, with an increase in references to the terms 'open' and 'citizen engagement', amongst others [127].

Technological solutionism [54] has been a prominent approach throughout the evolution of the smart city paradigm [114][93][210]. However, there has recently been a decisive reaction against this solutionism. Many scholars have identified a need for smart cities

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[2]I discuss the right to the city in more detail in a later section (2.2.1) and it's implication in the smart city (2.2.2).

research to evolve from being technology, management or governance focussed to being citizen-centric[114][127]. Terms such as citizen engagement, participatory design and co-design are emerging as the new territories of rhetoric. These terms carry long and mixed histories of use in a variety of domains, including technology design, service design and healthcare design [116]. While there are legitimate concerns about the successes of these types of citizen-centric design [116], I suspect that a more fundamental issue affects smart city research. I suspect there is a dissonance between the amount of literature using citizen-centric terms and terminology, and the amount of involvement people have in that research. In order to identify whether this dissonance exists, I carried out a systematic literature review.

There is no complete definition of what a 'smart city' is, but common themes and terms run through them. Giffinger et al's definition [85] considers smart as performing in a forward looking way. The forward-looking development approach to a smart city considers issues such as, awareness, flexibility, transformability, synergy, individuality, self-decisiveness, and strategic behaviour. In other studies [103][102], a smart city denotes an instrumented, interconnected, and intelligent city. Instrumentation enables the capture and integration of live real-world data through the use of sensors, kiosks, meters, personal devices, appliances, cameras, smart phones, implanted medical devices, the web, and other similar data-acquisition systems, including social networks as networks of human sensors. Interconnection means the integration of those data into an enterprise computing platform and the communication of such information among the various city services. Intelligence refers to the inclusion of complex analytics, modelling, optimisation, and visualisation in the operational business processes to make better operational decisions. In contrast, the Natural Resources Defence Council defines 'smarter' in the urban context as more efficient, sustainable, equitable, and liveable. Toppeta [209] emphasises the improvement in sustainability and liveability. Washburn et al. [223] view a smart city as a collection of smart computing technologies applied to critical infrastructure components and services. Pardo and Nam [158] found some recurrent and shared characteristics in these definitions of smart cities and summarised them based on three different dimensions:

- Technology dimension, which is based on the use of ICTs to improve and transform life and work within a city.

- Human dimension, which is based on people, education, learning and knowledge and regarding them as the key drivers for the smart city.

- Institutional dimension, which is based on governance and policy, because the cooperation between stakeholders and institutional government bodies is crucial to design and implement smart city initiatives.

Cocchia [41] took a more systematic approach to the smart cities literature. In her systematic literature review comparing the similarities and nuances between the concept of the smart city and the digital city, she summarised the differences in a table (see Table 2.1). A few similar concepts that were listed in the table includes Urban Informatics (Foth), and Urban Computing and Urban Interaction Design (Brynskov).

According to this table, from the earliest publication in 2002 to the latest one in 2011, despite continuous attempts to pin down the precise meaning of the smart city, they appear to have been merely talking past each other. Since 2011 until today, late 2017, we've also seen some more terms and trends make their way into the smart city realm. There's a growing number of critical reviews of the smart city (e.g. [93][210][45]), there's also the mentioning and emphasis of the human in the smart city (e.g. [31]) and finally the Internet of Things (IoT) has also found its way into the smart city discourse (e.g. [40]) as Urban IoT[3] (e.g. [34][226]).

In *Smart cities in Europe* [31] Caragliu, Del Bo and Nijkamp state, "a city can be called a 'smart' city when investments and human and social capital and traditional ICT infrastructure fuel a sustainable economic growth and a high quality of life, with wise management of natural resources." At the heart of this definition is the consideration of humans, but only insofar as they might be harnessed to enable growth. The smart city discourse tends to present the view that only through the deployment of technologies will the quality of life improve, which may certainly be the case for some, but not for all, within the city. Views and experiences of those who actually live in cities and will be affected by this move towards the autonomous urban realm are largely ignored within the literature. Caragliu's (ibid) definition can be contrasted with the following statement, taken from a white paper [40] on "Smart cities and the internet of everything" which states: "smart cities are a future reality for municipalities around the world. These cities will use the power of ubiquitous communication networks, highly distributed wireless sensor technology, and intelligent management systems to solve current and future challenges and create new services." Both definitions place technologies at the heart of the smart city, with the presumption that through the deployment of 'smart' initiatives, the city will expand and its problems will be ameliorated through technology alone. The core of these concepts is the augmentation of urban spaces and places with technologies, however, there are a variety of interpretations about the function, form and manner of implementation they should, could or must take which is left un-addressed.

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[3]Greenfield (2017) gave a useful analogy in his book *Radical Technology* linking IoT and the smart city. According to Greenfield, we can see the concept of IoT at three different scales, that at a body scale, the IoT implementation is the essence of Quantified Self, at a domestic level, IoT is the core of any smart homes system, and finally at an urban level, the IoT is the embodiment of a smart city.

Descriptions of these smart city visions are predominantly large and deal with infrastructure, such as control centres, which have the ability to monitor areas such as traffic or crime, using live data to implement immediate measures to rectify situations [125]. This is already happening in cities across the world and is manifest in transport systems through the use of 'smart transport cards' such as London's Oyster Card, and Automatic Number Plate Recognition (ANPR), which can track vehicles and input information into wider transport systems solutions. Moreover, many people living in the city already use existing ICT solutions, such as location-based mobile phone applications, so what the label 'smart city' is adding in terms of value is unclear. Recently a more critical discourse, that challenges assumptions relating to the largely positive claims for the smart city, is beginning to emerge and some scholars have begun questioning its scope, ideology, and its limited involvement of local residents [115][127][159]. In the paper *Critical interventions into the corporate smart city*, Hollands [115] suggests that such a reliance upon technologies as a panacea for a city's problems makes ideological assumptions that have not as yet been widely addressed. He asks *"Who, and what, is driving our preoccupation with the smart city, and who stands to gain and lose in the race to such an urban future?"* Questions relating to who gets left out and what people living in smart cities feel about this new environment are vital, but as yet are not being thoroughly addressed by academia or large IT companies [125]. Numerous academics have already highlighted the necessity of involving citizens in urban development projects and advocating for their right to the city, from Lefebvre [141] to Harvey [104] and Jacobs [121] to Soja [199].

2.2   A continued research effort

2.2.1   Right to the city

Henri Lefebvre [140] first coined the term 'right to the city' in his book Le Droit à la ville. It is a declaration of a collective intent against the homogenising approach to urbanisation and an inter-disciplinary debate located across geography, law, and urban studies [142][14][105][151] [175][176]. Harvey [105] iterated this concept as such:

> "The right to the city is far more than the individual liberty to access urban resources: it is a right to change ourselves by changing the city. It is, moreover, a common rather than an individual right since this transformation inevitably depends upon the exercise of a collective power to reshape the processes of urbanisation. The freedom to make and remake our cities and ourselves is, I want to argue, one of the most precious yet most neglected of our human rights."

The 'right to the city' is a call towards becoming active and moving towards the democratisation of urban space with the emphasis on collectiveness. It is an attempt to appropriate the production of space from the dominant hegemonic regimes, which in contemporary cities, is capitalism, within which space is valued predominantly for its exchange value, and private property and profit is prioritised over all other rights and claims [105][141]. Lefebvre [141, p. 358] gives the following example:

> "There are two ways in which urban space tends to be sliced up, degraded and eventually destroyed by this contradictory process: the proliferation of fast roads and of places to park and garage cars, and their corollary, a reduction of treelined streets, green spaces, and parks and gardens. The contradiction lies, then, in the clash between a consumption of space which produces surplus value and one which produces only enjoyment – and is therefore 'unproductive'. It is a clash, in other words, between capitalist 'utilisers' and community 'users'."

Harvey [105] also pointed out the intimate connection between urbanisation and development of capitalism as, in his opinion, urbanisation depends on *"the mobilisation of a surplus product"*. Therefore, within the current neoliberal capitalist system, the production of space is alienated, or made strange, from the users. It is not produced by them, but by others for them. We are also alienated from others who share the space.[4] According to Lefebvre [142, p. 158], *"the right to the city is like a cry and demand"*. It can be articulated as the right to autogestion of space [141, p. 166-167], which refers to the radical project of people refusing to passively accept the existing system of spatial production. Jacobs [121] famously advocates for a counter act to this alienation; that people must re-appropriate the production of space, take control of it and govern it for themselves. The acts of spatial *autogestion* are happening continuously in our cities: people and social movements everywhere, in all manner of ways, are engaged in active struggle to reshape the city and overcome isolations, resisting the efforts of developers, and the state to create homogenising urban space for capitalist and state benefit [105]. And Purcell [176] argues for an expansion of 'the right to the city', that it goes beyond just urban spaces and it should be a strategic claim applies to space in general, which in my case includes the right to the smart city.

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[4]This phenomenon could also be found in technology development. The digital technology production too is far from its end user and hidden in the black box. And despite the claims that technology could bring us together, we are more set apart.

2.2.2   Right to the smart city

As argued previously there has been a growing body of research critiquing the approaches which prioritises technology over people. I would like to further articulate this concern from 'the right to the city' perspective. In the smart cities, the neoliberal approach to urbanisation is fused and rejuvenated with the input of technologies. The algorithms which drive these technologies and the data produced are likely to steer towards increasing the profits of technology companies. As Antoniadis et al. argue [11],

> "Unlike the physical urban space that it overlays, this new and rapidly emerging "virtual" space has practically no capacity constraints. However, it is subject to inequalities in terms of access, representation, participation, and ownership. Indeed, today it is mostly large corporations like Google, Facebook and Twitter that control the digital social interactions at a global scale... the complete lack of ownership and control of these platforms on the users' behalf poses significant threats related to privacy, surveillance, censorship, and manipulation, which should not be underestimated."

Gabrys [77] raised her concern that the citizenship in current smart city rhetoric is *"reduced to a series of actions focused on monitoring and managing data, when that data managed by corporate and state actors"*. In addition to the continuous battle over the right to physical space, we now also have to be vigilant of our right in the digital realm. And in the smart city, these concerns and struggles are increasingly intertwined. This interweaving is exemplified in Apple's new *"town squares"*, where communities are encouraged to form around Apple's products in hybrid space [30]. The struggle for the production of space is of interest within the HCI and CSCW communities and in its concerns over control, participation, representation, ownership, access, surveillance, and privacy. There have been a growing number of civic-minded researchers trying to incorporate citizen participation in their smart city related technological interventions. At the very beginning of my PhD, I took part in a collaborative project which examined citizens' involvement in the smart city. With two other HighWire colleagues, we conducted a systematic literature review of technical, peer-reviewed smart city publications we found that citizen perspectives have been largely absent from the smart city discourse (see Appendix A.1). In the few exceptions found by the review, people living in smart cities were only invited to contribute to the design of technologies that had already been conceived of by academics, technology companies or governments. When citizens were involved in that technology design process, they were only invited to contribute via the use of a very limited set of methods, including focus groups, interviews, and surveys (Ibid.). True co-design, which invites participants to design with

scholars and practitioners from the outset of a project, was entirely absent from the literatures we reviewed. The limited involvement of citizens, as identified in the review, carries serious implications for the future of the smart city. The results indicated that a gap between rhetoric and practice does exist regarding citizen engagement in the smart city. Moreover, the results also showed that non-practitioner, non-academic residents are not involved in the definitional discourse about smart cities.

2.3 Areas of interest

2.3.1 Could it be a democratic innovation?

As we are witnessing how ICT has catalysed the smart city research, there is also a plethora of research featuring the merging democratic innovations in the digital era [83]. Smith [197] defines democratic innovations as *"institutions that have been specifically designed to increase and deepen citizen participation in the political decision-making process."* Elstub and Escobar [60] expands Smith's definition, adding that democratic innovations can be processes as well as institutions and replace 'decision-making' with 'governance processes' more broadly.

However, when processes and technologies are initiated from a top-down perspective with the intention to engineer public participation , it becomes what Squires [201, p. 171] would describe as incumbent democracy. According to her, *"the incumbent model conceives of democracy as an institutionalised and rule governed procedure, where participation becomes primarily instrumental, subsuming ethical considerations into interests to be adjudicated and preferences to be aggregated"*.[5] Such models of participation and democracy have long been questioned, and even where innovations are driven by a perspective of inclusion, they are too often co-opted by government to serve their needs for legitimisation rather than the original intentions behind them [26]. As Blaug [22] pointed out, the issue with this kind of top-down initiated democratic reform is its rare success in engaging the public at large. It can be argued that *"...citizens themselves have not been demanding enough"*, Blaug argues that such initiatives will never work because *"...indeed, they are not intended to work"* (ibid). On the contrary, such initiatives are designed to maintain the status quo, and *"to propagate the unreflective and deeply ideological assertion that democracy is a single political project to which all can be safely harnessed"* (ibid).

Blaug contrasts *incumbent democracy* to *critical democracy*, which primarily occurs at the periphery of and in resistance to elite governance. The main point of participation is not

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[5]It is the critique I pointed out in the 2.2.2 'right to the smart city'

to legitimise, but rather to challenge established institutions and participation is perceived as empowering in itself. This model of democratic practice has been adopted in HCI/CSCW through, for instance, Mouffe's [156] agonistic pluralism and in embracing the pedagogical necessity of digital participation in democracy [46]. The latter is in line with the educative, developmental side of Carole Pateman's notion of participatory democracy that sees participation as necessary to build capacity and skills to increase political efficacy [177]. These practices lead to claimed spaces for participation, created by less powerful actors outside of and separated from formal spheres of government [81]. Here the participants are also the creators of the space for participation and the ones who decide which democratic mechanisms they want to use. Though these do not have to be innovative, there are several examples of how social movements, such as the *Spanish Indignados*[6] and *Greek Aganaktismenoi*[7], have experimented with innovative democratic procedures in how they work internally [174]. Such radical movements are attractive for the study of digital technology, however, in many cases the routes to change for such political movements are unclear.

Bottom-up initiated democratic innovations could manage to attract great numbers of people to take part in experimental procedures to civic participation and collective decision-making and thereby widen popular participation. Castañeda [32] uses Inidignados and Occupy as examples of mass grassroots movements as such and, more importantly, how these movements helped to start a popular debate about how to deal with economic crises. However, movements as such also received criticism for being 'ineffective'. Blaug [22] suggests one explanation in that he argues *"by conceiving of participation as a micro-level process in which identities are created and dramatically displayed, it appears strangely disinterested in the realities of power politics"*. The "realities of power politics" these movements encounter, according to Blaug, includes "organisational inexperience", "few resources", "restricted information", and the "open hostility of states' (ibid). So paradoxically, on the one hand these mass grassroots movements are criticised for their ineffectiveness but are also feared for their potential effectiveness. Despite the notion that these mass grassroots movements could open up debates and dialogues that might have been previously impossible, they still struggle to navigate paths to impact. Without the strategic coordination and effective organisation from within themselves and the engagement with established institutions externally, democratic innovations at this (micro) level would only have limited influences on decision making. Similarly, despite seeing a potential in online participation, Manuel Castells was early to recognise the risk of online political activism that avoiding formal politics would further

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[6]Inidignados is an anti-austerity movement in Spain, https://en.wikipedia.org/wiki/Anti-austerity$_m$ovement$_i$n$_S$pain

[7]The anti-austerity movement in Greece involves a series of demonstrations and general strikes that took place across the country. https://en.wikipedia.org/wiki/Anti-austerity$_m$ovement$_i$n$_G$reece

undermine the institutions of democracy [33]. According to him, in order to allow for (electronic) grassroots democracy without "yielding to a technologically savvy elite", we need to balance the input from concerned citizens and the usage of technology in political representation and decision making [33, p. 417].

2.3.2   What's the role of technology here?   Through an HCI/CSCW lens.

There seems to be a binary in the early depictions of possible consequences of the Internet on democracy, which tended to either be overly optimistic [169] or apocalyptic 'gloom and doom' prognostications [177, p. 171].While many theorists have pointed out that neither of these predictions were likely to be completely on point, many also reached the conclusion that *"...it is hard to imagine solving our contemporary civic dilemmas without computer-mediated communication"* [177, p. 180]. However, I'd like to argue that this trend is more revealing of the era we live in (one that's witnessing the rapid technology advancements and abundance of technology availability) and less indicative of the civic dilemmas. As people have been engaged with grassroots civic activities such as grassroots lobbying long before current technologies (e.g. the poll tax riots). Technology itself did not create this type of critical democracy, but it presumably enables it (hence why the Cameroon and Ethiopian governments regularly cut off their citizens internet access to stifle opposition). Thus, a whole field of studies on e-participation has emerged, assessing the mobilisation effects of the Internet [192], comparing online participation to offline participation [83], and exploring the potential of political campaigning through online media [181]. Accordingly, the focus of these studies tends to be on invited spaces for participation [81] based on a notion of an incumbent democracy. But, similarly to their offline counterparts, studies show that such top-down initiatives to engage citizens online struggle to engage the public at large except from low-intensive and non-deliberative engagements such as e-petitions [155]. In contrast to the view that the democratic potential of the proliferation of ICT and the Internet primarily lies in re-energising traditional channels of civic participation, is the view that the traditional approach to democracy has been challenged by the widespread adoption of ICT and the Internet to such an extent that it is not viable to just rely on reinventing the old democratic institutions [46]. The Internet, for instance, is argued to be specifically suitable for issue-politics or matters of concern [49] [60] promoted by large professional interest groups or grass roots social movements. In other words, it opens up spaces for different forms of civic participation.

And the research endeavours commenting on the crossroads of HCI/CSCW and smart cities contributed towards the discussion on citizen engagement, civic participation, the use of technology and democratic practice in the context of smart cities. Especially in Urban HCI research and Urban IxD (or Urban Interaction Design) research where citizens in a city are invited to participate in the development and design of a smart city or a specific smart city technology.[8] For instance, some of the research comment on the technology facilitated engagement and interactions in urban settings; whether that is urban agriculture [164], some focus on media interventions in built environment [63] [64] [108], some try to bridge the top-down and bottom-up approaches in community engagement [76], some looked into incorporating grassroots initiatives in urban design [133]. Veeckman and van der Graaf [219] describe a multi-method, multi-case study research project that invited citizens in four smart cities (e.g. Ghent, Belgium; Issyles-Moulineaux, France; Manchester, England; Athens, Greece) to co-design mobile application templates. The templates went through iterative cycles of development based on citizen feedback gathered in workshops, interviews and surveys. The co-designed mobile applications were openly available for all city residents to download, use, and discuss (ibid). Similarly, Di Fiore, Chinkou, Fiore, and D'Andrea [52] describe their use of workshops, tutoring and shadowing to co-design a set of Smart Campus mobile applications with students at the University of Trento. They aligned their work with Trento's smart city vision, and labelled the end-result a co-designed mobile application. Vicini, Bellini and Sanna's paper [220] also presents a co-designed technology that they refer to as a mobile medical monitoring (M3) tool. To co-design the M3, Vicini et. al. held a preliminary workshop with expert users, 'including nutritionists, cardiologists, biomedical engineers and professional athletes' (ibid). Once the researchers had developed a working prototype, they invited local residents to trial it, and keep journals and notes about the experience. The researchers used interviews and a survey to gather additional feedback at the end of the project [220], and drew on this data to redesign, develop and improve the M3 (ibid). The common theme throughout these papers was the timing of local residents' involvement. In each paper, smart city residents were only invited to contribute to the project once researchers had already conceived of the technology domain (i.e. mobile applications) and, in some cases, the basic design specifications for the technology. No project brought residents and academics together from the outset to conceive of and design new services, technologies or experiences for the smart city. While looking into involving citizens in the smart city related research, Alawadhi and Scholl invited local residents to contribute to the definitional discourse about smart cities. how in what way by involving citizens

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[8]In some cases Urban HCI and Urban IxD have been used interchangeably by some researchers (e.g. [63], [64]).

in smart city design process is going to transform democracy in the smart cities. There's also research effort on involving smart city residents through a slight different method: participant observation [222]. Wang and Huang (ibid) use participant observation to study how people interacted with an existing smart city information point at a station in Taipei's Mass Rapid Transportation system. Their thorough and focused participant observation project led them to recommend several changes to the information point, without having held a single conversation with local residents about their opinions or needs (ibid). Their use of participant observation, a well-established service design and user-centred design method, adds another dimension to the ways in which people can be involved in smart city research. While many smart city researchers use interviews, workshops and surveys to involve residents in their research, these are not the only methods available. Other methods that are not usually employed, such as participant observation, discourse analysis, and ethnography, may offer equally useful insights to researchers. Shaffers, Komninos, Pallot, Trousse, Nilsson and Oliveira [189] describe the promise of Living Labs for collaborative 'future Internet research' projects and smart city technologies. They briefly outline the Smart Santander, ELLIOT (Experiential Living Lab for the Internet of Things), and Periphera projects, claiming that citizens and 'end users' were involved in each project's development. However, they offer no description of how, when, why or which people were involved with the projects. Similarly, Gaved, Jones, Kukulska-Hulme and Scanlon [80] offer a rich description of MASELTOV ("Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services"), a three-year project that will be co-designed by academics and local residents, many of whom are migrants. Although the paper stresses the importance of participatory, citizen-centred design, it does not provide any detail of how, when, why, or which local residents will be involved in the design and development of the application. (ibid) Kominos, Tsarchopoulos, and Kakderi [131] also mention that local residents were contacted and involved throughout their smart city service design project. However, once again, the detail about how, when, why, or which local residents' did not suffice to justify how in what way by involving citizens in smart city design process is going to transform democracy in the smart cities.

And new complexity comes with new trend in HCI research. When HCI as a discipline starts to critically reflect its previous focus on the human, we start to see HCI research on the smart city calling upon a non-human focused approach. For instance this paper [145] from 2017 points towards the introduction of non-anthropocentric design to de-centre the human as the focus of design and that's not to forget the smart city agenda is critiqued for its focus on technology and business led solutions. The researches emphasise the necessity to de-centre human in not only HCI but design in general if humanity is to meet the challenges

of the Anthropocene, the era in which human activity affects the Earth on a geological scale. While there is plenty of civic engagement oriented activity and research happening with the assistance of technology, and whether they put humans or non-humans at the centre, most of it never finds its way to any formal political institutions. Which makes me wonder if the way forward for us is to properly incorporate citizen participation, i.e. the bottom-up approach and balance it with the top-down guidance. Could it be a policy innovation that we are looking for? How in what way by involving citizens in smart city design process is going to transform democracy in the smart cities?

2.3.3   What could policy do in the smart city?

A policy is a deliberate system of principles to guide decisions and achieve rational outcomes. A policy is a statement of intent, and is implemented as a procedure or protocol. According to Sabatier the process of public policymaking includes the manner in which problems get conceptualised and brought to government for solution; governmental institutions form alternatives and select policy solutions; and those solutions get implemented, evaluated and revised [183].

In the smart city agenda, policy could serve as a powerful means for us to unpack the smart city notion, understand the current issues and provide feasible solutions and yet it is underdeveloped. In the paper *Exploring the Nature of the Smart Cities Research Landscape*, Ojo et al analyse 170 papers concerning smart cities or intelligent cities in order to map out the distribution research effort in the smart city [166]. According to their paper the top four most common research themes are: technology – about 29 percent of the publications; nature of smart cities – roughly 17 percent of the publications; model and frameworks – about 13 percent of the publications and; and policy and strategy – roughly 8 percent of the publications (see Fig. 2.1). (ibid)

Looking specifically at the UK, as stated in 'smart cities', a background paper from gov.uk, there are six key areas for policy making to help UK firms to exploit their capabilities in smart city development. They are:

1. encouraging and empowering city authorities to develop the vision and leadership to provide solutions to their own problems; open data and the capacity of organisations to improve access to open data, to share and to use it, including the development of open standards;

2. programmes to develop underpinning technologies and to demonstrate their efficacy;
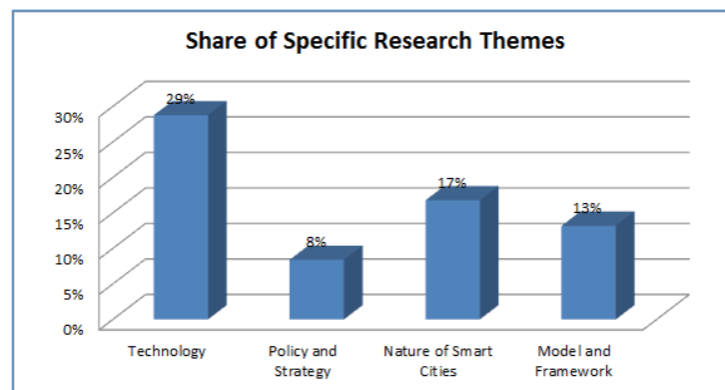
Fig. 2.1 Share of Most Common Smart City Research Themes in [166]

3. departmental programmes to encourage the adoption of new approaches and technologies, to transform both the service systems and consumer behaviour;

4. participating actively in EU programmes;

5. helping UK firms to exploit their capabilities in global markets.

However, there is a clear disconnect between 'vision' and 'policy' and in consequence the dissonance between smart city practice and policy remains unaddressed. For example, searching the key word 'smart city' in gov.uk policy page, no results were found. This is not to dismiss other endeavours by the government in smart city policy related areas but to highlight the vagueness the notion still embodies. Government policy Broadband Investment especially the Super-Connected Cities programme provided options for wireless connectivity which could be key to smart city feasibility. Similarly, The Open Standards principles are the government's policy on open standards to make government IT more open, cheaper and better connected. Government policy business and the environment is in place to support innovations that make products and services more environmentally friendly. England's cities are promised new powers and freedoms through City Deals. The government strategy for low impact building shows how it will provide up to £60 million in funding for innovation in low impact building over the next 5 years. Low carbon technologies policy is to increase the amount of energy the UK gets from low-carbon technologies such as renewables and nuclear, and reduce emissions through carbon capture and storage (CCS). Comparably household energy policy is to help households keep their energy bills low, support those most in need and take action to help secure energy supplies in the long term. All these selected policies from the government are within the realm of the key areas for UK smart city policy making. They either empower the local authority, encourage technology development, adoption and efficiency, or support business innovation and growth. And the list goes on to policies that

are tangentially related to the smart city agenda such as cyber security, which is to make the UK one of the most secure places in the world to do business online and help to shape an open, vibrant and stable cyberspace that supports open societies, etc. Government policy on research and development intends to utilise UK's talent in research, development and innovation to make the UK the best place in the world to run an innovative business or service. Planning reform policy is there to ensure people's right to influence decisions that affect them.

Meanwhile the Parliamentary Office of Science and Technology (POST), Parliament's in-house source of independent, balanced and accessible analysis of public policy, issues policy briefings related to science and technology. There's no POST notes reporting specifically about the smart city but there are four reports from 2014 featuring big data which is another key area for policy making in smart city. It is also the core of a lot of smart city developments such as 'OPEN Glasgow', 'Bristol is Open' and 'MK:Smart'. There is also one note from 2014 reporting smart meter and energy usage. In addition, the POST note Towards 2020 and beyond from this year looks into the relationship between the UK policy and people, technological change, climate change, and sustainability etc. The policy drives discussed in this report overlap with the issues that motivates smart city development. Although the 'smart city' has not been directly addressed by any direct policy or POST yet, issues and topics that are key components of the smart city have been researched, published and to some extent regulated.

Another concern is that these disconnected policies concerning the smart city might deliver a disjointed collective of smart parts within a city that may not serves as a city more holistically.[9] That there is a possible clash between smart city policy and other existing and developing policies, for example concerning individual data privacy and security. The smart city vision has been criticised as functional but not liveable for citizens [93][114][204] and arguably without bringing together the segmented smart components this critique might be the future we are heading towards. The emphasis on big data and data mining from government's policy briefing spotlights another concern in the smart city agenda. Smart city development often receives the criticism regarding concerns over data privacy, security and value. Due to these issues, the data needed for initiatives such as open data platforms and the integration of health services is not easily made accessible. For example, the launch of care.data, a database which integrates data gathered from GPs with hospital medical files was postponed due to concerns over data privacy and possible breaches [211]. Despite these

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[9]However, this is not to advocate or to promote a centralised system for the smart city, as having centralised systems for cities means we risk paralysing the whole city when anything goes wrong with the systems; and things do go wrong. Rather this is a critique of the disjointed approaches to the smart city that need better co-ordination so that we could avoid unnecessary duplication and potentially contradictory policies.

potential violations of privacy and security, the question that needs to be answered first is whether smart city is simply a data gathering exercise?

Angelidou has offered various spatial strategies for smart city policy to adopt but there's no literature that has yet touched on the policy concerning HCI in smart city development [8]. Nam and Pardo unpacking the smart city discourse suggested three dimensions for policy innovation which are technology, people, and institutions. For them a smart city policy should include the "integration of infrastructures and technology-mediated services", should allow "social learning for strengthening human infrastructure" and ensure "governance for institutional improvement and citizen engagement" [158]. AlAwadhi at el.'s research set out to understand the building of a smart city and from their empirical study discuss the policy context for four different cities (Philadelphia and Seattle in the United States, Quebec City in Canada, and Mexico City in Mexico) and discovered that the smart city policy varies depending on the city, city manager or mayor, and his or her political position [1]. Their findings point out that interdepartmental agreements shape the policy context of the initiatives and the executives' policy directions shape policy context. Chourabi et al regards policy as one of the drivers locate in the inner circle of smart city initiatives framework [39]. Still academic endeavours on smart city policy development, as opposed to technology development in the UK are also comparatively underdeveloped.

2.4 Standing on the shoulders of the giants

As I stated in the beginning of this chapter, any literature review should be aware that it is a survey of the state of art of a subject. It is to 'stand on the shoulders of giants' in order to gain a 'better' view of the subject matter. It is also through this literature review process that I learnt how and where to position my own research work within the extensive amount of work that has already been done in regard to the smart city. It is the more critical perspective trying to restore 'people' back to the centre of the smart city and asking critical questions about the smart cities with which I align myself. Since the time when Hollands (2008) posed the questions *"will the real smart city stand up"* in his instrumental paper, to the time I started to pick up the smart city as a research subject (which was 2014) two things have happened. Firstly, there still has not been a real 'smart city' come into being during those six years and there is still not one actually existing today. Greenfield regards the absence of a smart city as a failure and counts projects such as the Masdar City, New Songdo and PlanIT Valley as failed projects *"by most any reasonable measures"* [93]. He argues that even where these projects succeeded as real-estate development, they have taken too long and still failed to

deliver on their promises of transforming everyday life with their advanced technics.[10] Some
may argue that the case of an 'actually existing smart city'e.g. [195], however it is still part
of the discussion of implementation of smart city projects rather than actually having a smart
city. Secondly, there are more critical voices that have been picked up and highlighted. And
two examples of such voices are *Against the smart city* by Adam Greenfield and *Smart Cities:
Big Data, Civic Hackers and the Quest for a New Utopia* Anthony Townsend.

While we struggle to find the central theme, Anthony Townsend details the history and
present state of technology meticulously. He provides a detailed account of where we stand
on the subject of smart cities. He has provided a detailed history, countless examples and
the present challenges. In his book, Townsend calls for a few things to guide smart cities'
development around the globe: good governance that serves the people and that avoids blind
infatuation with the glistening toys of smart cities; an open-source approach to smart cities
that solicits the creative intelligence of the people who actually live there, instead of the
wholesale standardization of smart cities through the global sales teams of a few corporations;
and a balancing of smart city tech with an interdisciplinary, *"soft"* urban planning intelligence
that is more of an art than a science. Why do we need this softer touch? Townsend draws
parallels to the standardization of urban areas in the early 20th century, especially in regard
to the personal automobile. That standardization, and the vast infrastructure eventually built
to accommodate the car, seemed logical, reasonable, and rational at the time, but it is a huge
problem that we now wrestle with. As he says, *"if the history of city building in the last
century tells us anything, it is that the unintended consequences of new technologies often
dwarf their intended design"* [210, p. 14]. We must be wise in our rollout of smart city
designs because the stakes are higher than ever as Townsend argues. Indeed, at the end of
this century, *"with as much as 80 percent of the world's population already living in urban
areas, there will be few cities left to build"* [210, p. 284]. Quoting economist Paul Romer,
we are building the cities that humanity will live in forever.

Greenfield, on the other hand focuses his critique on the underlying ideology embodied
in the exemplar projects that people pointed to at the time as the best representation of the
smart city. His main critique is that these exemplar smart cities as envisioned in the literature
but they do not currently exist. They are: the New Songdo City, a twenty to forty billion
dollar development for half a million people built on reclaimed land by the Yellow Sea
in South Korea; the Masdar City in Abu Dhabi, which is marketed as a future home for
40,000 residents and a place of work for 50,000 commuting workers; and PlanIT Valley, a
ten billion dollar collaboration in Portugal planned to accommodate 225,000 citizens in an

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[10]This was not a harsh comment on smart city developments, especially the case of New Songdo. In 2015, I
had the chance to visit Songdo when I attended a smart city conference hosted there. It was not particularly
smart on the surface level and it was still under development when I visited.

area *"about the size of downtown Boston"*. These projects are not in an advanced state, and it is arguable whether they will look much like the advertising and promotional materials when they are completed. Greenfield when reviewing these smart city visions raises problems with narratives; that a smart city is promoted as a collection of technologies that, once deployed, will function consistently and uniformly. As a city, it is one that is built in a generic space, unfolds in a generic time and has generic technologies installed. However, cities, he argues, are rather products of specific geographies, social milieus and their inhabitants. He specifically critiques the continuation and remanence of the 20th modernist approach to urban planning in the smart city, which is over planning and over specification. However, there are other scholars who hold a rather neutral stand on this approach, Dourish and Bell [58] in their book envisioning the technical future we are heading into, simply present the modernist approach as the approach to urbanisation rather than questioning the implications of this approach. For them *"the city embodies modernist ideals of rational planning and the products of industry harnessed for the entire not just of the individual but for civil society as well – a model of technology's application to the fabric of everyday life."* [58, p. 121] For Dourish and Bell, technology and humanity share an equal weight to the existence of the city. Greenfield would have disagreed, as he argues that the implication of technology in the smart city is not about the city, rather it is to ease the management and administration work for the administrator through a rather authoritarian approach. Greenfield concludes *Against the smart city* on the note that *"there is no such a thing as a decentralised, distributed and community-oriented smart city... not when centralisations, technology and the assertion of power from the above are what the phrase means."*[93, p. 99]

Townsend work is mostly a reflection of his experience in NYU so many of the projects, cases and examples for this reason has a specific focus on North America while mainly focusing his critiques on the smart city imaginaries offered by technology companies. Meanwhile, Greenfield's book, as he points out himself, has a tight focus on marketing and promotional materials. Taking the inspiration from their work and adopting a more critical and what Townsend would call a 'softer' approach to the smart city, I decided to conduct an empirical study of the smart city focusing on the UK. So rather than studying exemplars that have been thoroughly reviewed, unpacked and critiqued by Townsend and Greenfield, the goal of this thesis is to understand how the smart city vision is being interpreted and implemented and in more 'ordinary' cities [4]. It is also important to acknowledge the influence a different geography and culture would bring to the study. That is to say that despite taking inspiration from Towsend, I also need to note the different urbanisation process between the UK cities (which was often associated with modernisation) and US cities (which was driven by the car). As a result of this difference in the city making process UK cities do not typically suffer

from the same problems as US cities do, such as public transportation, walk-ability, city and local centres. The acknowledgement of these differences is likely to be revealing for examining the development of smart cities. That is to say that perhaps what happened with the car can be held up as an example of the trouble that comes from designing solely around new technology.[11]

2.5 Sandcastles v.s. Dashboards

Looking at the smart city discourse there are two types of imaginaries leading the smart city vision. One type is smart cities built on the greenfield sites, i.e. master-planned new built smart cities, such as the famous trio of canonical smart cities, i.e. New Songdo, Masdar City and the PlanIT Valley [93]. This type of the smart city proposes to incorporate digital technology and infrastructure in the design, development and construction process of the city that's being built.

Despite the criticism and skepticism these three smart cities have attracted, they provide a version of 'how to' guide on building a smart city from the scratch. Taking Masdar City as an example, it is a new master-planned urban development purported to become the model of sustainability and blueprint for the cities of the future [148]. However, rather than demonstrating how to build a future smart city, what Masdar City really trying to demonstrate is the feasibility of a smart city business model. When Masdar City partners up with technology companies (both the leading ones and the emerging ones), the companies are expected to come in with not only the capital but also the technologies to be researched, developed, tested, installed, marketed and showcased in their designated area in Masdar City [45]. Smart cities like Masdar city has a significant impact on the later comers in the smart game who are combining the smart city development with rapid urbanisation, i.e. countries like India and China. India has released their ambitious mission plan of building 100 smart cities and quite a lot of them are following the Masdar City's development model [47][48].

Meanwhile there's also another type of smart city that's more common in Europe, where the urbanisation process is in a different stage and facing a different set of challenges. Rather than putting in new urban infrastructures to satisfy the growing needs created by urbanisation, the European cities are faced with updating the aging urban infrastructure [12]. Therefore, the smart cities exemplar coming from Europe has a different emphasis in their plans. The focus for cities like Dublin, Amsterdam and London is to retrofit existing cities infrastructure often

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[11]In section 5.5.2 The smart city gaze – seeing as a smart city I reflect more upon the difference between the car-drive US urbanisation and UK one taking the example of the development of Milton Keynes as a city and as a smart city.

dating back to the Victorian period with digital layer. One of the most common examples is to build a smart city dashboard utilising the existing urban monitoring system in the city, e.g. the CCTV cameras and environmental sensors. Dublin Dashboard is regarded as one of the successful examples demonstrating the value of employing urban data in managing a city, and other Irish cities have started to follow its footstep hoping to replicate Dublin's case [128]. In spite of the difference in the approach to the smart city development whether that is retrofitting digital technologies or building a city from scratch with technology encoded, whether that is to have a dashboard documenting each breath the city takes or to endeavour to build a sandcastle, what these smart cities development plans share is their profound impact on the smart cities to come, cities we live in. If the World Bank's report were to hold, the urban developments we are building now are likely to stand for at least half a century [225]. What we build today will be what will see in 2050.

So far, I have gone through some key issues regarding the smart cities in the research literature. Firstly, the smart city as a concept is unclear, it functions as a banner for a considerable number of projects, development, and research concerning the intersection between urbanisation and ICT implementation. Secondly, the smart city discourse rarely engages citizens in its definition process in a meaningful way despite the increasing numbers of papers trying to address the citizens' right to the smart city. In addition, with the growing body of work offering a more critical, soft, and sociological perspective to look at the smart city, there is still a gap in policy and strategy work that could be accomplished in the smart city in the hope of addressing the lack of definition, incorporating people's perspectives and democratising the process in developing a smart city. It is on these grounds, I started my exploration of the smart city, in particular, unpacking the concept and the discourse of the smart city. It is an enquiry of the deciding voice on what a smart city is, what it means to democracy and how we are getting there, but also of what people ultimately see as a smart city from their experience and perspective. It is an important enquiry because what we build today will be what will see in the near future.

Table 2.1 Different definitions of the smart city [41]

Concept	Definition	Author and Reference
Wired city	"Wired cities refer literally to the laying down of *cable and connectivity* not itself necessary smart"	Hollands [114]
Virtual city	"Virtual City concentrates on *digital representations* and manifestations of cities"	Schuler [191]
Ubiquitous city	"Ubiquitous city (U-City) is a further extension of digital city concept. This de nition evolved to the ubiquitous city: a city or region with *ubiquitous information technology*"	Anthopoulos et al., [9]
Intelligent city	"Intelligent cities are territories with high capability for learning and innovation, which is built-in the creativity of their population, their institutions of knowledge creation, and their *digital infrastructure* for communication and knowledge management."	Komninos, [131]
Information city	"Digital environments collecting official and unofficial information from local communities and delivering it to the public via *web portals* are called information cities"	Anthopoulos et al., [9]
Digital city	"The digital city is as a comprehensive, *web-based representation*, or reproduction, of several aspects or functions of a specific real city, open to non-experts. The digital city has several dimensions: social, cultural, political, ideological, and also theoretical"	Couclelis,[42]
Smart community	"A geographical area ranging in size from neighbourhood to a multi-county region whose residents, organizations, and governing institutions are using *information technology* to transform their region in significant ways. Co-operation among government, industry, educators, and the citizenry, instead of individual groups acting in isolation, is preferred"	California Institute, [185]
Knowledge city	"A Knowledge City is a city that aims at a knowledge-based development, by encouraging the continuous creation, sharing, evaluation, renewal and update of knowledge. This can be achieved through the continuous interaction between its citizens themselves and at the same time between them and other cities' citizens. The citizens' knowledge-sharing culture as well as the city's appropriate design, *IT networks and infrastructures* support these interactions"	Ergazakis et al.,[61]
Learning city	"The term 'learning' in 'learning cities' covers both individual and institutional learning. Individual learning refers to the acquisition of knowledge, skills and understanding by individual people, whether formally or informally. It often refers to lifelong learning, not just initial schooling and training. By learning, individuals gain through improved wages and employment opportunities, while society benefits by having a more flexible and technological up-to-date workforce"	OECD, [135]
Sustainable city	"Sustainable city uses *technology* to reduce CO_2 emissions, to produce efficient energy, to improve the buildings efficiency. Its main aim is to become a green city"	Batagan, [16]
Green city	"Green City follows the Green Growth which is a new paradigm that promotes economic development while reducing greenhouse gas emissions and pollution, minimizing waste and inefficient use of natural resources and maintaining biodiversity"	OECD, [165]

Chapter 3

Inter-/Post-Disciplinarity, Well Organised Chaos!

This chapter discusses the methodological orientation of the thesis. It places my doctoral research within a spectrum of research philosophies and specifies and rationalises how a mixture of data gathering methods comprising ethnographic interviews and workshop/conference observations, and analysis methods consisting of thematic analysis and Foucauldian analysis, were combined during the course of this research. In this chapter, I clarify how this specific combination of methods employed helped in meeting the research aims and objectives – 1, to unpack the current discourse of the city 2, to capture the vision of a future smart city, 3, the implication for Design — a briefing on the smart city for policy development. Due to the highly inter-disciplinary nature of both my doctoral research and the research centre in which I am based, the discussion of inter-disciplinarity would help put this chapter into perspective. Inter-disciplinarity: is best seen as bringing together distinctive components of two or more disciplines. In academic discourse, inter-disciplinarity typically applies to four realms: knowledge, research, education, and theory [163]. Interdisciplinary knowledge involves familiarity with the components and philosophy of two or more disciplines. Interdisciplinary research combines components of two or more disciplines in the search or creation of new knowledge, operations, or artistic expressions. Interdisciplinary education merges components of two or more disciplines in a single program of instruction. Interdisciplinary theory takes interdisciplinary knowledge, research, or education as its main objects of study. In this sense, my research could be categorised as and contribute to both inter-disciplinary research and theory.

> "It is of course impossible, in our age, to become an expert in everything. But if we mistake disciplinary knowledge for wisdom; if we forget how much we don't

know; if we forget how much we cannot know; if we don't set for ourselves, in principle at least, the ideal of the unity of knowledge; we lose something of great importance. By persistently aiming at the hazy target of omniscience, interdisciplinarians help us remember these things. They thus spur us to see the various components of human knowledge for what they are: pieces in a panoramic jigsaw puzzle. And they inspire us to recall that "the power and majesty of nature in all its aspects is lost on him who contemplates it merely in the detail of its parts, and not as a whole."[99]

Even under the best of circumstances, an interdisciplinarian is unlikely to gain as complete a mastery of her broad area as the specialists upon whose work her own endeavour is based. She must risk dilettantism to gain her bird's eye view. She may become jack of all trades, master of none. Literary critics, for example, often borrow a theory from another discipline, even though they fail to *"first understand what it means in that discipline and how it is judged there"* [143, p. 33] . An interdisciplinary dialogue runs the risk of going stale. The interdisciplinary community can become *"cut off from fresh infusions of disciplinary knowledge."* It can slide into naive generalism with little disciplinary training [90, p. 35].

The following sections present an overview of the methodological, epistemological and philosophical stance adopted in this research and highlight the contribution of each individual investigation, i.e. the ethnographic interviews and observations, the thematic analysis, Foucauldian analysis to the overall research questions and inter-disciplinarity.

3.1   Overview – a hybrid research

"Your planet is very beautiful," [said the little prince].
     "Has it any oceans?"
     "I couldn't tell you," said the geographer ....
     "But you are a geographer!"
     "Exactly," the geographer said. *"But I am not an explorer. I haven't a single explorer on my planet. It is not the geographer who goes out to count the towns, the rivers, the mountains, the seas, the oceans, and the deserts. The geographer is much too important to go loafing about. He does not leave his desk."* [51, p. 63-64]

As I alluded to in the title of this chapter, because of the paradoxical characteristic of inter-disciplinarianism in academia— while we are encouraged to conduct our research in a problem-solving oriented rather than discipline-practice focused manner, we are discouraged at the same time for not choosing a community and discipline to be associated with and be

based at [95].Therefore, the data generated during this doctoral research was not generated by relying only on one clear-cut method. In addition, the research does not conveniently fit into any singular established methodological framework. Hence, the hybrid here refers to the concept of mixing data gathering methods such as ethnographic interviews (specifically expert interviews), workshops, observations and genealogical data collection and analytical frameworks including thematic analysis and Foucauldian approaches all in one research project.

This chapter begins by acknowledging the beliefs, assumptions and subjectivity on which this research was founded in order to highlight how they might have influenced the study. Morgan and Smircich have suggested that researchers make 'assumptions' consciously or unconsciously at every stage of their investigation [154]. *"These include assumptions about human knowledge (epistemological assumptions), about the realities you encounter in your research (ontological assumptions) and the extent and ways your own values influence your research process (axiological assumptions)"* ([188, p. 124]). I'd like to argue that a researcher can not exclude herself from the research context that she investigates. This thesis assumes that maintaining complete objectivity in societal research of this kind, in pursuit of 'knowledge', is impractical and that it also signifies some level of indifference towards research subjects. One of this thesis objectives and merits is to offer an alternative perspective or even counter point of what smart cities are. With a clear and strong axiological stance which is to critique the neoliberal nature of smart cites, this research attempts to be as 'subjectively-objective' [154] as possible.

The first section of this chapter presents the philosophical position and the overall research approach adopted during this study. It continues to introduce the key aspects of ethnographic interview, thematic analysis and Foucauldian approach that were instrumental to research strategy, each followed by a summary of techniques and procedures used during the course of this study. The final section discusses how these research methods address the research questions specified in the Introduction. The research process that the 'onion' described [188] has inspired the structure of the discussion in this chapter. Working inwards from the external layers of the onion (Fig. 3.1), this chapter discusses the rationales to the methodological choices made during the research. The onion represents six levels of methodological groups a researcher works within starting from the broader perspective of the guiding research philosophy to the narrow and specific tools and techniques of collecting and analysing research data.

The following discussions of various methodologies aim to illuminate inclusiveness, and provide a base from where audiences can interrogate the rigour of the project regarding methods, methodology and epistemology.
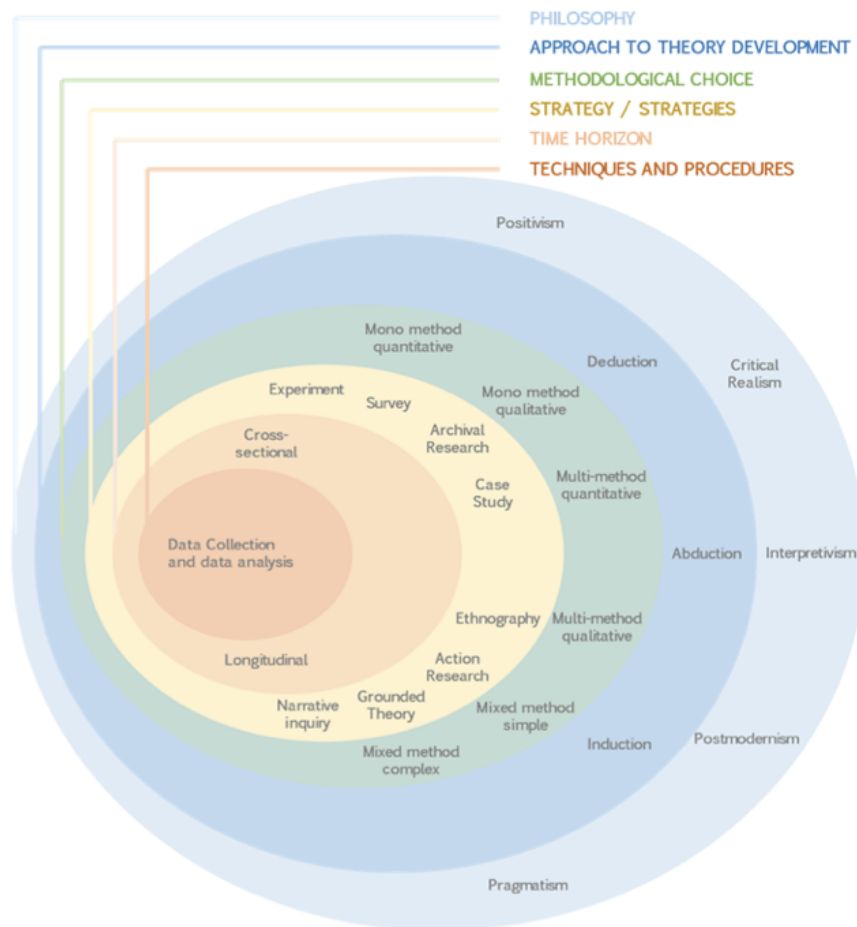
Fig. 3.1 The Research Process 'Onion' by [188]

3.2   An Ethnographic Investigation

"*The concern to balance detailed documentation of events with insights into the meaning of those events in the enduring hallmark of ethnography.*"[62]

Ethnography is often regarded as the approach to gain an insider perspective to understand shared cultural and social meanings and to feature interaction with the context, and the use of narrative to communicate the findings. It is a qualitative orientation to research that highlights the detailed observation of people (which requires attention to the 'seen but unnoticed' as Garfinkel puts it [79]), in naturally occurring settings (which in Suchman's term would be "situatedness" [202]). Ethnographic research can be explained in terms of 'subtle realism'

as described by Hammersley [101]. The assumption is that knowledge can be explained in terms of uncertain beliefs. Validity, through confidence, is likely and does not depend on the demonstrability of empirics. The aim of research can, perfectly legitimately, be to represent an understanding of reality from a singular perspective. As Sharrock and Randall argued *"it would be foolish to assume that the results of ethnographic enquiry, under whatever auspices, will necessarily be adequate for design purposes. They do not, that is, replace other kinds of work, but are offered in addition."* [194] This sums up precisely the same epistemic foundation that underpins this thesis.

This said, when it comes to transferring qualitative data into findings with validity, some theoretical commitments were needed to turn a method into something rigorous and generalisable. There are a substantial numbers of frameworks that in their own ways, provide some means to generalisable conclusions. Sharrock and Randall [194] have offered a brief taxonomy of frameworks as such, including Grounded Theory [86], Activity Theory (e.g. [160][179]), Actor Network Theory (e.g. [28][136], Distributed Cognition (e.g. [118]), Structuration theory (e.g. [84]) Participatory Design (e.g.[21][92]), and Soft Systems Methodology ([37]). Grounded theory, in particular, shares a key similarity with methods employed for this thesis, that is they take into account details as they emerge. However, rather than fully adopting grounded theory methods which moves the research towards theory development, this thesis draw upon a grounded approach instead. Grounded theory owns a systematic approach to coding of data in order to arrive at a theory while a grounded approach allows me to arrive at an *"implication for design"* (which is not necessarily a theory). Combining ethnography and grounded approach is not new or radical, Charmaz and Mitchell have argued the benefits of using these two approaches to complement each other in research [36]. That is, a grounded approach can sharpen the analytic edge of ethnographic research and ethnographic methods can prevent the grounded approach becoming a quick and dirty qualitative research (ibid). Another virtue of using a grounded approach in ethnographic research is that it allows the 'usable' details to invariably emerge and accounts for the 'unplannables' in the field in practice through simultaneous involvement of data collection and analysis. The acceptance and realisation of the value/benefits that can be garnered by adapting a research's direction should not be underestimated. Accepting a degree of flux, and believing that usable detail will emerge, takes a degree of trust. For instance, the direction for the second half of my fieldwork was not planned initially, nonetheless it occurred naturally, as my fieldwork developed.

In this thesis, the predominant data collection/fieldwork method is ethnographic interviews, namely ethnographic interviews with experts. Research interviews, as Hester and Francis argued are locally organised interactional encounters such that the knowledge/information

in the interview is an outcome of the ad hoc co-production of both the interviewer and interviewees [109]. That is to say that the production of interview data is not solely conditional on the interviewer/researcher's compliance with *"methodologically correct theoretical idealisation"*; it is produced with some minimum interactional involvement on the part of the interviewer (ibid). Hence, the key principle I followed in carrying out ethnographic interviews in this thesis was to 'let the subject talk'. This is at the heart of both the design process prior to the interview and the actual practice of the interview. For instance, the majority of the questions in the interviews were purposefully and decidedly open-ended and leading questions were avoided in order to keep the interviewees talking and in an attempt to attain reliability/validity and maintain objectivity[1]. Preparation processes were also fundamental in order to yield any useful and fruitful outcomes. On the topical and conceptual level, preparation and planning means developing adequate if not excellent expertise in the relevant topic area (i.e. smart cities) and asking informed questions. Practically speaking, interview preparation and planning came down to decide whom to interview, how many interviews were needed, what type of interview to conduct and what analytic approach to take [59].

Kvale created two wicked metaphors which captured the contrasting perspectives on the role of interviewer[134]. One metaphor sees the interviewer as a 'miner' who unearths the *"nuggets of essential meaning"* and under this metaphor, the knowledge is in turn regarded as collectable objective facts. The other metaphor conceptualises the interviewer as a 'traveller' who tells the story (of research) upon returning home. The story that sums up the traveller's experience – knowledge – is shared among people with whom the interviewer travelled and modified so that the interviewer is transformed by this traveller experience. In this thesis, I see myself as the 'traveller' and with my interviewees the 'story' of smart cities were co-produced. According to O'Reilly , "An ethnographic interview is like an in-depth conversation that takes place within the context of reciprocal relationships, established over time, based on familiarity and trust." [168, p. 125] Therefore, to research 'smart cities', I carried out in-depth conversations with both my fellow citizens (or people who live in the smart cites) and fellow professionals in the business of smart city research and development (or people who are behind the scenes in smart cites development). There are of course different styles of interview that are adopted and conducted in various ethnographic or sociological investigations in general. Most qualitative research methods books categorise interviews into structured, semi-structured and unstructured interviews [168][178]. As the name suggests, a structured interview follows a set of pre-determined and fixed questions, whereas an unstructured interview is more formless and free-flowing and a semi-structured

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[1]More discussion around reliability, validity and objectivity is continued in the section Questioning the methods.

interview falls somewhere in the middle containing elements of both a structured and an unstructured interview. In my thesis work, I have utilised the semi-structured interviews to maintain the minimum standardisation amongst all the interviews (i.e. the key ideas ought to be covered) to a certain level while allowing some flexibility and fluidity (which mark the interviews to be ethnographic). Qu and Dumay [178] provided a discussion, in summary of Kvale's [134] work, on typology of questions:

- *Introducing questions*, which are used to "kick start" the interview and to build rapport with the interviewees. They are not related directly to the research question but are opening questions and small talks to ease the interviewees in to the discussion of the research topic. However, in the expert interviews I have used introducing questions which have direct links with the research questions to open up the dialogue. A classic introducing question "can you tell me about [. . .]" was adapted and specified as "can you tell me about your involvement in smart cities" to start the conversation.

- *Follow up and probing questions*, which attempt to expend the answer through further inquiry and occasional critical attitude of the interviewer. Interviews according to Rubin and Rubin demands *"a respect for and curiosity about what people say, and a systematic effort to really hear and understand what people tell you"*[182, p. 17]. In practice, this demand translates into picking up signals in the answer which indicates a rich vein of information. Since I have adopted semi-structured interview, this type of questions was often used to follow up unusual terms or intonations.

- *Specifying and direct questions*, which are used to develop more precise descriptions. Kvale suggested direct questions should be postponed until later in the interview after interviewees have had the chance to make their own spontaneous descriptions [134]. This suggestion was adopted in my interviews with general citizens in smart cities. Though with the experts, often they have given their precise description in their writings, speaks, talks and (media) interviews prior to my interview, direct questions were also asked earlier in the interviews too.

These types above, alongside other types of questions including indirect questions, structuring questions, interpreting questions and silence were all mixed and used as interviewing tactics to serve the data collection objectives. The last methodological discussion here before I continue to the description of the fieldwork is expert interview. Bogner et al. stated at the very beginning of their book *Interviewing Experts* that "in relative terms, talking to experts in the exploratory phase of a project is a more efficient and concentrated method of gathering data than, for instance, participatory observation or systematic quantitative

surveys."[23, p. 2] This is also the rationale behind the choice of expert interviews in this thesis. Pfadenhauer more specifically advocated that ethnographic expert interviews are particularly suitable for reconstructing explicit expert knowledge, and in this thesis, expert interviews were used to unpack the current smart cities discourse and to reconstruct the accepted knowledge and concept around this topic [173]. Pfadenhauer then pointed out that the experts' impression of the interviewer has a profound impact on the interaction and exchange during the interview, i.e. the type of knowledge they will communicate, and how they communicate such knowledge. Therefore, it requires that the interviewer become a "quasi expert" in order to obtain relevant expert knowledge through professional reference. In ethnographic terms, it requires the researcher to once again to become "the native", but this time to a certain expertise (and it happens to be smart cities in my case).

In terms of the typography of expert interviews, Bogner and Menz distinguished exploratory expert interview, systematizing expert interview and theory-generating expert interview [24]. According to their definition, *"the exploratory expert interview used primarily to provide orientation, the systematizing expert interview targeted at the systematic retrieval of information and the theory-generating expert interview aimed – in the spirit of qualitative social research – at reconstructing social interpretative patterns and subjective action orientation criteria."* Based on this classification, the type of expert interview I have adopted is a combination of systematic and theory-generating expert interview carried out in the form of semi-structured ethnographic interview. Notably, what Bogner and Menz called for as an *"interaction model"* (ibid) in expert interview echoes coincidentally yet perfectly with Hester and Francis's view on ethnographic interview; that what *"interaction effects (normally considered as interfering variables) are seen as constitutive and productive elements in the data production process"* [109].This interactive knowledge production appropriately captures the essence of the fieldwork in this thesis.

3.2.1 Data collection/Fieldwork

For the first part of the fieldwork, I designed an ethnographic study of people's familiarity with, impressions of, and experiences in 'the smart city', in order to get the insider perspective as citizens living in the cities that claim to be smart. The initial approach was to study people in three of the UK's smart cities, i.e., London, Manchester and Glasgow that can be comparatively easily accessed from Lancaster, and ask if they would be willing to participate in a semi-structured interview about their city. This stage of fieldwork took place over the course of three months in 2015 from February to May. However, as most fieldwork would recognise, two primary obstacles emerged during the process of the study. First, it was extremely difficult to recruit participants on the street. Ethnographic fieldwork, often times

relies on the kindness of strangers, but many more times, the people I approached claimed to be too busy or disinterested in the topic to participate. Several people did not meet the initial 'citizen' criteria that was set for this part of the field work, for instance tourists and visitors of the city. The second obstacle was with regards to the intent to make observations about people interacting with the "smart" city. Although a few "smart parks" and 'smart' municipal service systems exist in the cities, it was almost impossible to observe people specifically interacting with those systems and features (which are often ambient) in the city. As a result, we decided to cease our ethnographic observational endeavours and shift our attention instead towards collecting rich data from the few people who were willing to engage in conversations on the street.

Throughout the course of stage one, the fieldwork amounted to twenty-two semi-structured interviews, each of which lasted between seven and thirty-one minutes in length. The participants consisted of twenty men and two women, from a diverse age range; ten of our participants were from Glasgow, six were from London and six were from Manchester. The participants had lived in their respective cities for varying lengths of time, ranging from less than one year to over thirty years. They were start-up founders, health-care support workers, web developers, managers, university students, office administrators, artist, and designers. During the interviews, we asked participants what they liked most about their city, if they were familiar with the term "smart city", what visions they had for a place called a "smart city", whether or not they believed they should be consulted during specific urban development projects, and what urban issues they believed were important. Three researchers transcribed the interviews, compiled field notes, and cross-examined the data for recurring themes, presented below for further discussion and exploration.

The second stage of the study was designed to be an exploration of expert's experiences with and understandings of 'the smart city'. The (generally accepted) experts who participated in this stage were/are leading figures in senior positions in the field of the 'smart city'. Most of them are from UK, and some others from smart cities across the globe (Dublin, Barcelona, and Beijing). Similar to the first stage, I initially intended to complete in-situ observation that described what smart city research or development projects these experts are involved in or in charge of, where these projects take place as well as how they conduct these projects. This stage was carried out over the course of three months from the December 2015 to February 2016. However, similar obstacles with regard to observational work took another form and were incarnated in stage two as well. Apart from the lack of any 'real' smart cities to observe in which those expert worked, I also had difficulties coordinating with our experts to conduct even a minimum length of observation. Most participants I approached had a busy schedule or frequently travel between global projects. My focal point in this stage was cast towards

collecting rich data from the few experts who were willing to engage in conversations at their work location.

During this stage, twenty-seven interviews were conducted, each interview lasted between forty-five minutes and one hour in length, with the longest one being over seventy minutes. The expert participants consisted of senior academics, senior project managers, independent freelance researchers, city managers and policy makers. More than two thirds of these experts came from a technology background, they either had degrees in computer science or had rich experience working for leading technology corporations. In summary, these experts all held senior roles in their organisations, and their involvement in smart city projects covered a wide variety of works and expertise in smart city development, including policy making, public administration, academic research, industry based research and development, and technology development and sales. Due to the sensitivity of their work and for protection of their anonymity I cannot share more specific details in relation to smart city developments. Nonetheless, I chose these experts based on their experience (at least three years' involvement in the smart city and five years holding a senior position), expertise (through publications, invited talks and interviews, and recommendations) and influence (the positions they held, the recognition they have in the field). In the interviews, these experts were asked questions regarding their understandings of what it means for a city to be 'smart', their involvement and work in the 'smart city' and what other potential innovation areas (i.e. policy, knowledge mobility and inter/trans-disciplinarity etc.) they perceived in the smart city. All the interviews were first audio recorded and then transcribed. I analysed the transcription of the interviews, compiled field notes, and cross-examined the data for recurring themes, presented below for further discussion and exploration. Those results will be presented and discussed in the chapters to follow.

Even though I experienced set backs with the observations, I still managed to conduct observations with three different groups. One of them was with one of the major smart cities in the UK, enabling me to follow and observe one of the initial smart city outreach actives they had with the citizens of the city. Prior to the event, the group I went to observe had already had two outreach sessions with the local community to set up the smart city community grant and this third session was to announce and demonstrate the winner of the community grants and combined with the community photo competition. This session was co-organised by the experts who I interviewed for this thesis and their local community collaborator who had been dedicated to community engagement for almost two decades. This session helped me to understand the broader context of the interviews with these experts and it also provided a unique contrast with how they presented their work to me and to the citizens who either had been engaged already or would potentially be involved.

On top of that, I had also managed to attend and observe the first Westminster e-forum event on smart city policy which was also the first ever event on policy making in the smart city realm in the UK. During this event, many senior managements from the smart city related field came together to present their work and involvement in the smart city; offer their insights into smart city development, and discuss with each other the future of UK smart cities.

As my research progressed, I still had this sense of unsatisfied curiosity into how would people get to participate and take the initiative in shaping urban futures. All the interviews and observations in the second stage of this research share this top-down mentality, approach and voice. I was in need of a voice and an example of how this would take place through a more bottom-up means. This is where and when I participated, organised and observed the REFLECT< >MAKE workshops with an urban rooftop garden group. This garden project in my opinion was a fantastic example of an 'urban prototype' – by showing the local authority the success of this transformation, a building permit had been recently granted to this rooftop and more surrounding rooftops. From a bottom-up approach, the residents in the building decided to form a committee and take on this collaborative community project to transform the rooftop of the building into a rooftop garden and event space. The successful transformation set a great exemplar to demonstrate the alternative urban greening process where people take the initiative and agency, extended the attention of urban green spaces from the street level to rooftops, and mostly importantly it exemplified the power embedded in a hands-on approach and can-do grassroots ethos.

3.2.2   Hot report, photo taking, and research story telling

Apart from the audio recordings of the interviews, photos and immediate reports have also been a huge part of my data collections. Throughout my doctoral research, I have always made a commitment to visit and interview my participants in their own settings as much as I can. This meant that during the data collection time, I made trips to London, Milton Keys, Glasgow, Blackburn in the U.K., Dublin in Ireland, Beijing in China and Songdo in South Korea. I took over 300 photos in the field, including both where the smart cities are being 'produced, imagined and conceptualised' – where the experts in smart cities work, meet and present, and where the actual smart cities are. Apart from those photos, I have also kept 'hot report' written almost immediately after the interviews I have done. The content of the report consists of a quick description of the interview itself (when and where we met for the interview and how long it lasted), the observational notes (on both the interviewee and surroundings), and a quick on-the-spot reflection (on how the interview process and my initial

hunch before going into deep and detailed analysis). The photos, hot reports alongside the interview recordings and transcriptions form a holistic picture of the field and the fieldwork.

Being informed by a grounded approach[2] , while completing the second half of the interviews, I have started the data analysis process owing to the iterative nature of this approach. Though Glaser holds that analysis can start during the first interview if the researcher identifies concepts that are striking at that time, I did wait until half way through the interviewing process to inspect the data [87]. The transcriptions of interview data were systematically analysed first using a grounded thematic approach and then a Foucauldian approach where the hot reports and observational notes were used as supplementary materials to inform and remind me of the context of the interviews.

3.3   Thematic Analysis

"*It's may be messy and imperfect, yet it opens up worlds that will otherwise remain locked to outsiders.*"[7]

The purpose of fieldwork and data collection is to gather materials or 'evidence' in order to solve some puzzle or research question, however, it is not that such materials and data we collect have any intrinsic value. The data, material, story is only valuable insofar as it can be made relevant or useful for what it can say about the social organisation of activities. Making sense of the materials collected is, of course, not a matter of making any sense or, worse, trying to find the sense of the materials as if they had only one sense. Therefore, some systematic approach has to be adopted to help in extracting the sense of the raw material. Thematic analysis is a broadly and frequently used methodology in qualitative research [97]. It is a way to recognise, examine and establish patterns in research data through a primary coding process. However, thematic analysis goes beyond simply counting phrases or words in a text and moves on to identifying implicit and explicit ideas within the data [98]. It emphasises the organisation and rich description of the data set. The patterns or reoccurring themes, emerging through coding process offer a description of a phenomena, form the categories for analysis and provide insight into a research question.

Before delving into the details of how I conduced the thematic analysis, there are a couple of concepts need to be clarified. Firstly, coding and codes. When conducting a thematic analysis, coding is the primary process for developing themes within the raw data by recognising important moments in the data and encoding it prior to interpretation. The

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[2]Various literatures on grounded theory, which apply in grounded approach too that coding and analysis should be performed with an open mind without preconceived ideas. [86] insisted that preconceived ideas should not be forced on the data by looking for evidence to support established ideas.

interpretation of these codes can include comparing theme frequencies, identifying theme co-occurrence, and graphically displaying relationships between different themes. Secondly, theme. A theme is different from a code. The theme is the result of coding. It's the abstraction, categorisation and analytical refection of codes [98]. The example from Saldana best distinguishes the nuance between the two – that "SECURITY can be a code", whereas "DENIAL MEANS A FALSE SENSE OF SECURITY can be a theme" [184, p. 14]. So in my analysis, 'privacy' is a code whereas 'citizens do have a strong concern over piracy in the smart city' is a theme. 'Internet of Things' or 'IoT' is code and 'smart cities is a collective of urban IoT project' and 'the smart city as a discourse starts to see the raising influence from IoT, data mining and machine learning' are separate yet related themes.

The results of the thematic analysis are summarised and described in detail in the next chapter and the analysis procedure is documented in Table 3.1 (at the end of this chapter). Through the thematic analysis, there are some key themes that emerged from the interview data that highlights the links between knowledge creation and the power of discourse and it also uncovered the evolutionary process of the smart city concept, which indicates the value of analysing the data through a Foucauldian lens.

3.4   A Foucauldian Approach

"*No sociological or psychological methods or methodologies, nor for that matter any other methods or methodologies, will guarantee success in respect of design.*"[194]

Tamboukou's writing started with the researcher's story of her encounter with Foucault during the time that ethics returned to be a primary focus in the philosophical agenda in European intellectual landscape [203]. Almost two decades later, my encounter with Foucault happened to coincide with a time when ethics struggles to find its way into the technological debate. Bastalich demonstrates that Foucault's genealogical work points to the role of historical practices and discourse in producing subjectivity and meaning rather than the conceptions of persons as meaning makers [15]. Foucault therefore, offers a distinctive epistemological and ethical basis for knowledge claims that deserves attention on its own terms, which leads us to the discussion of how this power of knowledge is formed through discourse and subjectivity.

Genealogy is a historical perspective and investigative method, offering an intrinsic critique of the present. It critically analyses and uncovers the relationship between knowledge, power and the human subject in modern society and reveals how the present has been shaped by historical forces. Foucault's genealogical analyses challenge traditional practices of

history, philosophical assumptions and established conceptions of knowledge, truth and power; displacing the primacy of the subject found in conventional history and targeting discourse, reason, rationality and certainty. Genealogy seeks to illuminate the contingency of the taken for granted, to denaturalise what seems immutable, to destabilise seemingly natural categories as constructs and confines articulated by discourse, opening up new possibilities for the future. However, it is not the search for origins, nor the construction of a linear development. Instead it seeks to show the plural and sometimes contradictory past that reveals traces of the influence that power has had on truth. As Foucault notes "analytics today must find a way of taking seriously the problems and conceptual needs of the past, but not the solutions and conclusions based on them."[67, p.122] Archaeology of knowledge is a process for working through the archives of a society.[3] It is concerned with 'the history of systems of thought' and the history of societal structures (or episteme in Foucault's terminology) that have produced and shaped the boundaries of knowledge, ideas, truths, representations and discursive formations. Archaeology as a method isolates and deconstructs components of accepted knowledge. It reveals the arbitrariness of interpretation and the ordered procedures that made discourses possible. Foucault's archaeology concerns contextualising and historicising notions of truth, knowledge and rationality. He examined the conditions of emergence, how and why a given society/era recognises certain things as knowledge, how and why some procedures are considered rational and others not. In short, genealogy and archaeology are two halves of a complimentary approach, alternating and supporting each other. In the smart city context, the core idea of 'smart' is often seen as a shiny new concept and the approach to the next phase of urban futures. In adopting the genealogical way of thinking, I contend that the smart city is neither new nor the only way to construct thinking around urban futures. Smart city discourse, in my perspective, is an assemblage of several pre-existing urban imaginaries. Given the character of the smart city concept as a collective of ideas and imaginaries around urban 'smartness', the archaeology of the 'smart city', therefore, needs to trace back various individual components that make a city 'smart'. If we map out the narratives and trajectory of 'urban imaginaries', and place the smart city discourse as the most recent phase, what we find is that this discourse emerged in the wake of the narratives of the sustainable/resilient cities and of the informational/intelligent city [218][126][4] The smart city is not a new invention but developed and evolved from previous research endeavours concerning urban development. On the one hand, there is

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[3]E.g. parliamentary debates, prison records, chronicles, diaries, journals, logbooks, official records, grand theories, popular knowledge, subjugated knowledge etc.

[4]Other examples of notions that smart city may have rooted from 1) which feature technology are tech cities, digital cities, cyber-cities, knowledge cities, innovation cities, intelligent cities, eco-cities etc.; 2) visions that centres neoliberal development includes entrepreneurial cities, competitive cities, innovative cities, sustainable cities, and creative cities.[126]

the assertion in the smart city discourse that smartness stands for being good, healthy, and technologically advanced, therefore, the 'smart city' is intended as the ultimate goal for urban development projects. However, this is not a distinct urban promise that a 'smart city' intends, it is a shared promise that a 'resilient city' [217][216][38] and a 'sustainable city' [187][106][123] have yet to deliver. On the other hand, the smart city discourse is used by the city managers and policy makers to support specific development strategies and policies. There are many links between neoliberal urban developments and smart city imaginaries: the construction of a clean, green and intelligent city image is in fact useful to attract investments, leading sector professional workers and tourists [114] [127]. The green/sustainable city and the technological/informational city have been, and still are, a powerful diegesis to justify and rationalise the political choices, generate alternative business models and trigger new economic paradigms which promises us the ultimate 'smart city'.

I carried out this genealogical work in a threefold process in this thesis. Firstly, I examined the discursive formation of the smart cities. A smart city discursive 'formation' is a coherent discourse possessing common objects, concepts and arguments. It is analysed against what Foucault defined as the components that constitute a given discourse. The components of a Foucauldian 'discursive formation' include: 'surfaces of emergence', 'authorities of delimitation', and 'grids of specification'. In application, 'surfaces of emergence' point to specific discursive and institutional sites – conferences, exhibitions, magazines and books, where arguments about the 'smart city' have emerged or been re-configured. 'Authority of Delimitation' refers to the experts interviewed, who possess the the ability to use their comments, publications and books etc. to define and shape the ongoing debate of the 'smart city'. 'Grids of specification', are the classificatory dimensions of a discursive formation, how it is, for example, related to other important ideas, i.e. ideas about urban life, governance and citizen empowerment in my case. Other relevant aspects of the smart city discursive formation would include the formation of 'enunciative modalities', (who is qualified to speak about a topic, and who is not qualified), as well as the formation of concepts, and argumentative strategies (for example the mixture of anecdote, history and philosophy offered by my experts in their interviews).

While reviewing the discursive formation, I have found that in various discourses the 'smart city' appears predominantly as an 'other' kind of city – efficient, technologically advanced, green and socially inclusive. To follow up the discussion of discursive formation I then argue that the smart city is a heterotopic space. I apply Foucault's six principles of heterotopia[5][73] to the synthesis of the responses collected throughout the research,

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[5]The term heterotopia originally comes from the study of anatomy. It is used to describe part of body that's alien. Foucault defines a heterotopia as, either a textual or a geographical site that allows the ordering of things inside not through resemblance but rather through the process of similitude.

allied with an understanding of the current literature and discussion concerning the relative proximity and realisation of the smart city vision, in order to understand the structuring and ordering of a 'smart city'.

Lastly, in the final step of this Foucauldian approach, I propose a new perspective to look at the 'smart city' – the 'smart city gaze', and specifically the 'data gaze'. In this session here I briefly touch upon what a smart city gaze (and a data gaze) would mean, what it consists of (i.e. how I interpreted the fieldwork data through the concept of 'gaze') and in the results chapter I will discuss how and what regimes of truth and knowledge are filtered through this smart city gaze. According to Foucault's definition of the medical gaze [70], what we would/could see is not simply 'out there' to be seen, rather it is a reality that's made visible. Gazing, therefore, refers to the 'discursive determinations', of socio-culturally constructed ways of seeing [215]. It is a performance that orders, shapes and classifies, rather than merely reflects the world. People gaze upon the world through a particular filter of ideas, skills, desires and expectations, framed by social class, gender, nationality, age and education. It is a performance that orders, shapes and classifies, rather than reflects the world.

The 'data gaze', like all the other gazes, uses specific methods to put its meaning together. For instance, when an 'expert' or professional looks at the city through data (or though the CCTV footage in the central control room), what they may see is an *"efficient"*, *"effective"* and *"smart"* way of managing and governing. They see that "nothing that happens in the city goes un-seen". The citizens, on the other hand, may see security concerns, potential privacy violations and even surveillance in the data gaze. They see that "big brother is watching". Hence, our interest is in researching and documenting exactly how both ordinary citizens and experts perceive the notion of the smart city and the data it generates; and the proliferation of potential 'data gazes' that might thereby be produced to influence both design and public policy.

3.5   Questioning the methods.

"Ethnography is research on the slow boil – something that's getting harder to justify when our public debate increasingly favours the quick flash in the pan."[7]

The quote above is a classic dilemma that faces not only ethnography, but research in general. It is the tension between ideology and reality which manifests itself as the pressure to produce quick-bite of research to satisfy growing appetite in efficiency. In this section, I would like to reflect upon the tension between ideology and reality I have experienced and to question the methods I have used. Qualitative approaches are inherently interpretive

research, recognising the objective subjectivity then becomes a key. Qualitative interview (ethnographic interview and expert interview included), as the most applied data gathering method in this thesis, can not escape the interrogation centred around objectivity. In addition, Hester ad Francis recognise that the methodological discussion regarding interviews has predominantly focused on *"the twin problems of reliability and validity"* [109]. Positivists suggest adopting standardisation in interviews to account for reliability and interpretivists advocate for an interactional character to the ensure in-depth understanding from the subject and thus the validity. Neither end of the spectrum has offered a solution that both sides could agree upon. In fact, these problems (subjective objectivity too) are insoluble, yet they don't deny interviews' sociological utility [109]. That through interviews, we as researchers are trying to generate abstractable, generalisable, and accountable properties. However, the questions continue, in order to generate abstractable properties, how big the sample should be, how many smart cites should I include, how many people/expert should I study, and how thorough do I interview them. And the list goes on. Both the experts and the people that were interviewed cannot reproduce or show the 'totality' of either their works or their lives, because they are indefinitely describable. The particulars of their mundanities are inexhaustible. However, by asking them to reflect upon the specifics vis-à-vis the interactions the citizens have with the city or the experts work within the smart cities, they were able to create findable-displayable narrative in the particulars without reference to what is left unsaid. Of course, more can always be said, shown, and observed, but this will not necessarily provide a clearer or more adequate view. As Hester and Francis put it, the 'more' may simply *"amount to 'more of the same'"*[109]. This bring us to the discussion of generalisation, a topic that has been well discussed if not over discussed in sociology and ethnography research. What I would like to clarify here is generalisation in relation to interdisciplinary research context which has also been well explored by Sharrock and Randall [194]. They point out that much of the problem around generalisation, really is the problem of discipline-led assumptions about methods and theory, hence generalisation is not the problem or a problem at all. The discussion should be centred around *"what kinds of generalisation and for what purpose"*. In my case, the insights generalised and abstracted interview data and observational notes are not claimed to be the only 'truth' but an alternative viewpoint of what 'smart cities' really are in both citizens' eyes and in the experts' eyes.

And this bring is to the discussion of who count as expert, what is his/her expertise and why does it matter? Meuser and Nagel originally offered a quite restricted definition of the expert – members of the professional functional elite. They have since then broadened this definition, by extending it the people actively involved in shaping public affairs and the negotiation processes of knowledge production [150]. These include, in their example,

NGO representatives who have acquired their expertise outside their professional role. In the course of their voluntary or professional activities, these people have acquired specialised problem-solving and analytical knowledge that constitutes their expertise and qualify them as experts.

Among various debates and discussions on what makes an expert, expert, I particularly enjoy this definition – it proposes that experts are people *"in a position to actually put their own interpretations into practice"*[23]. This redefinition, based on a classification of various dimensions of expert knowledge (both know-how and know-why), sees expert knowledge as an *"analytical construction"*. More importantly when defining the expert, Bogner et al. recognise and acknowledge the expert's *"formative power"* which is to say that *"expert interviews are neither characterised by an interest in limited special or specialised knowledge nor can they be adequately defined by separating the private sphere from the (generally occupational) functional context."* (ibid) This argument provides significant counter to the risk in expert interview of granting confirmation, reaffirmation and relevance of the undisputed or non-validated expert knowledge. Meanwhile the additional Foucauldian analytical approach also bring necessary scrutiny to prevent this accidental reinforcement of sociology and knowledge hierarchy in expert interview. And this brings us to the discussion and grilling of my data analysis approaches, starting with a grounded approach. As a methodology this approach lacks a clearly defined mechanism in my opinion, which echoes Allen's experience of using this approach [2]. Partington summarises this shared frustration in grounded approach as *"there is little dedicated methodological guidance for builders of theories and few exemplars of research conducted beyond the level of procedural detail. In much qualitative management research, important ontological (what counts for reality) and epistemological (how knowldge of reality may be established) issues are often either artfully avoided, taken for granted or ignored."* [172] Therefore, I overcame this lack of instruction by turning to thematic analysis for instructive guidance. Ironically, the lack of mechanism is not alone to grounded approach, in fact, it seems to be a shared theme among the methods I have adopted, and this also why I consider my methodology a well organised mess. Tamboukou admittedly points out, despite how useful, inspiring and insightful it is, Foucault's genealogy deliberately follows no certain methodology which left me no clear path to follow[203]. Wheler similarly has challenged the the rigour in Foucault's analyses and criticised them for lacking both empirical aspects and clarity. In Wheler's opinion, Foucault's source in which he based most of his thesis is insufficient in terms of diversity that Foucault only focused his research mainly on prisons and psychiatric clinics. Rorty has openly critiqued Foucault's archaeology of knowledge as being fundamentally negative and offering no new theory of knowledge. Though admittedly, he also acknowledged that Foucault provided an alternative

re-description of the past. However, I'd like to argue that these 'inadequacies' in Foucault's approach has more positive outcomes than people generally acknowledge. Yes, Foucault did not offer a new theory of knowledge or new paradigm of epistemology, but what he offered is mentality that was luxury in that age and still is a rare now, that is to challenged the established and what's taken for granted. Looking at the history from an alternative perspective and viewpoint and (re)examining the origins of certain knowledge may or may not generate new knowledge but it certainly encourages a more critical and modest attitude toward knowledge. That knowledge is not set on stone and not to be challenged, updated and changed.

3.6   Final Remarks

The methodological approach I use can be described as eclectic: I have no single commitment to a particular method. I am driven by what was available to me and also the role and advantage of each method and the overall purpose of the research project: trying to understand the nature of smart cities and making policy and design suggestions based on my understanding.

   This has led to the fact that the participants in my research play both the informants of the research content and subject but also the audiences and beneficiaries of the research too.

   The method employed and presented in this thesis is a chimera. It takes elements of each of the methods reviewed above and puts them to work in order to detect and amplify the reality being studied, and it is within that reality that useful and interesting research observations emerge.

   This research uses a flexible research design. In practice the design of the research project, including methods, methodology and even aims, was so flexible I prefer to refer to the design of this project as 'fluid' (as opposed to fixed, or flexible). In the case of this fluid design, it is also very exploratory. It is because since the research subject and context — smart cities is a rapidly growing and continuously developing field. The realisation of the appropriation of a Foucauldian approach and focus on the policy potentials did not really occur until the middle of the project after months of immersion in the field and the initial ethnographic research with citizens in 'smart cities'.

   The aim of the research is to unpack the smart city discourse or to uncover the smart cities worldview per se, by conducting research in-situ, at smart cities would have been ideal. The observation of a given smart city would certainly produce produce useful data on what smart cities are as a 'lived space'. Lefebvre's 'triad spatial model' describes a space as the combination of conceived space, perceived space and lived space [141]. It helps us to

understand a space in three-fold, distinguishing the intentions from the designers from the people's perceptions and interpretations. However, the smart cities in discussion of this thesis is not the lived space or interpreted space, but the 'conceived' or intended one. Therefore, the necessary immersion one ethnographer needed in the field is obtained through readings by and conversations with the experts who are behind the smart cities production. The adaptive and reflective features of grounded approach were employed throughout in order to reassess both what and how the project could deliver. Researcher immersion in the context is central to how meaning and rigour are derived; these elements are very much taken from the ethnographic tradition. The emphasis on personal immersion and experience in fact goes beyond the primarily observational paradigm generally used by ethnographers. It is because of the personal immersion that an appreciation of the value of phenomenology needs to be incorporated into the method fusion constructed here.

As stated in the beginning of this chapter, one of the objectives of this thesis is to reach an implication for design. Of course the rather simplistic and contested notion of "implications for design" has already been explored and challenged by Paul Dourish in his *Implications for Design*[55] and *Responsibilities and Implications: Further Thoughts on Ethnography and Design*[56] – and for some time has been subject to various notable misinterpretations. Paraphrasing Dourish, I want to argue that, *"the presence or absence of explicitly demarked 'implications for design' is not the best evaluative criterion for the relevance, utility, or quality of an ethnographic contribution"*. And that the use of theory in this fashion, the 'work' that it does, serves to misrepresent or misunderstand the relationships and interplay between the technical and the social, and that nowhere is this more obvious than in CSCW/HCI treatments of the 'smart city'. Therefore, this session is set to clarify the motives and justify the rationale of introducing this Foucauldian analysis to the data set. Continuing this theme, there are all kinds of important questions we might reasonably ask of any theory or concept: notably, what 'work' does this theory or approach or category actually do? That is, what analytic work does it do? As Halverson [100] suggests, the value of any approach or theory resides in how well it can frame the object of study, how the approach determines and highlights relevant issues. When viewed as tools for helping people understand a phenomenon, theories or concepts or approaches should possess particular attributes: descriptive power, to help us describe (rather than misdescribe) the world; rhetorical power, to facilitate exactly how we can talk about the world; inferential power to enable us to make inferences and linkages between the theory and the 'real world', that in turn will hopefully lead to insights for both practice and policy, for example, offering some clues as to the likely effect of introducing change into a particular setting or smart city - to help us choose between alternative prospects, to give us some purchase on which approach might yield results; and 'application' power that

links the approach to policies and some form of 'design' in the world. Of central concern is the problem of relevant description, inference, rhetoric and application, and how we go about deciding them. When we use conceptual frameworks or theories to talk about the smart city and its intersection and inter-relationship with a host of other social and technical variables, how relevant are the issues we point to, both in describing the phenomenon and in informing policy and practice? Do they provide us with a conceptual framework for deciding which behaviours and activities, what pattern of regular and unusual events, we should be attentive to? Can it result in positive and relatively definitive statements about particular aspects of smart city settings (of housing, transport, empowerment, etc), about social policy and about social practice? Above all, and somewhat beyond the clearly serious concerns expressed by Halverson and Dourish, accepting that (social or cultural) theories rarely contribute much in the way of predictions or even concrete proposals for design, then maybe the criteria for evaluating the worth of a theory should change, towards the idea that a theory is valuable if it is 'interesting', if it makes us think in new and different ways (or just at all). And so I turned to Foucault.

"A critique is not a matter of saying things are not right as they are. It is a matter of pointing out on what kinds of assumptions, what kinds of familiar, unchallenged, unconsidered modes of thought the practices that we accept rest." [71, p. 155]

Mouzelis [157] writes in defence of theory that theory can provide conceptual tools, flexible vocabulary for sociologists to bridge the disciplinary gap and *"obstacles"* that theory creates shall be removed for purpose of an open-ended communication between disciplines. To this extent that there are theoreticians working in HCI/CSCW – e.g. activity theorists, lovers of distributed coordination, 'practice' theorists and so on – I suspect they would probably make very similar arguments. Except, of course, such theorists often do have foundationalist pretensions (they do make epistemological and ontological claims); they rarely are interested in 'building bridges' but instead operate some sort of 'fictive consensus' which rarely amounts to 'pluralism' or 'open-ended communication' – but simply seeks to avoid trouble or confrontation by avoiding any argument (and, thereby, the possibility for intellectual development through argument). I don't consider this to be an especially persuasive defence of theory or 'theoretical frameworks and so I intend to conclude this chapter by considering how this approach plays out in terms of the attributions of theory that Halverson documents, whilst also suggesting that such an approach is 'interesting' and intellectually 'fertile'.

Table 3.1 Thematic Analysis Procedure in Steps

Phase	Process	Result
Familiarisation with data	In order to gain familiarisation with the data, I have transcribed all 27 interviews myself before reading and re-reading the transcriptions. While going through the data, I paid specific attention to 'obvious' patterns.	Preliminary understanding and detailed notes.
Generating initial codes	Generating the initial codes by highlighting in the transcriptions where and how patterns occur. Throughout the coding phase, I have labelled categorised the data for further analysis (data reduction in Braun and Clarke's term). While creating the codes, I have also created inferences about what these codes mean (data complication).	Comprehensive codes of how data answers research question.
Searching for themes among codes	After establishing initial codes, combining codes into overarching themes that accurately depict the data is at core of this phase. During this phase, I have not only developed themes but also described exactly what the themes mean. What's needs to be acknowledged here is that, there were (and always where be) codes that does not seem to 'fit' into any emerging themes, so a 'wild card' themes is created to house these potential outliers.	List of candidate themes for further analysis.
Reviewing themes	In this phase, I looked at how the themes are supported by the data and are supporting the overarching theoretical perspective. This is a phase about finding what's there and what's missing.	Coherent recognition of how themes are patterned to tell an accurate story about the data.
Defining and naming themes	In this phase, I have defined what each theme is, which aspects of the data are being captured and what's special about these themes.	A comprehensive analysis of what the themes contribute to understanding the data.
Producing the final report	This phase is to provide an accurate representation and description of the data. The following chapter functions as the final report of the thematic analysis. This is research story telling, so the following chapter is organised in a concise, coherent, logical, non-repetitive and interesting account of the story the data tells both within and across themes rather than following the sequential or chronological order of occurrence of the themes.	A thick description of the results.

Chapter 4

Thematic Analysis

4.1 Introduction

In this chapter, I present the findings of the thematic analysis of my fieldwork – the expert and citizen interviews I conducted for the thesis.[1] As I presented in the methodology chapter, the majority of my data collection was through the expert interviews, as Bogner et al [23] state at the very beginning of the book *Interviewing Experts*,

"In relative terms, talking to experts in the exploratory phase of a project is a more efficient and concentrated method of gathering data than, for instance, participatory observation or systematic quantitative surveys."

Pfadenhauer more specifically advocated that ethnographic expert interviews are particularly suitable for reconstructing explicit expert knowledge [173], and in this thesis, expert interviews were used to unpack the current smart cities discourse and to reconstruct the accepted knowledge and concept around this topic. I have also interviewed citizens to capture the discourse concerning the smart city from the citizen's perspective, which both complements and contrasts with the perspectives the experts hold. In this chapter, I would like to regard the people I interviewed, the citizens', as a kind of expert too i.e. they are the experts of their living experiences in the city in which they reside.

The purpose of fieldwork and data collection is to gather materials or 'evidence' in order to solve the puzzle (which in my case is to unpack what the smart city entails), however, it is not that such materials and data we collect have any intrinsic value in themselves. The data, material, story is valuable insofar as it can be made relevant or useful for what it can

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[1]Because the smart city research field is a relatively small and well connected one, in my analysis, in order to maintain the anonymity of my participants (in particular the expert participants) I will not adopt the general practice by differentiating them (e.g. assigning them numbers such as P1, or Participant 1) when I quote them. As there is a high chance for the 'smart city insiders' to tell who the participants were if they were able to pick out the quotes from one participant and put them together side by side.

say about the social organisation of activities. In this chapter I present the findings of the thematic analysis. Compared with the next chapter which is the Foucauldian analysis, this chapter follows a fairly traditional sociological approach to present the themes I identified in the interviews, hence it may appear to be evidence heavy. Braun and Clarke [25, p. 9] note that thematic analysis can be a "contextualist" method, sitting between essentialism (which focuses on experiences, meanings and the reality of participants) and constructionism (which emphasises the ways in which events, realities, meanings, experiences and so on are the effects of a range of discourses operating within society) so it "can be a method which works both to reflect reality, and to unpick or unravel the surface of 'reality'". According to Braun and Clarke (ibid) another characteristic of thematic analysis is that it does not have to commit to pre-existing theoretical frameworks, so it can be used within different theoretical frameworks (although not all). Hence in this thesis I chose to adopt a thematic analysis to present, reflect and unpick the 'reality' of the smart city and to build the case for Foucauldian approach. The summary or taxonomy of the components forming the smart city discourse presented in this chapter both serves as the main body of knowledge through my empirical study but it also sets up the context and the case for a Foucauldian analysis in the next chapter.

I will first describe the experts' understanding of and involvement in the smart city, then I will introduce the citizens' view on the same subject – their understanding of the smart city, which is followed by discussing the smart cities' influence on democracy, then I will discuss the research and knowledge production of the smart city and finally I will present the policy gaps and potentials before concluding this chapter. The processes of how I arrived at these themes are described in more detail in the previous Methodology chapter. In summary, the analysis was conducted in the following steps: 1. Getting familiar with the transcription, after each interview was done I transcribed them in order to gain more familiarity with the interview; 2. Generating coding strategy and codes, I picked five most representative transcriptions (two with academics, two with industry experts and one with policy maker), based on which I highlighted where and how patterns occur and generated initial codes which were used to analyse all the transcriptions; 3. Establishing and reviewing the themes, after the coding phase, I grouped codes into overarching themes, looked through the data to review how the themes are supported; 4. Defining and naming the themes, this step was to define what each theme was, which aspects of the data are being captured and what was special about these themes. The title of each section represents the main topics I've discussed with my participants in the interviews, and the subtitles in each section are themes that emerged during the thematic analysis. They have been regrouped and categorised under each major theme based on the relevance to the theme rather than the sequential order of when it occurred

during the interview. For instance, the definition of smartness could be found in various parts of each interview with different participants but due to its significance and relevance to defining *what a smart city is*, it is included in the discussion of the theme *what a smart city is*.

4.2 What is a smart city?

From the literature review chapter, we can summarise at least two of the characteristics of the smart city – we don't have a definition for it, and yet we appear to have invested a lot of faith in the smart city. It is an ambiguous concept that vaguely describes the deployment of Information Communication Technology (ICT) in urban development; secondly, it often comes with the promise to solve the urban issues facing the cities today, for example, traffic pressure, air pollution, urban sprawling and growth etc. Therefore, it made sense for me to explore with the people who are behind the scenes of smart cities what they think a smart city is hoping that we will be able to pin down the essence of this concept[2].

4.2.1 What is a smart city?

When asked what a smart city is, the experts provided diverse perspectives, unpacking the notion of the smart city in surprisingly different fashions. Some experts provided a definitional understanding, highlighting the features of a smart city such as *"near real time monitoring"* and *"integrated infrastructure"*. One of the experts decided to unpack the role of technology in relation to urban development, emphasising the overall importance of technology in this process. In his own words, this meant that *"it is important to understand technology, because of the role of technology, it has always changed cities, (whether) it's flushing toilet mechanism or air conditioning."*

In his opinion, we have not paid enough attention to exactly how technology has enabled urban development and modern cities. Cities may seem to be evolving organically but the technology has always been either an enabler or a driver, just as automobiles enabled the proliferated mobility and sprawling city. Another expert on the one hand acknowledged the

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[2]The philosophical debate of whether/why we need definitions could go on for days and we could date back to Plato's early dialogues portray Socrates raising questions about definitions (e.g., in the *Euthyphro*, "What is piety?"). However, this is not the discussion I would like to have here as this topic in itself will be worth at the very least another thesis. The pursuit of a definition of the smart city is a pursuit of clarity. The four attributes Halverson (2002) summarised could not only be applied to theories but also to definitions. That having a definition is to have a 'descriptive power' to describe the reality, and the 'rhetorical power' to form a corpus that could be used to describe such a reality and the 'inferential power' to differentiate one definition from another and ultimately to the application of such a definition

importance of technology, but on the other hand recognised the smart city as a partnership ecosystem. He described the smart city as *"developing new partnerships and a new way of working together."* In so doing, he was able to improve internal communication within the local council, invigorate interdepartmental collaboration by *"building an ecosystem that consists of the city itself, the city council, commercial partners, citizen groups university and SMEs."*

Meanwhile, the third expert considered that defining smart city is in fact a way of standardising both the system that will be used in a smart city and the data emerging along the way. He also recognised the current approach to the smart city as a *"cluster approach"*, i.e. certain areas and parts of the city have been made 'smart' but not the whole city, especially in big cities like London.

It seems there's no agreement to be reached in defining what a smart city is, the experts only confirm what the literatures have already argued – there's the lack of working definition of a smart city but in principle, it is about the use of technology in urban development. And another observation, now looking back at the how the experts approached defining the smart city is that they tried to define a smart city by defining what they meant by 'smart' rather than what they meant by 'city'. Then there was this assertion that there is this universal understanding of what makes a city, a city. Therefore, rather than being able to unveil more on 'citiness' of the smart city, this chapter commented more on what 'smartness' could be in the smart city context.[3]

4.2.2   What is 'smartness'?

For one expert being 'smart' means using technology to save money, as the expert said *"if you can put technology in and that saves money, that's often smart."* This sentiment could also be found in the promotion of Smart Meters or energy related 'smart' projects that the 'smartness' in this sense is 'saving' whether that's money or energy consumption. Being 'smart' is also a way of setting standards and standardisation in regards of the urban data that are being collected in order to have the ability to compile them.

"You have to define smart, you have to put various standards in place. . . define what data standards should be, so once this data emerges, it all begins to join up"

With the capability to compile, process and join the data they are hoping the city will one day be aware of itself. So, in other words the data being collected now would be used as training data to develop machine learning and potentially systems equipped with artificial

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[3]However, what's interesting about the lack of citiness in the definition of the smart city offered by experts, there's a lot emphasis on 'citiness' or 'smartness in a city context' offered by the citizens I interviewed which are detailed in section 4.3.

intelligence to achieve the seamlessness in the smart city.[456] Smartness could be defined as *"self-monitoring, analytics and reporting technologies"* and ultimately *"self-aware"*. Another expert arrived at the same argument, *"it's not just about the nice stuff, it's about this kind of everyday kind of mechanisms that are built underneath using the new ability to sense things like water levels."*

Considering the urban data being collected is used to train machine learning systems to create a smart city i.e. approaching the smart city as merely a data collection exercise, whether they will be able to solve the problem we are facing in cities is becoming a secondary consideration. As one of the expert put it, *"on one hand we create a problem and trying to solve it through other means where we say let's loads of data coz data will be really useful and we say but actually we have to make the data really useful to people by making more things that are less useful than it. It's a real kind of... let's produce data until someone figures out what to do with it and eventually someone will figure out what to do with it, but until that point let's just keep making more."* Therefore, it is not a surprise that some experts would argue not to *"take smart city seriously"* since if we do, we are still far away from being anything near a smart city.

From how the experts define 'smartness' there are three things worth noticing. That NOT being able to pin down what 'smartness' means is in my opinion the main obstacle for us to reach a clear definition of the smart city. The second one is, the understanding of 'smartness' is context specific – in energy related discourse 'smart' means efficiency or simply energy saving, and in data related discourse, smart means standards. This means we probably won't be able to *"take smart city seriously"* as it is going to be impossible to put a definition upon a context specific concept.[78] Thirdly, from the experts' definition of the smart city, there is an internal contention between 'smartness' and 'city' in defining a smart city. Some placed the emphasis on the smartness (especially the ones coming from a technological

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[4]UK government has embrace such as concept and it will be used in UK health care design. See: https://www.gov.uk/government/news/people-will-see-health-and-social-care-fully-joined-up-by-2018

[5]Matthew Chalmers however openly argues against seamlessness, that "seamfulness is about taking account of these reminders of the finite and physical nature of digital media." Instead he advocates for seamful design which "involves deliberately revealing seams to users, and taking advantage of features usually considered as negative or problematic." [35]

[6]Greenfield heavily criticised the concept of seamlessness, that the effortlessness experiences the seamlessness promises comes at the price of separating the people from what's behind the technology and what's behind the seamlessness.[93]

[7]The expert's definition of the smart city also reminds me of Garfinkel's 'indexical expressions'. Indexicality is a concept in which Garfinkel argues that even if there is shared meaning, either attached to an object, within conversation, gestures etc, the individual meanings may still help and shape the emergent meanings. In a conversation, an individual would understand a description with a meaning for the speaker – who which then assumes that the meaning is the same for the listener. Garfinkel argues that these meanings people use may not be the same between the two or more individuals involved within social interaction.

[8]And this is not to say that the smart city is a boundary object due to its lack of central identity

background whether they were based in academia or industry) meanwhile the experts from urban management or urban design background centred their definition more on the city. And this contention in defining a smart city is not distinctive just among the experts I interviewed, Alawadhi and Scholl pointed towards a definitional gap between academics and practitioners in the smart city arguing that while the practitioners focus on more immediate issues the academics tend to have a more holistic approach towards defining a smart city [1]. That said, there is still very little coherence in how to bring these two potentially competing concepts together. The question then becomes 1.) how we could try to re-clarify what smartness means in the context of a city as it may not be necessarily how 'smartness' is being defined in the context of the smart city; 2.) whose right it is to define what a smart city means and ultimately what a city ideally means, whether that is the people who live in them or the people who design them. The right to the city as I introduced earlier in the thesis should not just remain as a nice concept; rather how to translate into our action, design and research of a city should be at core of any research that's concerning a city. Whether that's to follow Harvey and Lefebvre's argument to consider the right to the city as a fundamental human right or that's to follow Jacob's idea that people must re-appropriate the production of space and take control of it and govern it for themselves.

4.2.3   Links with other concepts[9]

Following the argument that 'smartness' is a context specific concept, another interesting observation is that when the experts were asked to describe their understanding of the smart city they tend to parallel it with other similar or related concepts. 'Internet of Things' (IoT) is one that is most referred to in the responses. Smart city was also being viewed as 'neuro-network system' and 'giant artificial intelligence system' in the interviews. This is a similar phenomenon too in the smart city literature, as stated in Chapter two, where researchers have long be linking smart cities to other concepts, apart from the IoT, such as e-governance, sustainability and green/resilient cities, which are often regarded as close proxies for smart cities.

During the interviews, the term 'smart city' was loosely defined. Apart from being compared to similar concepts, it was also used as a collective of segments that could come under the banner of 'smart city'. For instance,

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[9]This theme also strongly indicates the value and advantage of adopting a Foucauldian discourse analysis, because one typical Foucauldian approach is to map out the connections one discourse has to other relevant discourses. The following two themes too indicate another Foucauldian approach which is the genealogical way of thinking, it emphasis the 'taken for granted' history of a given discourse.

"to make places smart from a joined-up information system. So joining up the Internet of Things feeds, GIS feeds, all into one place, and that links to our Smart Park work."

"I think the real thing about smart city is the IoT, that's the reality of it."

And when it came to how a city would approach this huge concept of smart cities, they often divided it into a subset of smaller goals focusing on several areas and developed working groups to carry out the development in more manageable, tangible and quantifiable terms. For example, in Dublin the smart city initiative decided to focus on three areas (traffic, environment and safety, and energy efficiency), whereas Milton Keynes has a few more foci *"there are in total 7 work streams, they go from data infrastructure to water, to citizen innovation, to business engagement, education."*

So far, I have tried to define the smart city by asking the experts directly what a smart city is, what smartness means, and what the close smart city proxies are, and there was little agreement in terms of pinning down this concept. It seems that the experts are not particularly keen to put a definition to this concept. As a further matter, the ambiguity in this concept both allows the experts to firstly, enter the smart city field with less resistance and lower barriers, since any research about technology and the urban could be argued as a smart city project; secondly, it allows the experts to move the bar of what counts as a smart city project once they are insiders, this is evident in the emphasis and preference of technological projects over social or political ones in the smart city (e.g. [159]). Hence the ambiguity of this concept contributes to a glass ceiling[10] in this field, that the experts can use their discursive power established by the research and project they've defined, done, published and disseminated to ultimately define not the concept but the field and its entry criteria. But how did these insiders of the smart city first get into this field?

4.2.4 When did you first cross paths with the idea of the smart city?

The 'smart city' as a term, might be relatively new. However, the notion of smart city might well have appeared far earlier than the term itself.[11] One expert described his first impression of the smart city as *"something old wrapped up in a new descriptive"*. But when asked about their first encounters with the smart city research or development, all of these experts were able to pinpoint the time when they first set foot into this area or research field. For some

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[10]A glass ceiling is often used to refer to an unacknowledged barrier to advancement in a profession, especially affecting women and members of minorities. As explained in the following sentences that I've also observed this phenomenon in the smart city community, especially in the way how certain experts intentionally contributed to the unofficial barriers for others to enter this field.

[11]This theme is another one that indicates the value of adopting a Foucauldian analysis. The details of tracing the trajectory of the smart city could be found in the following Foucauldian Chapter under the Genealogical Way of Thinking section.

Fig. 4.1 Brief history of the experts' involvement of smart city

of them it occurred long before the smart city was called the 'smart city'. Using both the time and details of the occurrence the participants gave, I summarised a brief history of these experts' involvement in the smart city. Considering the prestigious positions and influential roles of these experts, this brief history also reflects the evolution of the smart city in the UK.

The earliest trace of the smart city could be dated back to the mid 90s, using my participants' words:

> "It was the first time I think that I've been looking at these ideas of data and digital and city physical place, virtual spaces, tracking digital activity to understand physical activity, vice versa, kind of everything what we do with smart city more or less, which we were never talking about sensors of course. We just had websites and emails. But we were beginning to do the same things, so I go back to that point."

The brief history of smart city (see Fig. 4.1) summarised here is based on the participants' involvement, so it is represented in an event based, chronologically ordered and linear manner.
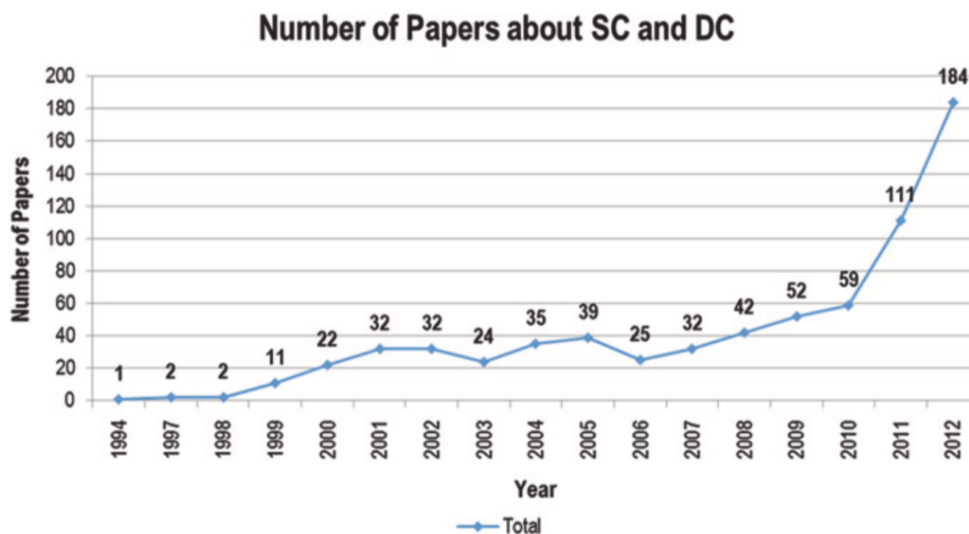
Fig. 4.2 Time analysis: numbers of papers about smart city and digital city by [41]

Cocchia surveyed the literatures about the smart city did and digital city between 1993 and 2012 and documented the number of papers on these concepts (see Fig. 4.2) [41]. Compared to my experts' experience with the smart city, the starting point when my experts started to get involved in the smart city matched the starting time of the literature being published about the smart city concept. More interestingly the growth of this concept (especially the near exponential growth after 2010) matched too. However, this is not a claim that the evolution of smart city development throughout the years is this clear and easy to track, and the intricacy and complexity of smart city is reflected in the previous themes failing to capture its definition. The experts' capability to recall the specific moment when they joined and pivoted on the smart city made me question what exactly the smart city means to them personally and professionally rather than conceptually and theoretically.

4.2.5   The smart city as a research interest

In addition to clearly identifying when they first encountered the 'smart city', the experts also detailed their research interest trajectory in regard to the 'smart city'. They mapped out where they came from i.e. their intellectual and research background, how they got into the 'smart city' and where they were now with the notion of the 'smart city'. It became evident in our analysis that their interests in the 'smart city' not only reflected their research and academic background but was also deeply embedded in their career development.

> "So I am coming from the Internet of Things area, I am a computer scientist and I have been working on a number of projects on the Internet of Things, and when I arrived here at [name of a university], there were already a number of people around the city council thinking about the future of the city, thinking about what a smart city might mean for [name of a city]."

""It's a core part of out lab, so our lab here [name of the lab] has been around for 20 years. So all in one room, there's a hundred of us. And our work is around sensing the movement of crowds, movement [of] traffic, very urban space and internet of things, mapping and GIS.""

> "Oh well, I suppose my research on cities goes back to my PhD work. Back in the 90s, late 90s. I was working in [name of a country] looking at rapid urbanisations in [name of a country] and its effect upon family networks, and older people and ageing. So what happened to old people left behind and how did the network operates to take care of the elderly and old people in rapid urbanisation what really what my PhD was about. So, that kind of give me a broad background, it wasn't so much about technology and smart cities, no one was using those terms in the 90s."

The 'smart city' in this sense does not serve as the research interest per se, but rather provides the context where they can continue or extend their existing research interests. The reason and rationale for the experts getting into the smart city is often linked with their career development. It can also be simply a product of serendipity in life. For instance, one of my expert described his move as following, *"I have been doing digital and intellectual property in the intellectual property office, went a long holiday and came back to a job at what was then the information economy team and in the department of Business, but have since moved in [this department]"*. And it is more often a 'smart' move with clear progression goals.

This is not only seen from the fact that they often came in with a well-established background and portfolios. The smart city for some of the experts is a stepping stone, a hot topic what will help to enrich the width of their research portfolios. After a few years of experience in this field, they can go back to the background the came from. One expert went back to leading another team in IoT, some left to have their own consultancy in the smart city. The smart city served as a good network with peers and a great platform for opportunities (i.e. employment, collaboration and funding etc.).

Thus far, I have been through what a smart city is from the experts' perspective. *Conceptually*, it is a decidedly ambiguous overarching term describing the deployment and application of ICT in urban development. It emphasises on the 'smartness' rather than the 'city' and yet the 'smartness' is left to interpretation. It is context specific, that it could mean energy

efficient, technologically advanced or money saving. *Practically*, the smart city serves as a safe experimental field, a career development track or a pivot point for experts to apply their past experience and background knowledge in another context, tap into another network of people and expertise and access a new platform with potentially more funding opportunities.

4.3 Citizens' smart city

4.3.1 Citizen Perspectives on the 'Smart City'

In the interviews with the citizens, before discussing what smart city means to the citizens, we first discussed whether they have heard of this term 'smart city' at all. Amongst the twenty-two citizens interviewed, just under half of our participants were familiar with the phrase 'smart city'. Ten said that they had heard the phrase before; three mentioned that they had encountered it at work. Although two participants hesitated to offer their own definition of the concept, the others provided different explanations of what they thought a smart city might be. One suggested that the smart city was *"about interconnected services and devices, [such as] smart meters in homes and hot-spots and bus trackers"*, while another stated that a smart city *"is a city that can react day-to-day to its population"*. One participant confessed, *"I think it's quite unclear what it actually means and I think it means different things to different people"*. None of the participants who claimed they were familiar with the term mentioned any specific companies, universities or academics involved with smart city development.

Of the twelve participants who were unfamiliar with the phrase, seven offered a guess of what a smart city might be. The detail they offered varied widely. One participant in Glasgow said that a smart city *"would be a city in which everything is smart, like smart phones and smart cameras and everything like that"*. A participant in Manchester said that a smart city would exist if *"city planners used data to make areas improved"*. Another participant explained that the phrase smart city *"brings up images of everything being connected in a digital sort of way"*, but she reiterated that she was only guessing. Yet again, none of the participants named specific companies, universities or academics. Moreover, none of our participants used the words efficiency, effectiveness or competitiveness, which appear to be very popular in both smart city literature and marketing materials and experts' description of the smart city. Many of our participants struggled to be more specific than referencing existing technologies that use the label 'smart', suggesting that the phrase was not very significant for most people, they did not really 'relate' to it. Despite this lack of a relationship

or significance, every participant was willing to respond to our visioning question and describe what features they might want to see in a smart city.

4.3.2   Visions for Smart Cities

When asked to describe what he or she would like to see from a future smart city, every participant offered a unique vision. Much like the definitions above, these visions varied significantly in terms of content and depth. Despite the variety amongst visions, four interconnected themes emerged during the interviews: the role of digital technologies in future smart cities, the value of community, the desirability of interconnected and multimodal transportation services, and the importance of privacy.

The role of digital technology

On the role of digital technologies in future 'smart cities', some participants thought that technology would be a key driver of future developments, whereas others resisted the idea that our lives could be more reliant on technology. For example, one London-based participant described a technology-driven city that would be *"kind of like in Silicon Valley, where technology is very ingrained and in tune with the city. People would interact as they do today in normal, daily life, but what would end up happening is that the technology would be so integrated that it [would] become part of a seamless experience."* He went on to describe a shopping experience with digitally augmented windows that recommended nearby products and experiences based on the previous history of the shopper; this would allow every shopper to see an individualised set of advertisements, and have a personal shopping experience, which the participant felt would be very valuable. One Glaswegian participant had a different vision for bringing value to a smart city's inhabitants, explaining that he *"would like to see Glasgow use technology to help with the health issues that the city suffers from. Obviously, it's got a really low life expectancy in certain areas and fitness is quite a bad problem in Glasgow, so if you were able to use technology to help people [address] that on a daily basis, then that would be something that would really improve the overall feeling of the city"*. Several other participants described digitally augmented buildings that would respond to air pollution levels, maps that advised people on how to avoid pollution on their commutes, and networked trash bins that would automatically communicate with the waste management authority. However, these technology-centric visions were not popular with all of our participants. One London-based participant acknowledged that his envisioned smart city would likely *"mediate conversations through technology, but [he] wouldn't be happy with that. [He] would want more sincerity, community, and good old-fashioned talking"*.

This was echoed by another participant, who admitted that his future smart city would likely feature a lot of advanced technologies; but that he would not necessarily be happy with that. He wanted more community connections, less isolation, and more infrastructures that encouraged sustainable lifestyles, but he was not convinced that technology could deliver any of those. These latter visions were more people-centric than technology-centric, and they underscored another sub-theme that emerged in our interviews: many people believed that community should be a primary driver of the smart city.

The sense of community

Having a sense of "belonging" mattered to most of our participants. In nearly every interview, my participants eventually stated that having a sense of community in their city—through their connections with friends, families and acquaintances—mattered the most to them. Several participants described apps that could facilitate connections amongst neighbours, raise awareness about community events, and notify people about social opportunities. As one participant plainly stated, *"if technology could be used to facilitate community interaction, then that would be great"*. Our participants not only expressed an interest in wanting to feel like they belonged within their immediate geographical and social communities; they also wanted to belong within their city's urban development community. In their imagined smart cities, most participants wanted to be consulted about, or at the very least made aware of, technological and infrastructural changes that would take place. They wanted to know what would be happening, where it would be happening, when it would be happening, and what that would mean for them. One participant asserted that *"the installation of any sort of tool for technological surveillance should be made public"*. Another echoed this sentiment, and noted that even the installation of something like a smart meter could cause community unrest if it were not installed with plenty of notice, *"because that's not just infrastructure change, that's social change, as well"*. Thus, in the citizens' imagined smart cities, communication and connectivity between people, projects and places mattered. That connectivity was expressed in social terms, as well as spatial terms. Comparing to the experts' imagination of the smart city the citizens' vision of the smart city centred more around what makes a city, a city.

The desire of transportation convenience

Transportation services and infrastructure were mentioned by almost all of our participants. In nearly every envisioned or imagined smart city, people described having access to reliable, real-time transportation information. In several visions, this information included direct

updates about the arrival times of public transportation services, easily accessible maps of city-wide traffic flows, automated notifications about construction projects, and web-based maps of bicycle routes. One London-based participant praised Transport for London's services, noting that he thought *"London is really good because there is a lot of information about the transit system"*. But not all participants felt the same way. One Glaswegian participant explained that *"one of the things [he] tends to think about mostly is public transport and having access to up-to-the-minute public transport information. Being able to do that very easily from wherever [he is] around the city, and that taking into account [...] other information about what's going on in the city that day"* was still an envisioned, future smart city offering for him. Moreover, some participants went further than just describing the delivery of information about transportation routes and services. Some described a full-scale reimagining of transportation infrastructure. For example, one participant explained that he wanted to see *"tube systems that were connected to other systems and they would operate in a synchronous format"*. The same participant went on to explain that *"in a lot of cities, they are chunking off a part of the road and dedicating it as a cycle lane. I think that an entirely separate route for cycling would make me cycle more [and I would like that]"*. Another participant mentioned wanting to see *"a network of automated vehicles [that] is integrated with infrastructures"*. These latter types of envisioned smart city experiences cannot be achieved in most existing cities without making some change to physical, as well as digital, infrastructure. But for some of our participants, those physical and digital infrastructural changes were accompanied by concerns about some very real risks.

The concern of privacy [12]

Many of the participants expressed concerns about who would own the technologies, data, and decision-making processes within their imagined 'smart city'. Once again, there was considerable variation amongst participants' opinions on the importance of these issues. Some participants felt that they should be advised about any and all data sharing processes, whereas others believed that regular consultation and awareness-raising processes would significantly inhibit urban development projects. Others held highly nuanced perspectives

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[12]I wonder whether people's concerns over privacy is really about privacy, there's numerous work unpacking and repacking the concept of privacy (e.g. Palen and Dourish [171], and Crabtree et. al [43]. Who has the right to access what (or what's visible/invisible to whom) remains the core of the concept of piracy. After the Foucauldian analysis, especially where I argue for the smart city gaze I wonder if the concerns over privacy is after all about power and empowerment. In the part I where discuss surveillance I referenced Foucault's argument that in the modern era it is the powerful who remains invisible, so I wonder whether the insistence on privacy is a way for people to seek empowerment.

about the use, context and ownership of data, explaining that they would need to know the specific details of a digitally driven project before being comfortable with its installation in their neighbourhood. Some participants were especially concerned about partnerships with private companies because those companies may wish to make a profit off of public information, data and services. As one participant explained, *"a lot of the time, technology is applied in an urban area by a corporate organisation, and it tends to be about making something more efficient with the end purpose of making more money or making something more profitable. If [my data] is just contributing to a product, then that's not something that I would be happy [about]."* However, we encountered two other participants who explicitly stated that they were not concerned about whether a private company would use their data as long as there was some personal benefit from that company's product.

Comparing to the experts' perspectives on the smart city, the citizen participants clearly value the cities as a whole, more than the mere 'smartness' of the city. For citizens, what matters to them is to be part of a community, to move easily and freely in their cities and to have the sense of security and privacy while providing their data in exchange of services. Digital technology or ICT is only a means to an end ¬rather than then end in itself. This is not to say that the citizens do not enjoy the convenience brought by the digital technology, but over emphasising the technological development in the city is missing the point from the citizens' perspective. From the literature review, we learnt of the lack of incorporation of citizens' in-put in the process of making a smart city, from the interviews with the citizens we know that what the citizens want as a smart city does not necessarily match what the experts are creating behind the scenes. And this mismatch in visions brought us to the next discussion, what does it mean to incorporate citizens' perspective in the smart city? Would this change the democracy we are used to? What does the future of civic participation look like?

4.4   Democracy in smart cities

4.4.1   The one-way traffic of engagement

Civic engagement and citizen participation in the smart city is another topic of relevance when we discuss what the potential the smart cities have in changing the landscape of democracy. However, from the previous literature chapter and the interviews with the citizens we can see that a lot of smart city projects that claim to have engaged citizens though the engagement process weren't really participatory. Rather than engaging citizens throughout the process,

citizens are often invited only to comment or evaluate a solution researchers came up with already.[13]Just as the expert who works in the municipal government said *"it is about trying to get that across to citizens"* which means engagement is interpreted as a communication task, as the expert went on to say that *"they [the engagement team] went out and we had various engagement hubs which took out things like iPads and screens and went to libraries, went to sports centres and places where the members of the public would flocking through, and try to explain what we are trying to achieve and something were easier than others."* The fact that engagement work is being interpreted currently as communication tasks, in my opinion, is another manifestation of the complex nature of smart city and its lack of a central identity. Without being able to explain to citizens what the councils, researchers and projects meant by the 'smart city' it is going to be difficult or impossible to engage citizens in the smart city making. However, this is not to say in principle that the councils, policy makers, researchers should not take time to explore with people what the central identity of a smart city could be. Meanwhile, experts whose work involves them in engaging citizens have all expressed how challenging it is to achieve the level of participation they had hoped in practice. This is a typical example of the frustration the council faces, *"sometimes [it is] difficult for the member of the public [to tell] you're the ideal of future city Glasgow, do you know what it has done for you, people would say, I am not sure, what has it done for me. Some of the things are for example this operation centre here is contributing towards increasing safety of the city, now 600,000 residents won't know that exits."* This sentiment is echoed by another city council,

> "I think it's up to us [city council] to communicate the value of the project, people don't necessarily understand it as with anything that is new. But if you explain to them in a way that's relevant, they will understand. Of course, citizens are important, things like the public transport, the real transport information that is life changing for a lot of people, they don't just go to the bus stop to wait for the bus, they know when the next one is coming. So things like that, but they don't necessarily relate that to a project that has happened under the scope of a smart city, so it's up to us to tell the story."

For experts who had high hopes for engaging citizens in the process it became more frustrating when the low engagement status quo affects not only the intended impact or research interest but also the political potential of such projects. As one expert summarised,

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[13]This imperialistic approach has attracted continuous criticism from Information Communication Technology for Development (ICT4D) community (e.g. [167][111][196]). Irani et al. in their paper *Postcolonial computing: a lens on design and development* also criticised this approach [120]. If we dig deeper that, such an approach according to Arnstein's citizen participation ladder is somewhere between Nonparticipation and Tokenism.[13]

"they transform the public space by saying that I am willing to participate in that activity and I can see it is actually mostly a positive things coz the change of perceptions and things like that. So it's a dual kind of relationship between a solution to a problem and also a political process in one mobile application that's easily accessible. That's one kind of example of how this sort of very simple solution can merge a lot of different kind of data plus community plus political change."

While some experts are embracing and pushing for 'citizen engagement,' the term is also criticised by some other experts and one academic even protested by not using 'citizen engagement' due to its poor reputation – engagement as a communication task in practice. He said, *"I deliberately refrained from using the term citizen engagement, which is very often used in this context, because it hints on the smart city project talking to citizens about what a smart city project does, it's always maybe not intentionally but in practice it's very often a one-way form of communication."*

Another expert offered an insight that might provide some explanation of why engagement is done merely as a communication at the moment, that *"the challenge was people were happy to do that but town planners weren't necessarily happy to respond to every single comment. So it was very much for me, it's kind of what I don't think the problem is on citizens or mobile applications, the problem is the other end of the process is not built to resounding to the different ways of citizenship essentially."*

Citizen engagement should not be a one-way traffic and it should be more than simply a communication task. In order to engage citizens in the process the local governments need more than just the willingness but the capacity to process such level of interaction too. However, from my observation, combined with the devolution[14], austerity and the lack of experience and support in digitisation, it is admittedly hard for them to approach citizen engagement more attentively. Meanwhile, we also need ensure citizens can and will benefit from the involvement in smart cities research project. And as researchers this might require us making this concern part of our research ethics[15].

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[14]Devolution is in short is the statutory delegation of powers from the central government at a subnational level, such as a regional or local level. It is a form of administrative decentralisation. According to Gov.uk that it is "a process of decentralisation, and puts power closer to the citizen so that local factors are better recognised in decision-making." UK government is currently making progress towards the devolution of power to Scotland, Northern Ireland and Wales as well as several municipal level governments including cities like Manchester.

[15]The university research ethics guidance covers the right to withdraw and preservation of privacy for the participants, but it is often up to the researcher to find a way to reward the participants whether that is a small amount of cash reward or simply an acknowledgement. However, it is neither explicit nor of the university's concern ensure the participants are more than a data source. And this critique applies to not only the ethics guidance but also the practice we carried out as well as to the general use of ethnography in practice I've witnessed both within and outside of academia.

4.4.2 Engagement hierarchy

Another issue I had with citizen engagement during my research was with the term 'citizen'. The term 'citizen' in itself seems to be politically charged, its official definition[16] is exclusive by default. 'Citizen' does not necessarily include temporary residents such as international students in the city, temporary workers, refugees and tourists. So ultimately, we have to ask who are we trying to engage, and who we are leaving out in the smart city engagement programmes? In addition, what issues are we trying to address by engaging with these people, because it is going to be mission impossible if a city sets out to involve everyone. One expert described their engagement process in their city through going into the local communities and trying to understand what people's concerns were. Often what they found was what he would call "hidden issues" that were not on the official smart city agendas. He was not alone. A survey[17] that the Dublin city council carried out to identify people's concerns with their smart city, discovered that most people would like to see homelessness being addressed which, unfortunately, is not one of the Smart Dublin objectives. And the Smart Dublin team was aware of this, "when we go wider, that's going to be our big criticism. Why are you not looking at housing or homelessness, these huge complex social areas and we touch in our last survey, we touch a few smart city themes, so this maybe interest for people are saying that Dublin is a smart city because of its people. Therefore, I wonder if those issues are really "hidden" or it is because we have been disconnected from people especially the marginalised community. Moreover, this situation only adds to my critique of experts' perspectives on the smart city v.s. citizens', one that suggests that the experts care about being 'smart' whereas the citizens care about the city and the people.

There is also the moral hierarchy related to who the beneficiaries are. Solving problems for the communities that are "in need" and marginalised is preferable, more noble and 'better' than solving the so-called first world problems. For instance, *this is not about citizen sensing that people run around with smart phones. But this is sitting together with a group with a group of young mothers who have a coffee morning, and talking about their issues and sort of listening in and understanding what their issues are."* This is echoed by another expert saying, *"it's not about knowing parking apps, knowing where the available parking spaces are, it's not that visible."*

Going through the popular terms that were used in engagement work, in addition to the ones I've mentioned such as *"hidden"* and *"invisible"*, *"giving a voice"* to whoever that's being 'engaged' is also very common. Ash Amin [3] heavily criticises the arrogance and

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[16]According to Oxford Dictionary, a citizen is a legally recognized subject or national of a state or commonwealth, either native or naturalised.

[17]http://smartdublin.ie/smartstories/civiq-smart-public-engagement/

entitlement embedded in the sentiment of *"giving a voice"* by questioning implicit power relations – who granted whom the right to give a voice to another. I would like to continue this question here ten years later in the realm of the smart city, that with this inherited unequal view on engagement, problematic use of citizen and loosely defined smart city, who are we trying to serve in building smart cities?

4.4.3   Who does the smart city vision serve?

During the interview with the experts, when I asked them who they thought the current smart cities vision is serving, one of the experts used a nice analogy from electrical engineering – "tracing the signal path" to explain how he would identify different beneficiaries in smart cities, in his opinion that by *"tracing the signal path or the execution trace we will be able to find some of those actors benefit a great deal, some of them benefit a little bit, some of them, their lives a negatively impacted maybe, the front line worker finds it the pain in the ass that this adds to their burden."*

While tracing the signals in my interviews with the experts what I found is a shared sense of confusion in their answers, e.g. one of them said *"I don't think it is serving anyone currently"* and another said *"it is hard to kind of weigh who benefits, who loses. There are many different ways they are affecting people, across section."* Though some of them firmly believed that this vision of the smart city serves the technology companies who are behind creating such a vision and selling it; some on the other hand thought that a subset of population is benefitting from the smart cities vision, they are not necessarily the technology firms but whoever is privileged to afford such life style. Some of them were not optimistic about the impact of the smart city on citizens, one expert raised the point that *"there's always the value proposition"*, however, *"it is very hard to make a case that citizens really do benefit."* Some held a rather liberal view that it's up to people to take advantage what's made available, for instance, one expert said, *"the current smart city here and now is people using mobile phones to rewire the city on their own terms to some degree."*

One of the expert's thoughts was a combination of the above viewpoints, that the technology companies and politicians benefit from the smart city vision through benefiting the subset of privileged population and through the power of marketing. He thought that *"the smart city vision satisfies the goals of politicians, coz they get a great PR exercise, coz they get to stand in front of this high technology big investment and they talk about creating jobs, which is a little bit cynical to think that something so controlled and often outsourced that can automatically create jobs."* He gave the example of Dublin (which is not the city the expert lives but it's a city he is interested in). He remembered first seeing the smart city marketing at the airport, selling this vision to what he called "the highflying executives

who are always good voters". The marketing was telling those executives that they would have a better life if they lived in a smart city. Then a few years later, the previously planted marketing seeds began to be reflected in the political campaigns, that this expert remembered seeing this specific campaign in Dublin where people going for the EU parliament were saying that Dublin would be a smart city. However, in his opinion, they should not have any influence on Dublin's smartness if they work in the EU parliament, and he highly suspected they would know what a smart city means. He said, *"it's just a buzzword that people were sold."* Another expert echoed this sentiment, that he thought in addition to the tech companies and academics , the smart city visions serves *"people in local government with a digital agenda, but not necessarily with a political participation agenda"*. Consequently, when a city heavily invested in being 'smart', what they generally get, or what I observed in these so-called smart cities, are a whole lot of servers and a whole lot of sensors and a big room with lots of screens in it. However, to quantify the actual change and the improvement in people's lives is a much more difficult task than installing all these infrastructures. Just as one expert said, that *"there's a handful of cases you can point to, like real benefits that have come out for citizens and there's lots of them but they tend to be sort of fragmented and kind of pushed around the whole world rather than in one say, one council's been really, really, good at it."*

Another narrative that I found while looking into whom the smart city serves is about information accessibility, transparency and equality, i.e. who gets to know what in the smart city. The promise of transparency in having access to all the information does not necessarily guarantee a benefit to everyone equally in society. For instance, two of my experts provided me with examples of the data sensitivity issues we need to consider when we think about who is going to benefit from the smart city promises and visions, and who is likely to face sacrifices. The first example is about people whose homes are in danger of flooding, according to the expert

> "you don't want the entire city [to] know about flooding, in any particular area, some of this will have negative consequences for people, I mean their house prices can go down, so you gotta be very sensitive to this stuff. And at the same time, you gotta let them know there is a danger."

And the second example another expert gave is about the politics in local policing, that

> "the police aren't gonna release the data that says here's where we make most of the arrests because that will allow people to avoid that area and [to] not get arrested, but that's actually an open data agenda. So, to me there a set of

constraints on what can be made open. That has nothing to do with data but are to do with politics."

The dilemma here is, on one hand we want to inform people about potential danger (whether that is flooding or street crimes) by providing them access to the data; on the other hand we also want to avoid negative impacts and consequences that come with data transparency. My motivation to question who the smart city is serving, is really to call for a reflection upon our current approach to the smart city – putting data before people and equalising the data we gather from people with the people. When data is regarded as a fundamental building block of a smart city, we need to resist what my expert would call "dataism as a cultural imperialism". We need understand how and when we produce data; recognise the things data does and doesn't do; and most importantly acknowledge that data doesn't represent the totality of society. Instead, we ought to make sure that people are valued, prioritised and served within the smart city.

4.4.4 What does Smart City mean to democracy?

At the beginning of this chapter I argued that 'smartness' is a context specific concept. Similarly, what the smart city means to democracy or what smartness means to democracy also varies from culture to culture, it too is a very context or culturally specific concept. Despite the implicit arrogance, one expert's response captured how the smart city could be less problematic in one context but more damaging in another

> "And you realise, from a cultural point of view, when you did it from a London point of view, you think you are making the citizen smart. And you are giving power to the citizen, you realise when you write the same sort of plan for different cultural you are creating the ultimate surveillance state, meaning you really are monitoring people 24/7. You know when they moved, you know what they say you know where they are, you know where they work, it's a really time sensor CCTV all over the place, and therefore, control those facts in a central state. That actually from an academic point of view that give us a bit of a, oh god what we are doing here and why are we creating like 1984? Coz that's almost where you are. It's just because, it's that cultural shift. So here, smart is seen as good, in some views, other place around the world, it's seen as good for the central controlling state."

For some experts, the real question in the smart cities is "what technology can do to help engage more actively in decision making." Currently, representative democracy has been

so deeply internalised as a model that people equate the idea of democracy and the idea of voting. Some of the experts believe that democracy should be more mundane, that democracy is more than just voting every four or five years. As one expert said, *"democracy is not an event, democracy is a process." Democracy is implicitly participatory to him that it is "where you spend your money, the words you choose to speak, the way you present yourself to the world, the way your dress, all of that is about, establishing a collective sense of shared public."*

However, not every expert felt comfortable to share their opinions on this topic despite their lived experiences as a citizen. It became more ironic when they said they didn't feel "qualified enough" to comment on democracy regardless of the fact that the very nature of their work is to envision the future of democracy in a smart city. One expert works to inform policy making though feeling "not in the position" to imagine the future democracy still expressed his wish to "have a much more consolidated city governance system" that "we can increase democratic participation".

The expert who worked in urban planning has envisioned how digital technology and smart city could impact on democracy in three-folds – how technology could impact on how we "run, grow and transform" the current democratic process using planning system as a context. According to him that *"digital can change how we run the current planning system without touching the existing planning system pretty much, we can already make big improvement, growing it is then enabling increasing access to people to get involved in that and doing so you are beginning to change the system a little bit fundamentally, but the transform thing is really interesting, that's when it really gets kind of high studies, you start to think hang on what is planning if we have people co-designing the houses with wiki-house modular open source construction. It could run from how to engage people better with the current system all the way through to a totally transformed system."* Essentially this is an example of democratisation of the planning process through participation. Similarly, digital applications such as FixMyStreet[18] came up several times during my interviews as a positive example of a digital technology used to improve the citizens' participation experience in our current system. However, I can't help but to feel that the discussion we need to have should be a much more inductive and exploratory enquiry. It should be more than simply replacing part of the system and process with digital technology and hope that it will fundamentally transform democracy. One of my experts also shared my concern and problematised applications as such:

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[18]FixMyStreet launched in 2007, is regarded as one of the most successful civic apps. It was developed with the help of a Government innovation fund grant and built in conjunction with the Young Foundation think tank. Citizens could use FixMyStreet as an alternative means to report problems they encounter with on the street and about their environment such as broken lamps, potholes and illegal dumping.

"We have asynchronous communication, why don't we have asynchronous partic-
ipation. So we are going to build digital platforms to allow people to participate
in decision making asynchronously. And I find that, kind of unsatisfying. I think
they are useful but I don't think that's any substitute for having to account for
yourself in real space and time. It's a nature of a deep conviction that there's
something profoundly different about decisions that are made being hashed out
in person amongst a group of people, or forced to be present to one or the other
and decisions that are made by pushing buttons on your screen."

Another expert echoed this sentiment and offered me a similar argument that different
means and forms of participation should be counted and accounted for differently.

"I think the danger is to assume [these] things should all count the same, that
somehow our established forms of democratic process should be kind of some. . .
equip to how people use to twitter or whatever. I am not invested in whether one
thing is the same of the other. I just think they'd open up a kind of a platform for
ways of participating and if we kind of are more open to that, then we can start
to design new capacities for being involved and engaged."

This quote is a rather perfect coda for this section on what the smart city could mean
to democracy. In order to truly engage people in the pursuit of a smart city, the councils
and us researchers will have to do more than simply treating engagement as communication
tasks. Moreover, engagement requires a change in our mentalities too that we need to resist
two forms cultural imperialism here. The first one is that instead of occasionally "granting a
voice" or "giving a voice" to the people who we claim to care, what we need to do is to listen
carefully, attentively and constantly so that we are in check with reality. The second one is
that despite the possibilities the digital technologies and platforms may provide, we need
to resist the technology solutionism and dataism. Blindly applying and implementing 'the
digital' and 'the smart' in our system is not going to be adequate to transform it. However,
these applications provide us a rare opportunity to explore the temporality and accountability
associated with new forms of democratic practices. Rather than getting closer to find an
answer, we are merely closer to finding the right questions to ask.

4.5 Knowledge Production in smart city

4.5.1 The imbalanced research effort

Back in 2011, Nam and Pardo pointed out that little research literature discusses innovation in policy, while literature on technology innovation is abundant [159]. Five years later, when I was conducting my fieldwork in early 2016 things had not changed much. One thing caught my attention was that both the experts from a traditional STEM background and the ones from other backgrounds mentioned their experience of the imbalanced development between the research focused technology and other types of research in the smart city. For instance, the research effort on decision-making processes in a smart city, the ones on policy potentials or general sociological ones concerning smart cities initiatives are comparatively outnumbered by the ones exploring applying of IoT, data science, mixed reality, machine learning, and artificial intelligence to the smart city. One expert concluded this balance as demand/supply issue, that the research on technology development and advancement generates supply, which means there should also be research on creating the demand. According to him, *"you've got the demand and supply, as in the demand creation, as well as the supply side of new technology and approaches. And that's sort of what we had in the 1950s around suburbanisation, you know new sort of buildings and the car, from the supply side, industry produced this tool and then it was very active, demand creation for that, for a whole number of reasons, some good some bad. You can look at the films from the 40s and 50s around selling suburban dream. So yeah, that's what we need now, demand and supply, and research in both areas."* However, I am reluctant to buy into his approach to re-balance the research effort, because the point of research on whether there's a demand is not to create one when there's no need for one.

One of the experts concluded the emphasis on technology-oriented research is the excitement of having technology as a new material and more specifically, having artificial intelligence (AI) as a new material. I on the other hand remain dubious about this rationale behind prioritising technology-oriented research. I contend that the emphasis on the technological research and STEM in general is both the product of our focus on STEM research as a society , the rigid divisions between disciplines and the bias interdisciplinary work faces while trying to get published and disseminated. One of the common biases that both some of my experts and I personally have experienced is trying to publish our more sociologically focused smart city researches with CHI and CSCW conferences.

> Expert Participant: No, so we have done work with older adults where we essentially just sat down and chatted to them about how they might do research

themselves, not with us. So we were really there to just facilitate them wanting to engage in things like smart city research or any other kind of research. And the idea was eventually, at some point, to trying to build something would help them. They never needed anything they just got on with it, so we didn't build anything, we just had conversations.

Interviewer: Is this piece of research published anywhere?

Expert Participant: It's not yet. Because we didn't build anything, it's difficult to publish it. (Laughing)

Another reason would account for the imbalanced research effort in smart cites comes with funding bias. Academic research is not necessarily free, and it is driven by government policies and initiative as well as funding. And the majorities of smart city research we have seen so far are funded if not fully then partially in collaboration with technology firms. And the current trend is technology companies investing more in the smart urbanisation and putting efforts to build their own versions of smart cities, such as Apple's town squares [30].

4.5.2   What's the role of universities then?

With all the driving forces in the smart city arena, universities while being one of the biggest stakeholders, are having a hard time re-defining their role in the process too. As one expert said, *"university itself I think they see themselves as important drivers of economic growth and innovation in the city context. This is not something that universities are particularly good at. I think that is a new role that university is trying fill out which isn't quite clear yet."*

When asked what the role of university research in the smart city might be one of the experts said, it is *"maybe [to] point out the crags and barriers, why things are actually not smart, why they can be smart and what might be the dangers of being smart. So critically informing not just pushing forward but sort of reflecting."* His answer made total sense, but what surprised me was the uncertainty in the way he answered the question, which quoting his words simply does not transcend.

Another expert who was frustrated by the little impact academic research has made on policy making thought that research is being treated as an exercise or even a checklist item. Throughout the years, he saw *"no example of evidence based policy making as much as it was advertised."* Other experts have also recognised the agony that universities are going through trying to find its identities. The collaboration between academic research and city government poses both opportunities and challenges at the same time for research. The opportunities for universities lies in the connection with the "real world" in the chances to prove the impact, and for cities, they get access to more funding and do the projects they

were not able to do before both technically and financially. However, the challenge mostly comes from the attitudes towards risk. The nature of research is experimental whereas the councils tend avert any foreseeable risks.

4.5.3   Smart city as a competition for specialties

"Smart city is the Wild West now, you see some developments here and there."

One of my experts said that when we were reflecting together on the distribution of research efforts in the smart cites. Indeed, it is similar to the approach we have taken for ocean exploration and space exploration, that everyone is trying to find the new piece of land or planet and make it their own or leave their own marks on it. It is almost a competition for specialties. If we were to be less critical and more positive, the competition could be argued as a necessary step to build an eco-system. The Smart Dublin team took this perspective in the interview and regarded university research as part of the smart city ecosystem they are building.

"So we have say insight centre for data analytics in Galway and we have the programmable cites in Maynooth, and we have Connect smarter cities in Trinity as well as down in Cork, there's a cluster down there as well, TSGG."

And this positive competition fits perfectly into Smart Dublin's narrative of the smart Dublin which is lowering the entry barriers into procurement process, supporting SMEs and harvesting the university start-up spinouts. Glasgow happens to take a similar approach with their university resources.

> Strathclyde was involved in the sensors and homes as part of the housing and tenemental, insulation retrofit, so the before and after, how successful has that been. Aberdeen University helped us with the behavioural change. And energy this is where we are talking about the idea of changing behaviour in the young people, so this wasn't about litter it was about energy consumption.

The urgency of having to have a specialty is not only evident amongst research institutions, but also amongst cities themselves.

""No one is doing everything right. Amsterdam seems to get a lot compliments also Copenhagen. I think on the kind of RD side, Bristol and Milton Keynes have done an awful lot. So I think, you know but it is no one is doing everything I don't think.""

And when the cities start comparing and competing with each other, the nation will also be compared too.

"I think we... UK cities under perform with the exception of London Bristol, we are under perform enormously compare to say German cities and so there will be attention to that but it still got quite a long journey."

This sense of competition rather than being recognised and questioned, is being embraced. One expert explained the embrace as the FOMO phenomenon – the fear of missing out. He called it "a response to this urgency" that "it's a symbol of a modern project of managing cities." Another expert considered the smart city FOMO as the reason for the "copy'n'paste" approach amongst the smart cities. *"They've done X in Lancaster, let's do that in Newcastle because it will just generally apply exactly the same way."*[19][20]

Though treating it as a competition, there's only the mentioning of "wins" but not the "loses". For instance, *"our whole vision was to promote Dublin as a prototype city really. So we've had quite a few early wins, quite a few early applications that have been developed, some of which have been scaled up globally. So that' really the size of the city I guess the size we want to be, competing globally."*

From my observation it seems the projects the smart cities choose and develop is a means for them to develop their own specialty to compete with other smart cities and to claim their territory. Glasgow considered itself ahead of the game in smart lighting and smart street lamppost whereas Dublin has developed their specialty in noise sensing. And when we look at companies, IBM's specialty in smart city is their ability to deliver the central control rooms, cisco's involvement in Songdo's in hose broadband system, and Intel is interested in sensors, for instance the smart citizen kit, the sensors they put in Hyde Park in London and the ones that are used in flood monitoring in Dublin.

4.5.4 So what counts?

During the interviews, when the topic touched competition, benchmarks and research impact, I also asked them how they would quantify progresses and achievements in the smart city research championship.

One expert approached "what counts" through unpicking "the notion of impact", more precisely through criticising the emphasis on impact that's currently been adopted in academia. Research impact and contribution to knowledge have traditionally been calculated based on the number of publications, the citation index and peer recognition within academia. With

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[19]Greenfield [93] criticised this well adopted 'generic approach' to the smart city. Applying generic technologies to generic spaces in a generic future without considering the localised issues that would occur during the implementation process. From technology perspective, it could be the choice of technologies for local needs, procurement process, business model, pricing plan, tariffs, policy and bureaucracy.

[20]Another critique of such approach is generalisation. Sharrock and Randall[194] critiqued the misuse of sociological research to form a basis of generalisation in design processes.

the increasing emphasis on real-world impact in recent years, researchers are encouraged to accelerate their impact through community engagement, industry collaboration and potentially policy informing. For an expert who is outside of academia, true impact happens at a street-level:

> "Is it generating knowledge? Yes. Would that knowledge be cited by other scholars? Yes. Will it come to constitute the fabric of my awareness? Absolutely it will. And it will become something I speak about to people like you and I will write about it in the Guardian and I will cite her in my book. I will try and try and try to make it part of collective understanding. But I don't think that happens very often. In term of changing the things at the macro level, changing the texture of the viewing of life out there on the street? I don't see it."

Important and influential as it is, the work aimed at the street-level impact may or may not be properly incentivised by the academy. One expert articulated this exact concern as such after witnessing this transition from the inside:

> "I mean, academic research traditionally worries most about recognition. And scientific contributions on a very abstract level. Now of course for the last 5 years or so we had the discussion about impact, what kind of impact does research have. I think now with the smart city discussion, we are getting the discussion of can this research have local impact, impact in the community and that of course is a very difficult proposition for universities, because it requires academics to go out into the street and work with the community. While actually nobody recognises you for doing that, so I think the university can play an important role in the local community and in the local context but of course academics are not necessarily seen that as very rewarding because our incentives are publications and research income and these kind of thing."

In addition to the extra work researchers have to take account of, where to publish is also factored into what level of impact the researchers are making, one expert told me as an anecdote the pressure they are facing. Because they are in an interdisciplinary group, they are not only required to publish with more than one discipline, they've also been told they should *get around to writing a 'Science' paper [or] a 'Nature' paper."*

I could understand the aspiration the institutions have to encourage researchers to reach a bigger audience in order to increase their impact but I am worried by this blind obsession with the so-called 'impact' without really defining what it is and what is achievable. Apart from impact, another poorly defined yet widely used term to evaluate performance is 'success'.

For a smart city, merely being able to find the solution to a problem is never as good as being able to quantify how successful the solution is, according to one of my experts who works at the city council, the approach to problem solving has been *"updated" with a smart city touch, that "what you do [is that] you go identity the problem, quantify it, do something about it and measure it again to see how successful it has been."*

For academics, success could mean either the ability to attract grant funding from various funding bodies or research excellency or an intricate combination of both. One expert who was outside of academia but had worked closely with various universities as part of his role in the smart city development articulated his concern as such, *"I worry the best research in the country is not necessarily... this is getting really controversial now, but I see that the most successful institutions are not necessarily considered successful not because of their papers they publish but because [of] the funding they raise."*

Another expert based in universities echoed this sentiment and expressed the need for change. In order to leverage the influence funding has over research we need to re-consider how research is evaluated societally and be mindful about the origins of the funding. Additionally, what we also have to acknowledge is the nature of research – the possibility of failure and the ability to learn from the failures. As my expert summarised,

> "I think we have to structure things in such a way that people do back and forth between theory and practice. If we were to have any impact at all. You publish something that immediately become part of the armamentarium of medical research lab resurgence not the same things as finding a math or you publish a solution or you publish an approach that become part of people's armamentarium. I feel like we all talking past each other."

Indeed, what counts in the smart city research should not be who has the loudest voice.

4.5.5   Yesterday's tomorrow

When "talking past each other" approach manifests itself in practice, it may look like what my expert described as reinvention, that *"right now there's lots of data systems and everyone is reinventing it, and nothing particularly joint up."* Another expert who shared this argument said that the smart city would remain a mess as it is today due to the complex nature of cities and different stakeholders involved. According to him, *"we have to step away from the thought that a smart city is sort of a well organised homogeneous system"*, especially when it comes to the "day to day operation" given the mess and the mass of the interaction between different players. However, re-inventing the wheel is not going to get us out of the

current mess. Rather, the consequence of re-inventing the wheel is that we are limiting other possibilities we can explore, as my expert said:

> "I am tying to find a metaphor that everything's been pushed down this direction by the smart movement and I think there's an opportunity being missed. But this is just a moment in time in the debate, if I were to verbalise my hope for the discourse, the word 'smart' has been so tight cast that we need to dissolve it away and we need to find something else."

Another outcome of re-inventing the wheels is what Bell and Dourish would call a yesterday's tomorrow [18]. That is to say that even if we arrived at the smart city vision based on our previous imagination we would not recognise it since it looks nothing like today's reality[21]. As one of my experts said, *"I think the smart city is here. No doubt about it. It's just not what people were thinking when they were thinking new Songdo city."*

In this expert's opinion, who works for a major planning organisation, yesterday's tomorrow is when the future is being crashed into the present. And he used autonomous vehicles as an example to illustrate his idea.

> "You look at autonomous vehicles, self driving cars, that's something even ten years ago, I didn't mention that when I was doing smart city work ten years ago, it was not even on the list and 5 years go people might have said yeah, yeah, 50 years time that will be amazing where everybody has autonomous vehicle, and 2years ago people are going hang on, it's closer than we thought, and this year it's like Yutong corporation will have them on the street in china next year and Singapore will have self-driving buses next year, Switzerland has self-driving bus next year."

What he also recognised was that despite the future which features autonomous vehicles had arrived, it was not "evenly distributed". It was not scaled and it was not necessarily equitable. Other experts held a slightly more pessimistic view that we simply will not be able to keep up with the radical changes we cannot predict:

""And then there's such like Uber come along, and throw the whole standard, the whole taxi standard of London out, it's just out of the window. So what's the point of putting standards, if companies are suddenly gonna popup and just completely wipe the floor with it.""

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[21]Better examples of this effect have been shown many times in science fiction classics. The 2015 we lived looked nothing like the one we imagined in *Back to the future*, and 2019 will not look the same way it looked in *Blade Runner*.

For some others, we are not only one step but two steps behind, not only that our visions are already yesterday's tomorrow our ability to execute such a vision is one more step behind the vision whether that's due to the technical constraints or the socio-political constraints:

> "Birmingham for example, have relatively well thought out smart city strategy, the problem then is to what extend the smart city strategies are actually being implemented are followed when it comes to concrete things or these are just mission statement that people feel good about. But that day to day operation management of a city actually is done in the normal way. So it will take a while before we see anything that's sort of resembling what we might read in the literature about smart cities. I am not even sure, that's what we want in the end of the day."

During my fieldwork, in addition to the interviews with experts of knowledge and experts of experience, I also attended various smart city workshops and summits in order to catch more of the debate and public discourse of smart city. One anecdote happened during the Westminster's e-forum smart city event. After hearing the critiques on duplications and "making the same mistakes" in British cities I asked the panel, which consists of the leading figures in the UK smart city scene what they thought was the reason[22]. None of them answered my question directly, I then asked whether that was because we have not created a safe space for cities to come forwards to share failures rather than telling success stories, the panel avoided my question again and became visibly uncomfortable with the word "failure". Status quo of research in the smart city does not look promising. We are guilty of treating the involvement of university research as a vanity project for the universities to meet the impact quota, for the councils to reach the outreach goal and for the industry to harvest successful research outcomes. Only success counts and the success is often defined by money and by the ability to attract and generate money. If we only incentivise and reward success and without being able to acknowledge, face and analyse the failures, it is not a surprise that rather than building a new wheel we only contend to reinvent it; rather than heading towards tomorrow we are stuck in the yesterday's tomorrow.

4.6   Towards a smart city policy

As I argued previously in 4.5.1. *Imbalanced research effort*, while research efforts tend to spotlight the technological facet of a smart city, its organisation and policy issues have not

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[22]The panel includes Miranda Sharp, head of Smart Cities Practice from Ordnance Survey and Joe Dignan, head of Business Development from Future Cities Catapult.

gained much attention. Policies, as the motivating power behind technology adoption or implementation should be brought higher up on the agenda for the reasons that the support of government and policy is fundamental to the design and implementation of smart city initiatives [159]. Meanwhile, in the article *Public Policy and HCI: Making an Impact in the Future* Jonathan Lazar called upon more HCI researchers assisting public policy making in order to optimise their research impact [139]. This argument is potentially dangerous in smart city context. Could we make policy on a notion still under exploration and research? What is the potential societal consequences of making such a policy? The focus of this section is to explore what influence policy could leverage in smart city agenda and why we should be mindful of that influence.

4.6.1 Policy challenges in the smart city

The absence of smart city policy

There wasn't any obvious 'smart city policy' when I started my fieldwork at the end of 2015 and there still is not any now. However, there are policies that are relevant to the 'smart city' but without being particularly explicit in terms of focussing on the smart city. And the experts' responses in the interviews echoed this observation.

""I would say indirectly address. Yes, I have seen promulgated government policy that is about the adoption of one or the other platform. More often I see white papers.""

> "Well, no in [name of a city]. I mean [name of a city] is trying to get its head around and it' just starting… it's just putting in place a future city's commission. That's looking at this landscape in a much more holistic way. I mean there were sort of light strategy papers, floating around before, that indicated pretty much that it would be nice to do something in this area and Milton Keynes should try to become smart city."

Two of my experts in the interviews critiqued some of the existing smart city documents (white paper, smart city plans, and smart city strategies etc.) as being too abstract and conceptual, suggesting that this could lead to some dissonance between rhetoric and practice. As some of them pointed out:

"That was very fluffy and very early"

"it's open to interpretation. But most of them are like that."

"Well, I saw no, no example of evidence based policy making as much as it was advertised."

Evidently, cities that are currently undergoing smart city development may have their own municipal level smart city plan or document but the government still lack the coherence in terms of a policy that might "join things together".

Accommodating contesting priorities and temporality

When describing the smart city projects the individual experts are leading or working on, they also brought to light some of the challenges they are facing in their research or development work. One common theme reported by the experts is that the smart city developments often need to accommodate various contesting priorities within a city. Clearly, different cities are often faced with very divergent problems and/or issues.

> "So the city has an expectation of rapid rise in population, so it's tasked with developing new housing, improving the road infrastructure, and making sure all the services are basically suitable to accommodate the growth. Water and transport are the two areas where there are very direct barriers."

""Yes, I mean clearly the city has targets, it has... it needs to oblige to targets by the UK government, it needs to oblige to targets set by the EU in terms of emission reductions.""

These different groupings in the city could then drive the policy into varying and even competing directions in the 'smart city'. Therefore, it poses a complex issue for policy development.[23]

In addition to accommodating competing priority another challenge the experts recognised is to balance different temporalities in the smart city. Development work happens over time, and, in a similar fashion, so does policy generation. Meanwhile, technology, often at the core of smart city development, proliferates and progresses vastly and dramatically in very little time. This mismatch or, kindlier nuanced differences in development speed has the potential to create tensions between policy development and technology adoption. Also, as one of our experts highlighted, smart city development often has experimental nature, which makes it even harder to manufacture policy along the way. As one expert pointed out that *you don't put Bluetooth on all the pipes, knowing that in 5 years' time Bluetooth won't used. And it will be out of date, coz some sort of new tech has come along.*

Also, another difficulty here is that *we haven't demonstrated that the utility yet. We haven't demonstrated an actual value for the city. Because the things which we built are*

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[23]This is not a new problem for urban development. As Greenfield used the example of gentrification to demonstrate the dilemma that people often have "multiple competing and equality valid" viewpoints of what's good for them and what's good for their communities: "a wavefront of gentrification can open up exciting new opportunities for young homesteaders, small retailers and craft producers, but tends to displace the very people who'd given a neighborhood its character and identity." [93]

too small scale and not yet completed. So that, it's very difficult to say that we have any kind of concrete value for the city as a whole." This creates another layer of complexity for evidence-based policy to be developed, as there is very little 'evidence' to be found in the current 'smart cities'.[24]

Planning for austerity and devolution

One of the bigger contextual challenges facing all the British cities is the devolution that's happening at the same time as the smart city development. Though the people who work for national level government consider it is a good time to combine the mandate of devolution and smart city agenda they don't feel "they are in place to tell the cities what to do." Another expert from a quite different angle has provided an explanation why the central government felt less empowered to do so.

> "Well, we've got this devolution thing going on, and I think it can be ignored that cities are much more empower and will continue to be much more empowered on a national or in the case of federal level. Manchester just got its entire health budget devolved to Manchester 6 months ago. So now they control how the NHS spends its money in Manchester. And this power will mean the local election became much more important. And how you elect your local council etc I think we are entering an age that old city boarders that existed especially in Europe for hundreds and hundreds of years, they are becoming less and less important. People are much more important than they used to be."

When I asked the experts whether they think the austerity the councils are facing is the motivation for them to digitise their service because being able to save money is considered smart. One expert pointed out that the money saving element might just be a retrofitted as a motivation for councils to embrace the digitisation promises come with smart cities. One expert held the opinion that the digital agenda predated the austerity. According to him, *"the cuts are a reason to push it but they were always gonna do it. Austerity has just become the continent way of saying that well now we have to do this because we haven't got the money to do it any other way."* He was also concerned with this "neoliberalistic government approach" might have a negative impact on the citizens that *"when you create something, you reduce the space for some else, that might actually mean that for citizens, they get less visits by social workers."*

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[24]Given the pressure to gather relevant knowledge, case and exemplars for this evidence-based policy making approach, the project we've seen now often has a function to serve as exemplars and demonstrators to show case various smart city visions. This characteristic of the smart city project is further discussed in the Foucauldian chapter. As this characteristic contributes to the principles that would mark the smart city a heterotopia.

Who holds the money is who has the say

From my visits to the smart cities during my fieldwork I realised that smart city projects I've seen were often financed by various stakeholders collectively. The ideology comes with the funding inevitably has role to play in the smart city development and potentially policy making in the smart city. Where the experts got granted the funding with what focus, would definitely have influence on what projects are carried out under such a funding,[25] for example:

> "And there's the new EPSRC, internet of things, cyber security and trust bid we have just won with [names], which is a 10 million pounds bid, and that again is sort of Internet of things, and going to Queens Elizabeth Park, and it's [place] and surrounding the UK, trying to make it smart."

As one of my experts put it, often they have to prepare more than one of those funding bids or plans hoping one of them would "capture the imagination of those who judges." Being able to attract initial findings to carry out smart cities research and development is one of the smart cities projects' and initiatives' focus, the other one is how to generate more money through these projects. If we regard the smart city as any commercial project, with the investment they have attracted, it makes sense for smart cities to focus on how to generate value and how to sell this vision "that is actively marketed".

Compared to the previous urban development forms we have seen, it seems there's nothing that new from the smart city one, it is yet another incarnation neoliberal urban development attempts as Rob Kitchin [126]rightfully summarises. However, one of my experts managed to spot one of the differences smart city has comparing to predecessors, that *"what's new, in terms of smart cities, is the ability to reduce the cost of sensing and scale the number of sensors out there."* However, that is not to say that the experts are completely on board with this approach to smart cities – developing viable business models for the deployment ICT and sensing technologies in cities.

Limited involvement of the experts

The experts have different level of engagement with policy making. Their involvement with policy varies too, some draws on existing policy some work to contribute to policy. During the interviews, when asked how the experts' work would influence the policy development in the 'smart city', to my surprise most experts considered their work has limited or even

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[25]This observation too indicates the value of adopting a Foucauldian approach to map out the interplay between power, practice, discourse and knowledge production.

little impact on policy development. One expert described his experience with policy making at a *"indirect level"*, in his words that *"I don't have any direct influence... I think that our work at the [name of the university] and the other universities that are involved, and what the companies have been doing have informed, have demonstrated what might be possible."*

However, despite the limited impact and involvement the experts had on policy making, they did express their interest in sharing their experience with their peers. So instead of a policy and in addition to academic publications, several experts suggested that it might be a strategy that we need to mobilise what we had learnt in the field to be used as insights for projects further down the line.

4.6.2   Policy directions

Motivation for policy making

The motivation behind smart city policy making is often complicated. From the interviews with the experts, there are at least three obvious reasons to motivate policy generation in the 'smart city': financial reasons, practical reasons and what might be termed 'ideological' reasons. In terms of finance: smart city policy has to ensure enough funding to support activities for the development work to follow. But often it is not enough, as one expert expressed that "it's a small budget comparing to the department of housing". And when they do get the smart city funding, they have also to be very strategic with their budgeting.

> "...because they also know that funding stops at some point... so those guys, they can just snap back to the previous state. Certainly they are getting the funding then gives the chance to win farthing funding, if they executed it well. Coz equally, if you don't execute it well, then you don't get anymore funding for a long time."

Meanwhile, the smart city has to demonstrate its own financial value. As one expert said, *to make places smart you got to put a financial case, and that's to save money. So most places are not really interested in smart in the smart sense, they are interested in saving money on whatever the running of bus network, train network, police and ambulance.*

Some experts suggested 'strategy' as an alternative for 'policy' to serve as the guide to smart city development. Throughout all the responses, 'policy', 'strategy' and 'mission statement' are used interchangeably but not necessarily synonymously. However, all the experts expressed an expectation for specific guidance on action in the 'smart city' development.

> "Yeah, there are loads of policies regarding smart cities. So the national munici-
> pal level has written some of them at the municipal level, Melbourne smart city

strategy, the Manchester smart city strategy last year, constantly engaging with cities like London around these things. So there are a lot of strategies and there are a bunch of policies around particular aspects of urban space or..."

Boiled down to its essence, what we are facing as a policy challenge is actually or fundamentally an organisational structure challenge in the government. As some experts pointed out having smart city 'policy' only is simple enough, there has to be a governmental unit attached to it. Some examples are, *"The city themselves became much more organised as well, they brought in a smart city coordinator to report directly to the CEO, the chief executive at the council"* and *"NY have a chief technology strategy officer and that changes things... and the technology officer actually linked their city wide information systems."*

However, another concern was raised regarding setting up the smart city unit.

"Or do you have a separate smart city strategy or even a smart city unit attached to that strategy, whose job is to drive that particular, if you do, you are on the risk of kind of ghettoising it, and all of the other departments, which is where the real delivery happens, transport, education, kind of go, well, digital is over there. Or smart city is over there."

When the individual, dedicated units are in place, we need to be wary about ghettoising their work; they should be well linked with other departments that are involved in the smart city development such as transportation, education and NHS. And scenarios like this will defeat the purpose of setting up a smart city unit, which is to assist government internal communication and increase interdepartmental collaboration in the 'smart city'.

A collective effort

While talking to these experts, what I had realised was there is a shared understanding that the smart city needs a collective effort and it cannot be done alone.[26] This is a project that cities should not tackle on their own; neither should a technology company try to take on it as a solo challenge. One of the expert who worked for a major technology company leading the smart city development pointed out that *"every city tries to do it alone, to some degree, but increasingly I found that over the last 3 and 4 years they are now looking becoming more organised and more conferences you know."* One expert who worked for the university

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[26]As I stated at the end of section 4.5, despite sharing this understanding and need for collaboration, the cities are still entirely comfortable with the idea to share their lesson learned in order to help other cities to avoid unnecessary duplications and similar mistakes.

leading the research in smart cities has brought PlanIT to my attention since *"they are pushing for a single smart city operating system. And that's because, there's money to be made."* However, he disagrees with this approach due to the fact that *"technology rapidly moves on, and single company I don't think can cope or compete."* My expert who works for the municipal level government has also identified the need for collaboration, *"there are big players in the cities, but they can't deliver all these things, they have to be done in partnership."*

However, there are some challenges that are facing the smart city development to form effective collocation amongst the partners, stakeholders and organisations that are currently involved or merely interested. One expert who works to bring these collaborative efforts together concluded one of the challenges for big cities such as London is the many boroughs they need to co-ordinate together. Similarly, the expert who works at the parliamentary level also pointed out the same challenge for England and the potential success for Scotland was their ability to get all the cities in one room since there are only eight of them.

> "I think it will be very encouraging for a start when it comes to sharing costs and sharing applications and you know the sensible thing is probably to do it with the local authority next door not going to the other side of the country. So it does make sense I think the new combined authorities should be a real opportunities for this."

Another expert imagined the future of democracy should involve a more consolidated city governance system where *"city governments borough councils start to collaborate a bit more and also in sharing recourses, there's a lot of efficiencies could be created if we could just break down the silos in these organisations. And across different cities."*

The expert who works at parliamentary level considers the lack of collaboration in smart cities as "a major problem" that *"there is a much less sharing on standard and good practice across local government than I would like to see."* An academic expert's reflection on how collaboration is currently approached in smart cities summaries the general practice that *"at the moment, the original idea is to basically bring lots of people together that have large projects that are related to the city and trying to consolidate where there might be overlaps."*

Learning from these experts' experience in encouraging collaboration, I don't think physically "putting people together" would guarantee collaboration or even communication. The paradox here is that on one hand, there is the approach taken by organisations like Future City Catapults and Newcastle city council that is to put smart city related small to medium enterprises (SMEs) together in one building, hoping it is easier for them to collaborate. On the other hand, they also recognise and acknowledge collaboration does not happen by simply

being co-located. It needs to be facilitated and cultivated. One example the expert who works to encourage and form collaboration in smart cites gave on how people from different disciplines come to a solution to both address drainage cleaning and cycle lanes in a city, demonstrated both the power of such a collaboration but also the fact that collaboration needs convening and facilitation.

> "There's a gentleman whose job was to clean the gully drainage in the streets, and he'd been doing that all his career, he is a very innovative guy as well with some patents to his name, a great guy. And there was a gentleman from the cycle policy, the biking policy department and there was someone from traffic and there was someone from sustainability. And there were many other people in the room, and we started to talk about flooding and one of the piece of information emerged from the gentleman who cleaned the drainage he said that one of the big problems with flush flooding is that cars a parked at the sides of street and they can't get the access the need to do cleaning, no one else in the room had ever heard that before and suddenly the traffic guy said maybe that means we should impose some parking restrictions but then the guy who is in charge of the biking policy said well it sounds like a really good reason to have a bike lane. And they never joined the dots between those three possibilities before. But just by having them sit in the same room for the first time, that idea came around and the really beautiful thing was there was one gentleman at the end of that meeting who had created his own initiative to prototype in the city, and he stepped forward to those three guys and he said well we try this."

Smart Dublin team whose work predominately is also to "bring efforts together" in the smart Dublin process has acknowledged the needs for collaboration and the challenges to realise those collaborations. Therefore, they see themselves as facilitators and connectors as one of them concluded, *"the idea behind our team in places we will try to work across those silos, and try to align priorities as much as we can, and also feed up the line."* Glasgow city council also echoes this sentiment that "bringing those groups together makes things much more efficient and makes groups able to work together better." Nonetheless, this is still very vague in terms how the collaboration would look like and how would city council look like in the smart cities context.

A twenty-first century council

When the discussion about motivation for policy making, organisational change and collaboration challenge they have identified in smart cities went further, several experts have all

expressed this wish to see a twenty first century council. So, I asked them about what a twenty-first century council would look like in their minds. Some of them offered Camden and Greenwich as examples of council that they think are particularly modern.

When I asked makes such councils special, he explained that was because "they are not sort of trying to put some services online or something, [rather] they are digitising the whole organisation." Essentially, what they meant by a twenty-first century council is a council that would incorporate the digitisation in the way they do their daily work or "day job" rather than creating a digital copy of the exact paper-based system.Another expert who works to develop smart cities reached the same conclusion from reflecting the difficulties they are facing trying to vender the smart city vision to councils. The vision they sell is a nice vision down but it does not necessarily address how the councils do their "day job" though it might help with their "day job" in five, ten or twenty years to come.

One expert who worked to help local councils navigate the digital transformation shared the same argument that to engage with the local government, you have to make sure they see the value.

> "I feel like it's when things start to work at that local level the council for example contacted us and say can we have access to that kind of data, to the results you've got, when the council start to see value in that, and have to deal with the issues of these data isn't the same as other kinds of data, then I think things become interesting and there's a potential there for these new forms of participation."

So in order to collaborate, work with and engage either local councils or citizens in the smart cities, it is vital to communicate the value of smart cities to those who are not yet involved in the process but more importantly, the smart cities have to have a value inbuilt and ingrained to councils as well as to citizens. And this value should not be pre-determined or defined by any individuals but through an exploration with people whose lives will be affected by it. In addition this value should be reflected, incorporated and ensured in the smart city policy.

So far I have reviewed my observation and understanding of the challenges that's currently facing the smart cities in regards to reaching a coherent policy. In addition to the lack of definition of smart city, the smart cities also have to face the practical challenge such as competing priorities in a city and rapid technology updates; political challenge i.e. austerity caused funding cuts, devolution, and more recently Brexit, and uncertainty comes with the national election; and ideological challenges such as involvement of research, appreciation of expert knowledge, and the need of an organisational reformation. Consequently it is not

going to be an easy journey for smart cities to develop a policy that could address all three of these challenges all at once. However, there are still general directions and policy potentials we can strive to head towards. That policy, as an abstract and conceptual document, does have power to guide practice at the ground level. The practice a smart city policy could ensure is to encourage collaboration through creating a safe space, a healthy discourse and an open-minded organisational cultures for cities to be able to not only share their success stories but the lessons learned through getting things wrong. Finally, policies in addition to guiding practice also indicate where the funding could and would go too. Being able to recognise and acknowledge the influence funding has over research and trying to maintain the neutrality of funding should be part of the smart city policy consideration too.

4.7 Are we heading towards doom?

So far in this thematic analysis chapter I presented the major findings from the interviews I have conducted with the experts. Through the analysis, I found that despite the lack of a universal definition of smart city, the experts more or less agree upon a working understanding of a smart city – using Information Communication Technology in urban development and regeneration, more specifically the incorporation of sensing and data gathering technology in urban infrastructure. Given the lack of official definition and the emphasis on data, the experts either try to encompass their definition of smart city around data standards or linked the concept of smart city with other better-known concept in order to pin point their perspectives. However, as I previously argued in a collaborative paper [204], that 'smart cities' as a conversational mark or tool is a failed one, not only amongst the experts but also when it is used to communicate with people what a smart city really entails.

Through my interviews with these experts, I suspect the definition of this concept is decidedly ambiguous. And because of this definitional vacuum, whoever would like to participate in this field can approach the smart city via their interpretation. This is illustrated through how they came into smart city research and development from their defined area of expertise and their efforts in shaping the smart city based on their disciplines. Smart cities for some of these experts served as career stepping stones, whether that was a way for them to prove their ability to apply their knowledge in another domain or this served as an area with 'hot money' that they could demonstrate the capability to attract investment and secure funding.

The lack of an agreed upon definition is not only shown in practice but also in the policy level. Amongst all the experts who I talk to, despite the level of involvement they have with policy making, none could point out a clear smart city policy that we base our current smart

city endeavours on. Through the interviews I found that not only the citizens were confused by the concept of a smart city, these excerpts were not entirely sure either to the point that one of them called it the 'wild west' of smart cities. The need for a guidance or an agreed upon strategy to the smart cities is high but the status quo we are facing to reach such a strategy is incredibly murky too. Within smart cities, we are not only dealing with the contesting priorities within a city we are also dealing with complexity in the layers of governance. At a city level, there are cities such as London who has way too many boroughs to co-ordinate. At a national level, there is also the lack of a platform for cities to share experience easily, instead, cities who are going through the smart city transitioning are treating the smart city more so as a competition rather than a collaboration. Meanwhile another fact we could not ignore is the uncertainly we are facing politically. One main issue that is facing any smart city project that is funded through EU funding within the UK all have the same question what happens after Brexit? And no one has a satisfying answer for that. We are faced with such a dilemma and some call it democracy.

So what could smart cities mean to democracy then? Since the majority of the interviews were conducted before Brexit and Trump, most of the experts saw the future of democracy in the smart city era quite optimistically. However, I wonder if I were to go back and ask them the same question again, whether they will remain positive. The spread of ICT, mobile devices and digital democratic tools does have an impact on how we can explore the different forms civic participation, whether that's through the apps like 'fix my street' or the increasing numbers of participation of election poll on twitter and Facebook. What we still don't have a definitive answer is if such an impact is all-positive, does it change the nature of the representational democracy we have been practicing for decades of years. However, instead of seeing the steady growth in research that has a politics, sociological and humanitarian touch, we still experience the imbalanced emphasis on research efforts in smart cities related STEM subjects. One of the explanations is due to the inherent vice who funds research in the smart cities and the politics and biases embedded in this funding. Meanwhile, the universities struggle with finding their own voice not only smart cities but in general as research institutions. Supporting the STEM research still seems as the safer option due the not only the publications it generates but also the amount of funding it attracts and research spin-outs it creates.

As the discussion regarding the smart city went further with these experts, what I had realised it is not just smart city needs to change. It is a bigger organisational, institutional and societal change that needs to happen. It includes how we evaluate research, development, success and impact needs to change which means how we incentivise these efforts needs to be changed too. It means that instead of working in silos we need to communicate and

collaborate rather than compete. Or else, regardless the high hopes we have for smart cities, it will never arrive. We will have stuck in the loop of re-inventing the wheel, talking over each other and creating yesterday's tomorrow.

As I stated at the beginning of this chapter that it is going to be evidence-heavy and it indeed is. What I hoped to capture by incorporating this amount of quotes is the complexity in the current smart city debates and discussions. Secondly, it is also because of the nature and stage of the smart city research and development we are in at the moment. A considerable body of work in smart city is still at the discourse level, that instead of being able to build a smart city, we are trying to make a case for the smart city. What this chapter has done so far is to present this extensive description and outline of the discourses that's happening which concerns the smart city. What I also attempted to demonstrate through this detailed description is how the experts influenced the discourse of the smart city through their practice (what project they do), their subjectivity and their authority. The aspiration to look closely into the intricacy and interplay between power, subjectivity and knowledge production of course let to my interest in adopting a Foucauldian approach . Moreover, when viewed as tools to help people understand phenomena, theories, concepts or approaches should possess particular attributes: descriptive power, rhetorical power, interferential power and application [100]. The descriptive power is to help us describe the world. In my context and in this chapter specifically, it is embedded the themes to pin down what the experts and citizens thought the smart city was. The rhetorical power is to facilitate exactly how we can talk about the world, i.e. the corpus we develop to describe the reality of the smart city. For example, the experts' understanding of 'smartness' and people's concern of the smart city. The inferential power aims to enable us to make inferences and linkages between the theory and the 'real world', that in turn will hopefully lead to insights for both practice and policy, for example, offering some clues as to the likely effect of introducing change into a particular setting or smart city - to help us choose between alternative prospects, to give us some purchase on which approach might yield results. And finally, the 'application' power is seen through the exploration of the smart city policies and some form of 'design' in the world. Of central concern is the problem of relevant description, rhetoric, inference and application, and how we go about deciding them. This chapter may appear evidence heavy at the first glance, because it truly is heavily rooted in the data. However, it is more than a scenic description of what my participants and I discussed in a series of interviews. Though the analytical work in this chapter may seem descriptive and minimal comparing to the following Foucauldian chapter, it is neither. The thick description was an attempt to re-create the total state of art

in the smart city and the seemingly minimal analysis is in fact a careful curation of themes summarising, comparing and reflecting upon the experts' (and citizens') views[27].

When we use conceptual frameworks or theories to talk about the smart city and its intersection and inter-relationship with a host of other social and technical variables, how relevant are the issues we point to, both in describing the phenomenon and in informing policy and practice? Do they provide us with a conceptual framework for deciding which behaviours and activities, what pattern of regular and unusual events, we should be attentive to? Can it result in positive and relatively definitive statements about particular aspects of smart city settings (of transport, empowerment, sprawling etc), about social policy and about social practice? Above all, and somewhat beyond the clearly serious concerns expressed by Halverson and Dourish, accepting that (social or cultural) theories rarely contribute much in the way of predictions or even concrete proposals for design, then maybe the criteria for evaluating the worth of a theory should change, towards the idea that a theory is valuable if it is 'interesting', if it makes us think in new and different ways (or just at all). And so I turned to Foucault.

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[27]The merit of this extensive collection of views is that despite the shared subject matter, these experts did not necessarily communicate, compare and exchange their perspectives with each other.

Chapter 5

Foucauldian Analysis

5.1   Introduction

The expression 'smart city' has recently become a leitmotiv in the vision of future city and urban development. However, the current smart cities concept can appear decidedly ambiguous, since it seemingly leaves its definition up to considerable interpretation. The 'smart city' as pointed out in the literature review, appears predominantly as an efficient, technologically advanced, green and socially inclusive city, and, as such, has attracted increasing attention from academia, industry, and government. This chapter or the whole thesis does not intend to provide any simple definition of what a smart city is, as it is unlikely be a simple, or even single, authoritative and uncontested, definition. In Law's words: "Simple clear descriptions don't work if what they are describing is not itself very coherent. The very attempt to be clear simply increases the mess". [138, p. 2]

In this chapter, I explore smart city narratives from a different, perhaps unusual, Foucauldian perspective to firstly uncover its 'discursive formation' – that is to consider the ways in which the debate is framed. Then I reconceptualise the smart city as a heterotopic space. And finally I propose the concept of a smart city gaze – a specific way to look at the 'smart city' (i.e. the 'data gaze') and being looked at by the 'smart city'. By providing another dimension in understanding the 'smart city', and offering a different set of perspectives to pin down the nature and essence of the 'smart city', I propose this unique approach in order to stimulate discussion on the relationships between technology, design and policy thinking, specifically focusing on future challenges in the smart city scenario.

Having already analysed the emerging data using an inductive, 'grounded', thematic approach, in the previous thematic analysis chapter, this chapter also synthesises the responses collected throughout the interviews with the experts. In addition, I have also incorporated some responses from the citizen interviews, current literature and discussion concerning the

relative proximity of the smart city vision, thereby providing a critical reflection on both the notion of the 'smart city' and ideas about developments or smart city 'trajectories' [161].

Though I have adopted a rather critical standpoint in introducing the Foucauldian approach to smart city research, this chapter does not aspire to produce a total critique of the smart city, denying its utility theoretically. As Grudin and Poltrock [96] formulate the issue: adopting a Foucauldian approach may, or may not, help to formulate testable hypotheses; but it certainly provides a vocabulary and a motivation for any debate on the 'smart city' and, in the process may contribute to design ideas and recommendations. Ultimately the ideas discussed in this chapter seek inform and impact any future thinking around smart city design and development.

5.2   A Foucauldian Approach

The role of an intellectual is not to tell others what they have to do. By what right would he do so? The work of the intellectual is not to shape others' political will: it is, through the analyses that he carried out in his own field, to question over and over again what is postulated as self-evident, to disturb people's mental habits, the way they do and think things.[74, p. 131]

After delving into my initial analysis, I soon realised that the expert interviews suggested the value of adopting a Foucauldian 'archaeology of knowledge' approach [71], by explicating some understandings, and misunderstandings surrounding the idea of the 'smart city'. In this section I briefly outline how I adopted the Foucauldian approach in unpacking the 'smart city'– both in terms of his general methodological, genealogical and archaeological, approach; his cogent ideas on the appropriate relationship between knowledge and power and specific concepts related to notions of 'discursive formations', the idea of the 'gaze' and 'heterotopias'.

Genealogy is a historical perspective and investigative method, offering an intrinsic critique of the present. It critically analyses and uncovers the relationship between knowledge, power and the human subject in modern society and reveals how the present has been shaped by historical forces. Foucault's genealogical analyses challenge traditional practices of history, philosophical assumptions and established conceptions of knowledge, truth and power; displacing the primacy of the subject found in conventional history and targeting discourse, reason, rationality and certainty. Genealogy seeks to illuminate the contingency of the taken for granted, to denaturalise what seems immutable, to destabilise seemingly natural categories as constructs and confines articulated by discourse, opening up new possibilities for the future. However, it is not the search for origins, nor the construction of a linear

development. Instead it seeks to show the plural and sometimes contradictory past that reveals traces of the influence that power has had on truth.

Archaeology of knowledge is a process for working through the archives of a society. It is concerned with 'the history of systems of thought' and the history of societal structures (or episteme in Foucault's terminology) that have produced and shaped the boundaries of knowledge, ideas, truths, representations and discursive formations. Archaeology as a method isolates and deconstructs components of accepted knowledge. It reveals the arbitrariness of interpretation and the ordered procedures that made discourses possible. Foucault's archaeology concerns contextualising and historicising notions of truth, knowledge and rationality. He examined the conditions of emergence, how and why a given society/era recognises certain things as knowledge, how and why some procedures are considered rational and others not. In short, genealogy and archaeology are two halves of a complimentary approach, alternating and supporting each other.

In the smart city context, the core idea of 'smart' is often seen as a shiny new concept and the next approach to urban futures. In adopting the genealogical way of thinking, I contend that the smart city is neither new nor the only way to construct thinking around urban futures. Smart city discourse, in our perspective, is an assemblage of several pre-existing urban imaginaries. Given the character of the smart city concept is a collective of ideas and imaginaries around urban 'smartness', the archaeology of the 'smart city', therefore, needs to trace back various individual components that make a city 'smart'. In so doing, I will be able to identify what is kept from each original imaginary that makes the smart city thinking 'new' and seemingly 'inevitable'. If we map out the narratives and trajectory of 'urban imaginaries', and place the smart city discourse as the most recent phase, what we find is that this discourse emerged in the wake of the narratives of the sustainable/resilient cities and of the informational/intelligent city [218][126]. My earlier chapter has echoed this notion that the smart city is not a new invention but developed and evolved from previous research endeavours concerning urban development. On the one hand, there is the assertion in the smart city discourse that smartness stands for being good, healthy, and technologically advanced, therefore, the 'smart city' is intended as the ultimate goal for urban development projects. However, this is not a distinct urban promise that a 'smart city' intends, it is a shared promise that a 'resilient city' [217][216][38] and a 'sustainable city' [187][106][123] have yet to deliver. On the other hand, the smart city discourse is used by the city managers and policy makers to support specific development strategies and policies. There are many links between neoliberal urban developments and smart city imaginaries: the construction of a clean, green and intelligent city image is in fact useful to attract investments, leading sector

professional workers and tourists [114][127]. As Rob Kitchin [126], one of the leading smart city researchers, put it:

> "Nonetheless, this vision of the open smart city, whilst somewhat different in terms of how city governance is enacted and central technologies configured, still largely adhered to the core political economy of the initial vision of smart cities — that of neoliberalism, with states becoming smaller and increasingly reliant on companies, privatisation, and financialisation to deliver core services, those state elements that remain being configured and managed through business practices, and an emphasis being placed on market-led regulation and open economies. The route to sustainability, resilience, smartness is through the free market and capitalist economic development of a certain kind."

The green/sustainable city and the technological/informational city have been, and still are, a powerful diegesis to justify and rationalise the political choices, generate alternative business models and trigger new economic paradigms which promises us the ultimate 'smart city'.

5.3 Discursive Formation

The smart city discursive formation is a coherent discourse possessing common objects, concepts and arguments. In the sense of Foucault, a discourse is "a group of statements in so far as they belong to the same discursive formation" [72, p 117] and "whenever one can describe, between a number of statements, such a system of dispersion, whenever, between objects, types of statement, concepts, or thematic choices, one can define a regularity (an order, correlations, positions and functionings, transformations), we will say, for the sake of convenience, that we are dealing with a discursive formation" [72, p 38]. Hence the analysis of a discursive formation is an analysis of systems and regularities of statements – statements that refer to the same object, are enunciated in the same way, share a common system of conceptualisations and have similar subjects or theories. The components of a 'discursive formation', according to Foucault include: 'surfaces of emergence', 'authorities of delimitation', and 'grids of specification'. So the analysis of a discursive formation could be conducted through examining each single one of its components.

In the smart city context, 'surfaces of emergence' point to specific discursive and institutional sites – conferences, exhibitions, magazines and books, where arguments about the 'smart city' have emerged or been re-configured. The notion of a 'smart city' first became well known when it was first trademarked by IBM in 2008. However, when asked when and how these experts first got into the field of smart city, they provided very different points in

time when and where they first rubbed shoulders with the smart city idea. Some dated this back to their work with aging populations in South Korea in the 1990s and some described their project experience of creating the first model of connected business network in the north of England in mid 1990s. Another theme I noticed is that these experts tend to pin down the definition of smart city through its connection with other closely related concepts according to their disciplinary background. Due to the technological nature of the 'smart city', the Internet of Things (IoT) has become central in defining and describing their understanding of smart cities. That means one major site for smart city research and development publications are IoT conferences, summits and journals or computing conferences with an IoT interest, such as Computer Human Interaction conferences in the USA and British HCI in the UK. The mixture and interplay of various disciplines has also produced new sites for smart city related debates and discussions such as Urban Informatics and Urban Computing. Meanwhile, the Smart City Journal has been in existence since 2013. Other major urban studies journals have been releasing special issues on the smart cities too. Even though the number of conferences and journals that welcome smart cities paper submissions has been increasing, our experts have still expressed their frustration and concern with finding the "right" venue and site to publish and disseminate their works. In our observations, there are at least two layers of complexity that are contributing to this issue. Firstly, considering the smart city is a relatively new subject and an arguably ill-defined collection of disciplines, the conferences and journals dedicated to the 'smart city' may not have the same level of influence, impact and credibility compared to other traditional sole-disciplinary journals. Furthermore, when researchers try to publish their work at conferences or with journals that have more significant recognisability, they might face some form of 'disciplinary' bias - despite academic commitments to 'interdisciplinarity'. For example, two of the experts who came to smart cities from an IoT background, both with established records within HCI conferences have expressed their frustration at the rejection of submissions exploring and commenting on the societal impact of smart technology. As one of them said: *"Because we didn't build anything, it's difficult to publish it."* This status quo has made it tricky for experts to find venues to publish in and thereby made it very hard for certain smart cities discourses to surface.

However, this does not prevent the experts I interviewed from being regarded as an 'authority of delimitation' in my analysis, and the possibility of using their comments, publications and books etc. to define and shape the ongoing debate. One of the experts described his work as a *"reminder"* for smart cities projects and developers to keep the citizen at the heart of the enterprise. After years of speaking at smart city events, and publishing articles calling upon some kind of kindred spirit, he has finally noticed the discourse on smart

cities has been shifting away from the technological determinist proposition at most recent smart cities events he has attended. As he put it:

> "... the nutshell of the problem with the smart city that it is entire body of knowledge generated or operationalised by people who are deeply inclined to de-value deprecate or dismiss modes of knowledge or modes of truth that they are personally not comfortable with."

While this statement may seem negative, it captures the importance, capability and power of these experts, whether they are in support or sceptical about the smart cities. Power here is not only the product of active agents applying force and authority to the bodies of the subjects e.g. the 'smart city', but rather the product of discursive tactics of professionals (i.e. the 'smart city' experts) who use scientific techniques and evidence to normalise social discourse– drawing the line between what 'makes sense' to say and what does not. Suffice it to say, as presented in the previous thematic chapter, what makes sense to these experts of knowledge is vastly different to what would make sense to the experts of experience (i.e. the citizens).

'Grids of specification', are the classificatory dimensions of a discursive formation, how it is, for example, related to other important ideas, in my case ideas about urban life, governance and citizen empowerment. During the analysis, the more I exposed myself to the smart city discourse and tracked the 'smart' narrative the more I recognised an increasing number of ideas that relate to smart cities. It is a growing taxonomy. There is a considerable number of concepts that are clearly not, in essence, a smart city idea or a smart city concept, such as smart electrical grid and smart homes – but are often implicated in the debate on the smart city, particularly when the smart city is conceived in terms of data and information flows. Meanwhile, there are other ideas that, whilst not sharing the explicit resemblance with the smart city, are deeply intertwined with the discourse. While a smart city project is undergoing development, 'government procurement' (three experts referred it as problem based procurement) is one important grid, which is about how smart technologies have been/are purchased by the various levels of government and made their way into the 'actual' smart cities. When a smart city development is facing its conclusion (such as Open Glasgow project), 'legacy development' is often required to both analyse and evaluate a smart city project carried out. Both grids capture an important economical element of the smart city – the cash flow, i.e. how and where the funds for 'smartness' went and how effective the investments were. Meanwhile, due to the IoT nature of some smart city projects, some of the 'grids of specification' of IoT become also smart cities ones too, for instance 'cyber security'

is often brought up and so is 'trust and privacy' with regard to smart city design/development challenges.

Other relevant aspects of the smart city discursive formation would include the formation of 'enunciative modalities', (who is qualified to speak about a topic, and who is not qualified)[1] , as well as the formation of concepts, and argumentative strategies (for example the mixture of anecdote, history and philosophy offered by the experts in their interviews). One expert shared how their project has to rebrand non-smart community issues (i.e. issues that does not involve any smart technology as solution) as 'smart' issues to allocate necessary funding for community groups to continue their engagement work. During the interview, I also observed that due to the nature of their work, position and responsibility, some of the experts have to adopt different (sometimes even contradicting) voices rather than their own.

In these interviews the participants reveal how a given set of objects and particular concepts such as 'Internet of Things' and 'connected cities' have been formed and shaped over time to become components of the 'smart city' discursive formation. As a particular way of talking about, of constructing, a topic – the 'smart city' – and its relations with other topics, such as technology, urban life, transport, information etc. – the discourse inevitably limits other ways in which a topic can be constructed – of what effectively it 'makes sense' to say. It is in identifying this 'discursive formation' that the merit of this chapter and this approach can be found, and why an overwhelming 'social science' concern with the relatively small number of interviewees is somewhat misguided. The current smart city discourse is still largely focused on the 'hard' technical aspects of smart city development such as ICT development and implementation as well as architecture. However, the discourse of the smart city is also experiencing some shift of focus towards the 'soft' side i.e. social perspectives raging from citizen engagement to participatory design. Yet the political and policy side of the discussion in smart city development is still to be developed.

5.4   The smart city as a heterotopia

Heterotopia is Foucault's effort of replicating the analysis he has done with the structuring of 'discourses' in places and living spaces. He conceptualises a heterotopia as a site that is defined by its absolute perfection, surrounded by spaces that are not so clearly defined as such [69]. Soja's work [200] adopted the heterotopia concept and demonstrated that

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[1]Citizens perspectives of the smart city should be considered as part of the enunciative modalities as their right to reside should qualify them to speak about their cities, however as discussed in thematic chapter, there are and should be others whose opinions of the city needs to be considered too, such as people who only have temporary permit to stay. Urry's [213] work on the *Tourist Gaze* serves as a thoughtful example of exploring the influences of tourists on the places they visit.

a heterotopia is also a site that is ambivalent and uncertain because of the multiplicity of social meaning that are attached to them. Both understandings of a heterotopia echo the characteristics of a smart city. On the one hand, there is the assertion that smartness stands for being efficient, healthy, and technologically advanced, therefore, the 'smart city' is intended as the ideal and perfection of a future city without acknowledging there are more to a city than simply achieving efficiency[2]. On the other hand, the smart city discourse is used by the city managers and policy makers to support specific development strategies and policies. For instance, there are many links between neoliberal urban developments and smart city imaginaries: the construction of a clean, green and intelligent city image is in fact useful to attract investments, leading sector professional workers and tourists which changes the social meaning of a smart city whenever necessary. The experts who work as public administrators for city councils have all expressed to me their appreciation of the funding and investment opportunities that smart cities brought to their cities. Meanwhile, the incongruous forms of writing and text in the 'smart city' realm that challenge and make impossible discursive statements make the 'smart city' resemble a heterotopia even more. That is the smart city as a heterotopic space highlights the clashes between discursive formations that are readily visible in my 'smart city' experts' experiences, attitudes and opinions.

5.4.1   What on earth is a heterotopia?

"*We are in the epoch of simultaneity: we are in the epoch of juxtaposition, the epoch of the near and far, of the side-by-side, of the dispersed.*"[73]

"*They are set up to fascinate and to horrify, to try and make use of the limits of our imagination, our desires, our fears ad our sense of power/powerlessness.*" [110, p. 40]

Heterotopia is consist of two parts, the prefix hetero- is from ancient Greek héteros, which means "other, another, different" and is combined with the Greek morpheme for place and means "other place". The term heterotopia originally comes from the study of anatomy. It is used to describe part of body that's alien. Foucault, who adopted this term and further developed the concept in his book *The Order of Things*[69], and in a lecture he gave to a group of architects which was then turned into an essay – *Of Other Spaces* [69]. Foucault uses the term "heterotopia" to describe spaces that have more layers of meaning or relationships to other spaces than what immediately meet the eye. He defines a heterotopia as, either a textual or a geographical site that allows the ordering of things inside not through resemblance

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[2]Mäenpää's [147, p. 29] was referenced by Koskela [132] while she discussed policing in shopping malls. Mäenpää had this argument that a shopping mall is like a prison reversed: deviant behaviours is restrained outside. In this respect, a smart city too could be seen as a prison reversed which too makes the smart city more paradoxical since cities as I argued earlier have long been tolerant towards the deviant.

but rather through the process of similitude. In this sense, heterotopias would only exist in relations, that is, they are established by their difference in a relationship between sites rather than their otherness deriving from a site itself. Therefore, a place is seen as heterotopic only from the outside but not from the inside perspective. Hetherington echoes this argument by suggesting that heterotopia does not exist in the order of things, but in the ordering of things [110]. He suggests a certain amount of neutrality needs to be taken into consideration while defining a heterotopia, for him, it is a place of alternate ordering. He also argues that a heterotopia is a space where freedom and control extend beyond their own limits and mingle with one another. In this sense, heterotopia is a passage, one that's between freedom and control. It is a place where different or alternate social ordering is performed.

Genocchino characterises heterotopia as a self-refuting concept as he believes that heterotopia has been misread; the notion itself is problematic; and it should be read more carefully [82]. He argues that heterotopia is an idea about space rather than the actual places or a practice that challenges the factional ordering while refusing to be part of that order even in difference. However, Hetherington on the contrary, provides a convincing argument that: *"No matter how much we wish to be free, we will always create conditions of ordering if not order itself."*[110, p. 52] And this argument became very evident when looking at the 'smart city', i.e. the way 'smartness' is often conceptualised as some form of new social/technological ordering. Most importantly, heterotopia, in my opinion, sums up the characteristics of both utopia and dystopia and features the contested nature and the plurality of futures. This is main rationale behind this chapter and the following analysis on the smart city as a heterotopia.

5.4.2   Smart city as a heterotopia

> *"It would be wrong to just associate heterotopia just with the marginal and powerless seeking to use Other places to articulate a voice that is usually denied them. An other place can be constituted and used by those who benefit from the existing relations of power within a society as in the case of the establishment of the workhouse or prison as a place of otherness that becomes a site of social control though the practices associated with it and the meaning that develop around it."* [110, p. 52]

In this second part of Foucauldian analysis I would like to introduce and apply to the analysis of the 'smart city' the idea of looking at the 'smart city' as heterotopia, rather than a utopia or a dystopia (a utopia that has gone wrong). In *Of Other Spaces* Foucault summarises the six principles of a heterotopia [73]. In this section, I apply these six principles to the 'smart city' to demonstrate how 'smart city' could be seen as a heterotopia.

His first principle says that there is probably not a single culture in the world that fails to constitute heterotopias, but they take varied forms, including what he would call heterotopias of crisis[3] or deviation. The 'smart city' appears to be an interesting example of a heterotopia of crisis or deviation. Cites, throughout history have continuously been contested spaces and they contain, embrace and nurture various kind of deviations. Contrary to ordinary cities, one of the greatest promises of the 'smart city' is that it is designed to free cities from crisis and deviation. One of the experts pushes this even further arguing 'Disney World' as a visionary exemplar of a smart city. To paraphrase Foucault's description of a crisis heterotopia in the smart city context, it is a space designed for the cities that are in crisis per se or facing various challenges ranging from urban ones to societal ones. The basics of being smart means a city would regulate deviation and push for normality by following a certain standard whether that leads to the resilience against disasters, security against crimes or the ultimate efficiency . However, efficiency and simplicity are a problematic assumption and maybe an illusionary goal in an urban setting. Law [138, p. 2] critiques simplicity, *"If the world is complex and messy, then at least some of the time we're going to have to give up on simplicities."* And he is not alone, one of my experts, who has been involved in many smart city developments, particularly appreciates the 'messiness' of a city:

> "There's a bunch of things baked into it as assumptions that ... like efficiency is a good thing, which I was trying to unpick, say that many of the great things about city, cities are totally inefficient. So, how do you deal with that? Explain to me, how efficiency is going to help with those things, it's not."

Another way is viewing the smart city as a heterotopia, which comes from the conflicts and tensions between the old and the new. It can be unpicked at two levels, at the physical level, a 'smart city' is an attempt at marrying the cutting-edge technology system to the well established and often Victorian age urban infrastructure. This creates tremendous design and development challenges for many cities to become 'smart'. On the cultural level, a smart city proposes a new way of city governing and an alternative management and communication model in councils that are still following the 19th century structure. When asked what is the real challenge in implementing and pushing forward a smart city plan, one expert concluded it was a question about organisational culture. The challenge and crisis that a smart city project crystallises as a *"cultural change"* fundamentally. It is not just in people but in the process, in how organisations work. The question *"what does the city council of the 21st century look like"*, for him should be at the heart of a smart city quest. And these conflicts, challenges and even development crises, are the attributes that makes a smart city heterotopic.

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[3]Foucault originally used the boarding school as an example of a crisis heterotopia to demonstrate that what he meant by a crisis heterotopia is a reserved space for who are in the state of crisis.

The second principle mainly suggests that heterotopia is a contextualised concept that its function and meaning would adapt according to the time and situation. Foucault used the cemetery in his original text to elaborate this principle. The cemetery was moved from the heart of a city to the border, from the 18th to the 19th century, as death, once regarded in sacred terms, increasingly became associated with illness. The 'smart city' is also a highly flexible and adaptive concept. Though it is designed for the future it is also designed to be future-proof (as if the future is to be prevented from occurring). It derives from some pre-existing urban imaginaries. In the smart city context, the core idea of 'smart' is often seen as a shiny new concept and the approach to the next of urban futures. In adopting the genealogical way of thinking, we contend that the smart city is neither new nor the only way to construct thinking around urban futures. Smart city discourse, in our perspective, is an assemblage of several pre-existing urban imaginaries. The 'smart city' emerged in the wake of the narratives of the sustainable/resilient cities and of the informational/intelligent city [218][126]. The early digital network of local businesses and activities in a city in mid to late 90s in both Manchester and Amsterdam[4] aiming at connecting the physical business through digital network which argued by one expert the earliest form of a smart city at that time (late 90s) is still the essence of many modern smart city developments. On the one hand, there is the assertion in the smart city discourse that smartness stands for being good, healthy, and technologically advanced, therefore, the 'smart city' is intended as the ultimate goal for urban development projects. However, this is not a distinct urban promise that a 'smart city' intends, it is a shared promise that a 'resilient city' [216][38] and a 'sustainable city' [187][106][123] have yet to deliver. On the other hand, the smart city discourse is used by the city managers and policy makers to support specific development strategies and policies. One of them is the emphasis on citizen empowerment and the promotion of the term 'smart citizen'. It takes a range of forms including e-voting, online-pooling (see the example of after election survey on both Twitter and Facebook), and civic participation (i.e. smart street).

The following principles characterise heterotopia as being capable of juxtaposing in a single real place, several different spaces, several sites that are in themselves incompatible. Foucault, used oriental gardens and their representation of the totality of a world to demonstrate this point. In the smart city context, this could be unpacked on two levels. Currently when developing a smart city (especially in the UK) the common practice is to develop smart parts in a city and hope by connecting and joining these parts together, we'd have a smart city. In so doing, these smart parts represent the totality of a smart city. Secondly, the smart city embodies the totality of the future world we are building for ourselves. On

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[4]This refers to the early network of creative industries in Northern Quarter region in Manchester and Amsterdam Digital Straat which is a website for the cultural activities going on in Amsterdam.

the one hand, the 'smart city' conveys not only one person's vision of what a future city should be like. It in fact accommodates many parallel yet contrasting and contested views on what the urban future is and should be. Taking MK: Smart as an example, there are seven different working streams on turning Milton Keynes in to a smart city, even though there is some shared vision in these seven streams, each of them is working under its own aims and objectives to realise their version of 'smartness'. And previously, these priorities and working streams were never brought together and categorised side by side in such manners. Similar situation could be found in the Manchester smart city project CityVerve, the Smart Dublin project and the Future City Glasgow project. In other words, this is a debate about whose smart city is the real smart city, whether that is the citizens', the communities', the councils' or other stakeholders' smart city. On the other hand, the 'smart city' rhetoric is often based comparing and contracting the present and the future, the status quo and the ideal, the real and the fictional. Going through the smart city blue prints and strategy, there's always the beautifully rendered futuristic city images that symbolise 'smartness'. They feature driverless cars, the skyscraper forest and the people-less streets, whereas the city we live in has traffic congestion, real forest and traces of residents (such as street littering). And this embedded desire and longings for an alternative reality (whether better or not) give a smart city the quality of being surreal and this too marks it as a heterotopia. The smart cities' fascination and obsession of future brings us to the next principle.

Heterotopias are often linked to slices in time. This fourth principle when applied to the 'smart city' helps us to unpack another feature in the urban smart city process – time or temporality. Foucault marks this link with time by contrasting heterotopias that are oriented towards the eternal (e.g. museums and libraries) with the ones oriented towards temporal (e.g. fairgrounds). One shows the accumulations of time, whereas the other portrays time's more transitory aspects. When talking with my smart city experts, one thing that they recognised and acknowledged was that every smart city would have a project on traffic management. Wiring the streets up with sensors and cameras in order to achieve the 'real time' response to either conjunction issues and traffic pressure in general, or to calculate and predict the best route. When applying this concept to a place with the potential of big crowds, we have the 'smart parks' that are dedicated to monitoring, predicting and managing crowd movement during large gatherings such as the crowd movements before and after events (i.e. a football match or a music festival). It seems that the city has to develop this capacity and ability to respond in 'real time' and any latency would be viewed as 'not smart' or potentially dumb. Under the overarching theme – efficiency, the 'time' in a smart city has to be at least in real time if not in the future. As one expert put it, "we may not know what to do with these data sets yet but we need to collect them and keep them in case one day we figure out what to do."

This quote captures many smart cities obsession with data gathering as an act of archiving. Apart from Beijing, every other smart city in my study has endorsed this obsession by having their own data dashboard. The 'smart city' design we see from the supposedly leading smart cities (London, Manchester, Dublin, Glasgow, and Barcelona etc.) is not only trying to enable a city with immediate actions and responses, but also would be able to survive the challenge posted by time, hence being *"future-proof"*.

Foucault then talks about the opening and closing of a system in heterotopias in the fifth principle. In the 'smart city' context, this means the silos and isolation created by the technology we introduce to the urban system. Indeed, open data and government transparency are two major components of a smart city agenda, it opens up what used to be closed data to people who possess the knowledge, power and capacity to access it. Nonetheless, people who does not have digital literacy, who cannot afford smart technology, and people who are not 'smart' enough then would be locked out of the 'smart city'. During the interviews, I asked the experts what they think the current smart city is serving, some of them think it is serving no one and some has pointed to the technology companies, government who bought into the smart city vision and us researchers who base our work in this realm but none of them answered citizens. This leaves me wonder that does this mean the smart city heterotopia only opens to the privileged but not to the ones it promises to empower?

The final principle, the last trait of heterotopia identified by Foucault, is that they have a function in relation to all the spaces that remain. Holland argues in his paper that there isn't a single city that stands unchallenged as a smart city [114]. Some experts I interviewed have argued differently. There may not be a city that is unequivocally smart, but there are many parts of the city that are smart as demonstrators or experiments. These demonstrators in the city, such as the 'Smart street' (Tenison Road in Cambridge), 'Smart district' (Merchant city in Glasgow) and 'Smart park' (Queen Elizabeth Park and Hyde Park in London) they exist to help the smart city developments to "walk the walk rather than talk the talk", which echoes the experiment nature of the smart city projects that Tironi and Criado has pointed out. Such an existence helps to show case how some smart city technologies work, and, more importantly, work to convince [208]. Technology companies use them to convince the city managers, and cities use it to convince its citizens that being 'smart' is the way (if not the only way) to move forward. In this way, the smart city indeed has a function to all the surrounding spaces as a pioneer, as an exemplar and as a standard. In my expert's words

> "We have very experimental projects which haven't proven or demonstrated any value as of yet, but more sort of sign post of what might be possible in 5, 10 or 15 years. what we have done informs what might come in the future. And of course we can't ignore that it has become a nice marketing tool for the city."

And the danger here in my opinion is not the duplication, what concerns me is that by following these exemplars and standard approaches, we risk limiting the possibilities of ways of thinking and overlooking the nuances and localities between cities. For research, it is the test bed, the living lab and the experiment field. For technology companies it is the major market to produce and vend their cutting edge technologies. For city managers and councils, it is the buzzword and the vision that attracts funding for development (whether it is smart or not). 'Smart city' is paradoxical, it simultaneously is a city and is not a city. It means different things to different people in different contexts. It imposes a rather simplistic and singular moral order on cities, that being 'smart' means good without much discussion of why. It presents a future that social, societal and urban problems are so amenable to technological solutions. However, despite this paradoxical nature, the 'smart city' is with us now and more cities are catching up with their own smart city agendas

5.5   Seeing like a smart city – the smart city gaze

This thesis is about space, about power and about the death: It is about seeing, the gaze. (adapted from the *Birth of the Clinic* [70, p. ix]

In this section, I present the last step of the Foucauldian analysis and propose the concept of a smart city gaze – a specific way to look at the 'smart city' (i.e. the 'data gaze') and being looked at by the 'smart city'. This is an effort and attempt to probe or to problematise how we gaze, see and understand the city differently – with the increasing assistance of the data gathering technology and the growing emphasis and integration of the Internet of Things in smart cities. And also to ask the questions concerning whether and how would the city cast a gaze on us as citizens, as people living in the city. If so, what would that gaze be like? Gaze, according to Lacan, is a concept that is not fixed, it is to explore the power and dynamics between the one who is looking and the one being looked at. Thus the dynamics between the one looking and the one being looked at is not fixed, and neither is their gaze. Hillier picked up upon the identity dimension and furthered this argument by stating that *"identity is contingent, we are at once and by turn, private and public, controlling and contrived, threatening and threatened"* [112]. Virilio on the other hand, turned the *"gaze"* inward, put emphasis on the bodily perception in the gaze by taking 'mobility' and 'mobility of body' in to consideration while studying the gaze [221]. In addition to introducing bodily perception to gazing, Virilio also points out that visibility is linked with sameness. As James summarises, while reviewing Virilio's work, *"our preoccupation with habitual forms and ways of seeing is arguably related to a whole cultural politics which favours sameness over*

differences"[122]. Thus, to briefly reiterate what a gaze is and how we have discussed gaze so far; the gaze is a way of looking, and it is multidimensional and mobile. The power holds by the one that's gazing can be shifted and the identity of the observer is contingent. And lastly, while gazing, we tent to favour sameness over difference, hence, we look for patterns rather than anti-forms. However, with this said, what is gaze from Foucauldian perspective? In particular, what a Foucauldian smart city gaze would mean? What does it consist of? And what regimes of truth and knowledge are filtered through it?

5.5.1   The Foucauldian gaze, visibility and seeing

"The eye altering, alters all.[5]*"*
"Visibility is a trap."[68, p. 200]
"Looking gives shape or focus to a human agent, thereby enabling and giving access to specific modes of behaviour, be they predominantly understood as social, cultural, or political."[50, p. 2]

Before presenting how the gaze concept is applied to smart cities, a necessary step is to clarify what constitute Foucault's notion of a gaze whether that is a 'medical' one or a 'panoptic' one. Simply put, it is how people 'look' at others. And this 'look' is a social construction. Translated from French 'le regard', the gaze is defined as a way of comprehending the world whether that is looking at or sensing, smelling or hearing. According to Foucault's definition of the medical gaze [70], what we would/could see is not simply 'out there' to be seen, rather it is a reality that's made visible. De Bolla's argument echoed a similar sentiment that "there is no naive position occupied by the eye – it too has prior knowledge, grids that overlay the evidence of light rays hitting the retina that it formulates in nonvisual as well as visual ways" [50, p. 10]. Heaton while applying the concept of gaze to the health care context argued that gaze, rather than being a historical mode of perception, facilitates the identification and definition of particular subjects through discursive practice at certain times [107]. Gazing, therefore, refers to the 'discursive determinations', of socio-culturally constructed ways of seeing [215]. It is a performance that orders, shapes and classifies, rather than merely reflects the world. People gaze upon the world through a particular filter of ideas, skills, desires and expectations, framed by social class, gender, nationality, age and education. It is a performance that orders, shapes and classifies, rather than reflects the world. In *The Image of the City*, Kevin Lynch found that people perceive the city predominantly as a built image, made up of distinct paths, edges, districts, nodes

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[5]This quote is from *The Mental Traveller*, a poem by William Blake, 1803

and landmarks [144]. Similarly, in smart cities, researchers have found that we have also envisioned the smart city as a built image, made up of futurist skyscrapers, driverless cars and interestingly peopleless roads. In turn, John Urry argued in *The Tourist Gaze* for most of us the city is a (photo) graphic image [213]. Although, in Urry's terms, the tourists here are not regarded as ordinary citizens, rather they are seen as special kind of professionals and experts with a very specific disciplinary/institutional gaze upon the city [214]. Which in De Bolla's term is how subjectivity is formed through gazing, i.e. *"how different practices of looking, and different inflections of the same practice, determine not only how historical agents in the past looked but also how they began to shape (and be shaped) and give coherence to themselves as subjects, that is enfranchised individuals able to participate in the commercial, political and psychic environs of culture."*[50, p. 7]

From his investigation of madness and medicine, Foucault began his journey of exploring the concept of gaze. While analysing his concept of 'gaze' I found that there is the threefold views of 'the gaze' that are present in Foucault's work – the clinical gaze (through his work on the product of technology and knowledge), the panoptic gaze (from his work deconstructing surveillance), and the self gaze (as in his work on sexualities). He first presented the gaze in his 1963 book, *The Birth of the Clinic*, focusing on the operation of the gaze in "la clinique" during the 19th centaury [70]. In this archaeology featuring the *"clinical medicine and teaching hospital"*, Foucault entails how individuals contained therein have been subjected to various techniques of monitoring or surveillance since the birth of human sciences in the late 18th centaury. Although this notion of the gaze was developed for individuals subjected to medical (mental) institutions and later on furthered for individuals in prisons, it is also applicable to other and newer aspects of surveilled life outside of the medical or prison context (see [112]). In other words, the gaze has the capability to transcend contextual, situational and disciplinary boundaries, and furthermore, it can also transcend temporality. Heaton argues that though Foucault's work was developed upon the operation of gaze in the 19th century, his analysis sustains and maintains a timeless value as the gaze suggests a non-fixed way of looking at the world [107]. In Heatons' word *"... it is malleable and dynamic, capable of identifying and redefining new objects of scrutiny as alternative methods of surveillance are developed"* (ibid).

Therefore, the gaze is a dynamic and fluid concept. Besides its timelessness and applicability, Foucault argues that the exercise of the gaze is not uni-directional, rather the scrutineer is also under scrutiny [65, p. 176-177]:

> "It was also organised as a multiple, automatic and anonymous power; for although surveillance rests on individuals, its functioning is that of a network of relations from top to bottom, but also to a certain extent from bottom to top and

laterally; this network 'holds' the whole together and traverses it in its entirety with effects of power that derive from one another: supervisors, perpetually supervised."

So far, I have only briefly summarised what the gaze means from a Foucauldian perspective – that the gaze refers to a socially constructed way of 'seeing' and this 'seeing' is multidirectional. It implies both looking and being looked at. Using De Bolla's term, *"it tells a story about how we came to be viewers in the cultural of visuality"* [50, p. 7]. Given the lack of a clearly defined and constructed framework of gaze, it would be useful to create one here for ease of applying this complicated concept to the empirical work and maintain a level of scholarly rigor. Therefore, I contend that the Foucauldian gaze shall be unpacked, approached and applied in three folds: firstly, it is an exercise of seeing, observing and examining (with the aid of the new technology, information and knowledge), it is an act to establish and define what's visible and what's not (the clinical gaze); secondly, it is an exercise of normalising, surveillance, and control, it is an act of power (the panoptic gaze) and finally it imposes its presence without appearance – it ushers the gazed upon into self-policing or performance (the self gaze).

Therefore, applying the gaze framework to the smart city context or to develop a smart city gaze would mean to define a gaze that we (as citizens, as experts or as people) cast upon what constitutes as a smart city; and a reversal gaze – seeing like a smart city; and in the end both people and citizens behave under their own self gaze.

5.5.2 The smart city gaze – seeing as a smart city

"Our gaze shapes our encounter with worldly space as it is immediately experienced in embodied perception."[122, p. 14]

Smart cities, as I presented in earlier sections, under the archaeological eye, is not the first urban imaginary we had come up for our cities and urban surroundings. Like other previous urban imaginaries, it is powered, enabled and motivated by technology. The smart city imaginary, before it was called the smart city has been portrayed almost three decades ago in terms almost identical to how we know it today. William Mitchell in his E-topia wrote [153]:

"Building of the near future will function more and more like large computers, with multiple processors, distributed memory, various devices to control, and network connections to take care of. They will suck in information from their

interiors and surroundings, and they will construct and maintain complex, and dynamic information overlays delivered through inanimate devices worn or held by inhabitants, screens and spaces in the walls and ceilings, and projections onto enclosing surfaces. The software to manage all this will be crucial design concern. The operating system for your house will become as essential as the roof and certainly far more important than the operating system for your desktop PC."

In addition to this conceptual example, Paris makes a good candidate to demonstrate without labelling itself as a smart city, the digitisation of the city itself has been undergoing for years and years. In terms of the connectivity and connections amongst its urban systems and how ambient (or invisible) these connectivity and connections are. Hence, Paris perhaps is the most "smart" among all. Greenfield nicely laid out the modern tale of Paris at the very beginning of his book *Radical Technology* discussing the technology usage and expansion in our daily life [94].

When we look back in history, what we will find is that for centuries, technology has been revolutionising cities and urban lives; and we have been seeing cities through various technology gazes. Smartness in cities, in the most fluid sense can be traced back to the early form of technology such Victorian sewage system. As one of the experts put it: *"I do think it's important to understand technology, because of the role of technology, it's always changed cities, rather it's the flushing toilet mechanism or air conditioning, it enabled skyscrapers, or automobiles enable the sprawling city."* That is to say that regardless of the various manifestations of technology, it has been an indispensable part of the urbanisation process. The smart city gaze, or to be more specific, how we know and see a city with the assistance of technology, is not new to us, just like the concept smart city itself. In 1974, Horvath has recognised that where and how the technology of the time – automobiles were shaping the urban imaginaries. In that paper, he pointed out how we have been gazing upon a city from a car's perspective, and how this gaze is in turn affecting how we develop and build a city and more specifically, how automobiles have changed how we look at and develop urban transportation systems [117]. And we are still living the impacts and influences of those changes motivated by this one particular gaze – cars. Taking Milton Keynes, one the smart cites to be I have visited, as an example, it too was planned, designed, and developed in the 1970s after seeing the dramatic increase in car use in 1960s. Architects and urban planners developed this *"new town"* with the foreseeable urban problems that could be caused by cars in mind, therefore the obvious solution was to design it around the car. For half a century, Milton Keynes has been described as a 'soulless suburb' – *"a centrally-planned slice of Los*

Angeles inconsiderately plonked in the centre of olde worlde middle England."[6] One of my experts has also echoed this sentiment,

> "Milton Keynes is unique in the geographic layout, because it's much more a suburban, it has much more a suburban typology like some of the US cities. And so public transportation is very difficult to deliver effectively because very large distances and so most people rely on their cars. And we don't necessarily have big traffic jams and congestions but nevertheless building up an effective public transportation system in the city is one of the things we need to tackle."

What's ironic is the very design of Milton Keynes' town planning which was meant to be a solution to the problem back then has become the reason for the transportation problem that's facing Milton Keynes today. This has made this city's transportation problem a classic example of a wicked problem.[7] Moreover, it demonstrated yet another characteristic of a gaze that it is impactful, influential and situational. If we were to apply the three-fold gaze framework from the previous section to compose a smart city gaze, then what constitutes such a gaze?

The smart city gaze is how ways of seeing in the smart city are largely assisted, enabled and accelerated by digital technology. Being 'smart' in this sense means applying large scale information system and data gathering technology in order to see the previously unseen. It is a social construction catalysed by the application of digital technology. If we were to regard the city as a body, the blood vessels and inner tissues once were invisible is now made visible – with the modern-day sensing technology, the urban data flow and live feeds become known. By gathering and analysing these various kinds of urban data, whether that is air quality, noise level, traffic, or energy consumption data, we are now able to uncover what was previously un-seen, un-noticed, and unknown. The technology and data granted us a 'new' or at the very least a different means of 'seeing'. Hillier had a very similar analogy – *"the surveying gaze in our cities may be regarded as an attempt to cure the body of the city (the city corporate) from the social ills (disease) that threaten it with violence and distraction"* [112].

The smart city gaze, especially when it is reinforced through the data perspective, would potentially have a profound impact on how we understand citizenship. Based on the premises of the capitalism we are familiar with, to be a good citizen means we need to consume. However, with this new element, data, added to the capitalistic model as a new form of

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[6]https://www.theguardian.com/cities/2016/may/03/struggle-for-the-soul-of-milton-keynes
[7]Churchman first coined this term 'wicked problem' in social planning, it refers to problems that are difficult or impossible to solve because of incomplete, contradictory, and changing requirements. And 'wicked' here highlights the problems' resistance to solution rather than 'evil'.

currency, a good citizen is a citizen who will generate data. Regardless of the status of citizenship, the contribution to society moves from labour, to tax, to not only making but also spending, and in smart city part of being a good citizen will require contributing data. It is not compulsory of course but it is explicitly encouraged and rewarded. That means the rhetorical push would be that by contributing data, you are helping everyone. The same sentiment could be found in work that was done more than two decades ago:

> "The surveillance apparatus in Citiplace was intentionally designed, both to protect the safety of the spending public, but also to protect the shops and their contents from the violations of the public. People are categorised as being either 'good' or 'bad' by virtue of their behaviour in an urban space. 'Good' shoppers spend money. They must be enabled to do so. In contrast 'bad' subjects, using the area for deviant non-conforming, non-consuming purposes, are to be swept away so as not to disrupt the legitimate ambience of consumerism."[112]

However, I would like to problematise this 'data morality' more. If being a 'smart citizen' means being part of 'extended infrastructure' as Tomas Diaz questionably claimed during *FutureEverything 2015*[8] while introducing the Smart Citizen kit[9], does that mean to be seen as a smart city means to be simply seen as a data repository? How does this understanding of city and smart city change the way we look at city and its infrastructure? I contend that by seeing citizens under this 'smart city gaze' in addition to the influence it has on infrastructures the real impact is on how we approach citizenship. I wonder if we risk stripping the meaning of citizenship down to a membership to use and be used in the smart city under such a utilitarian gaze. This data gaze has already changed how professionals (smart city practitioners) look at infrastructures. One of my experts, after hearing one big smart city company celebrating their investment in sensors that could detect leaking in the sewage system, rather than in the overall infrastructure said he felt frustrated and infuriated. In his own words it seemed *"perverse"* to hear *"something being claimed as a victory which was actually an admission of defeat."* I would not go as far to consider investing in sensors that could tell us where the problems are as a defeat just yet, but it is alarming to recognise how much we rely on data gathering. The push for data or evidence gathering first and then

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[8]FutureEverything is an event about the intersection of art, design, science and digital. http://futureeverything.org/about/

[9]The smart citizen kit is a low–cost environmental sensing kit sponsored by Intel, which lets people measure their local environmental data, such as humidity, noise and air pollution. It was first introduced at Future Everything festival in 2014. Initially it had over 100 active users, after three years, there are only a few users remained active and most of them are either based in Future Everything or their partner organisation in Barcelona. This kit like many other low-cost sensing kits received criticism on regarding its practicality from both users and researchers due to the low accuracy. Moreover, the smart citizen kit comparing to other kits received more criticism due to its comparatively high price too

maybe further action or investment is changing government procurement. As this expert said "in America, we don't do infrastructure anymore, we just don't invest in infrastructure". And in Dublin, the smart city initiative has been pushing for this problem oriented procurement which again implies that we need to know the problem to solve it. The procurement has become more re-active than pro-active. The data gaze is again demonstrating the influence and impact it possesses. Through just how we look at infrastructure differently, we are changing the ways in which we might govern a city and potentially what we regard as truth, and in this case 'data' is clearly the preferred truth. Having an urban data dashboard of the city has become a necessity of building a smart city. Glasgow, Dublin, London, to name a few, all have a website featuring the various data from various aspects of a city (e.g. air quality, transportation, weather and sometimes health). Admittedly, with the tremendous aid of data gathering technology and data mining techniques, we are able to 'see' more of a city than ever. If we were to compare a city to a human body, and the data gathering as a body scan, we now get to see not just body but also what's inside the body, the flow of blood and the veins (data and data flow in a city). Just as Foucault pointed out, with the medical advancement in the 18th century, we were able to 'see' more of a body, however, does seeing more really mean knowing better?

The question here is that does this better 'visibility' guarantee us a better understanding of a city? Several scholars have expressed a similar hesitation over this 'seeing means knowing' logic. Townsend considers it as an open question whether complexity science can actually get close to the city of multitudinous interactions and improvisations that still defy data capture and mathematical modelling, however sophisticated [210]. Greenfield echoes this sentiment and questions whether widely shared belief amongst smart cities that things are perfectly knowable in a city [94]. In his previous book, Greenfield has already expressed the same concern, and in his opinion that it may not be the new urban science that is at fault, but decision makers succumbing to computational intelligence and in the process losing sight of a city is more than algorism and formulas [93]. And as I have also argued in the Thematic Analysis chapter that it is not just decisions makers, but also the university research and the society have always been prioritising and favouring the seemingly more scientific way of knowing and Genevieve Bell has noted in her Guardian article "we will need new practitioners to tame and manage the emerging data-driven digital world, as well as those to regulate and govern them. Rather than just tweaking existing disciplines, we need to develop a new set of critical questions and perspectives." [17]

Meanwhile, as a city become smart then who has the gaze? This leads us to discuss when the smart city holds the gaze upon us. As Saskia Sassen put it there is a fine line between 'sensorship' and 'censorship'. So what does it mean, when a smart city can also 'see'? And

are we ultimately building what Foucault could call a panopticon? Some would argue 'yes': in his talk for Festival del Diritto, David Lyon argued that we live in a surveillance society and it is just part of being modern. Wood shared this argument too in his editorial that *"panopticism, the trajectory represented by the figure of the panopticon, the drive to self-monitoring through the belief that one is under constant scrutiny, thus becomes both a driving force and a key symbol of the modernist project"* [146]. To elaborate, in order to appreciate how the Foucauldian panopticon and surveillance would influence the smart city gaze we need to understand the notion of a panopticon. The panopticon also known as Bentham's prison is a type of institutional architecture designed in the late 18th century. The concept of the design is to allow all (pan-) inside to be observed (-opticon) by one watchman without being able to tell whether or not they are being watched.[10] In Foucault's terms it is a symbol of the disciplinary society; of surveillance. However, the difference Foucault notes is that the ordering of visible and invisible has shifted. In the modern era, it is power which is invisible and anonymous and it is those who are subjected to it who are visible.[11] And indeed in the smart cities, it is often difficult to see directly who cast the gaze through the technological lens. One could argue that there's often a functional value behind such surveillance. Koskela listed a few in her paper which includes guarding access and ensuring security (both as public and private space safe guarding and anti-terrorism measures), the policing consumption (in the case of shopping malls) and solutions for a better quality of life (through monitoring and preventing street crime and deviant behaviours) [132]. Crossley summarised four functions of surveillance techniques in Foucault's *Discipline and Punish* [44]: in the first instance, it is to achieve a deterrent effect through the certainty of capture and punishment amongst potential deviants; secondly, they provide instrumental and meticulous means to observe and examines the subjects to guarantee the effect of *"correctional techniques"*; thirdly, they create a basis for knowledge about human subjects; and finally, it is the intrinsic power effect of surveillance techniques, i.e. the impression and perception of constant and continuous observation. Joining Foucault's understanding of panopticon and Lyon's argument on constant surveillance, highlights how by living in such as constant gaze without questioning it, we are normalising both the gaze and being under

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[10]Although it is physically impossible for the single watchman to observe all cells at once, the fact that the one being watched cannot know whether and when they are being watched means they all must act as though they are watched at all times. The best example in our modern society is the use of CCTV camera, although it too is physically impossible for the operators in the central control room to look at all the real-time footage all the time and all at once, nonetheless it sends out the message "you are being watched" or "we are watching you", especially the smart city version of central control room has all of the footages analysed and stored.

[11] In *Discipline and Punish*, Foucault used the example of ceremonies of public execution and torture to illustrate that the deviant was only visible when they were used to display the excesses of power and otherwise hidden-away.[65]

the gaze. In the smart city context, it goes beyond the normalisation of the more obvious gaze, such as the acceptance of the presence of CCTV cameras and constant monitoring, but it is also slowly changing our perspectives on data gathering even supposedly sensitive data. So what does it mean to see like a smart city when the gaze is built on having hold of all these data?

5.5.3   Seeing like a smart city

"The gaze is a technique of power/knowledge that creates and exploits a new kind of visibility, or organising and normalising people so that they can be seen, known, surveilled and controlled."[112]

In *Seeing Like an Infrastructure*, Dourish adopted and adapted two major arguments from Scott's book *Seeing Like a State*[57]. One argument that Dourish picked up and developed in 'seeing Like an Infrastructure' was simplification. Initially in Scott's term the State gazes upon people, cities and states and sees figures, sees abstractions. Dourish applied it to the context of infrastructure and problematised how infrastructure, software and technology change the way we 'see' everyday life and everyday place. The state and infrastructure not only augment how we perceive the mundane world, but they also treat this simplification as the base for their actions. Dourish summarised the two approaches that have been taken so far to exemplify the relationship between social and technology. The initial one is a more common approach which looks at the *"social impacts"* of the arrival of new forms of technology and practice, while the latter one focuses on the *"social shaping"* of technologies, i.e. *"the ways in which technological and design decisions are made within social, organisational, and economic circumstances that collectively shape the technologies that emerge."* Seeing like a smart city is both a continuation and extension of the second approach Dourish identified in the context of smart city. It looks at how with the socially accepted data gathering approaches, organisationally encouraged smart city uptake throughout governments and funding bodies at different levels, and potential economic growth and benefits, have changed how we approach urban development projects.

When applying this argument in the smart city context, the 'smart city' gazes upon the city and sees clusters of data generated by its citizens, by the roads, cars and architectures in the city. Instead of seeing the real people and objects, the smart city sees the simplified versions – data that represents the real people, their actions, the buildings they inhabit and the objects surrounding them. Those data are the base of a smart city's actions. Thus a data gaze is formed. This simplification is not evident in how we 'see' a city through technology and data but also how we regard urban problems. Accompanied by the often critiqued technology solutionism, the simplification of a city and its problems has already 'taught' us to see social

problems differently. Taking the example of Glasgow, they had run a pilot project to monitor littering[12]. Benefitting from the high definition cameras Glasgow has installed for its smart city agenda, they developed video analytic capabilities to monitor the occurrence of littering. As the expert in Glasgow explained: *"it is not to impose a fine on individuals. it's not recording the person dropping the litter but it's recording the number of incidents of litters being dropped. That's all it does, a simple accounting. That's a bit more sophisticated that you might be looking at the registration number of the driver, where the technique I am talking about is more about how many times and when litter was dropped so you can intelligence and data about the occurrence of litter in a particular area through a time, they you and do something about it, then that might mean sending a patrol staff at certain times, that could be nudging behaviour, it could be about putting in an extra litter bins or taking out litter bins, it could be a whole series of thing."* Now the question is what has this ability of seeing changed? It has changed how city councils approach urban problems. Littering is a problem that's visible to anyone who has been around an area with that problem, as people would encounter a lot of rubbish as they walk. However, this is no longer enough for a city council to act upon it, not because it is not visible to the eye, but it is not quantifiable for the measurement of success. As the expert later on in the interview summarised, *"what you do you go identity the problem, quantify it, do something about it and measure it again to see how successful it has been, again it is trying to use video analytics in a way to build up intelligence to target resources rather than use do it at an ad hoc basis."*[13]

Whether it could be solved by technology deployment or yet another APP has become a standard question when approaching a problem or evaluating possible solutions. One example given by one of the experts who is also in charge of the smart city citizen engagement projects, was that in order to re-designate the money in smart city project to 'non-smart' problems, these problems needed to be replicated as if they were smart problems, or a problem that required a smart solution, i.e. technology involvement which may or may not be necessary. Another expert echoed this sentiment, when it comes to smart cities now, he said, he wished it was *"not another dashboard"*. Seeing like a smart city has the danger of prompting us to classify and categorise social problems and urban problems as the ones that could be understood with data and solved by technology and the ones that could not. Thus, in order to see like a smart city, we will need to implement more data gathering tools and techniques, deploy various types of sensors and install more CCTV cameras.

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[12]This is an example given to by the Future City Glasgow team during the interview. The technical detail of this project is not yet published as an academic paper yet, quoting my expert that the project *"has quite a little bit to go"*?

[13]See all Marilyn Strathern on 'audit culture'.

Lyon in his talk provided a justification for such an intense way of seeing that *"the watching has a point that can be justified, in terms of control, entitlement or some other publicly agreed goal."* [146] He then characterised such a 'watching' as routine, systematic and focused. These traits also apply to the gaze the smart cities hold, i.e. how the smart cities 'see'. It is *routine* or *mundane*, it is weaved in our modern way of living, from each tap of the oystercard, to each transition we make, to each meter of electricity we consume at home. It is also systematic, it is planned and carried out with a rational intent, whether that is for security reasons (CCTV) or for the greater good (NHS data). It is focused, it involves incredible detail and it is panoptic. The way the smart city is seeing resembles a panopticon, and although not having all the actual physicality of Bentham's panopticon, this digital one has the essence of such a facility.

Mitchell also followed the Foucauldian path, advocating *"power and surveillance are tightly bound up together"*, he continued to say that Foucault *"repeatedly"* portrayed society as a giant panopticon, in which power holders exert surveillance over the rest and in which subjects' awareness of constant surveillance is a reminder that punishment awaits if they step out of the line, the rulers would know and they would respond."* [152, p. 156] In Foucault's own words, *"the panopticon mechanism arranges spatial unities that make it possible to see contestably and recognise immediately."*[65, p. 200] And in the context of the smart city, with the arranged *"spatial unities"* as well as the technological unities and data unities, it is becoming ever more possible to see contestably" and *"recognise immediately"*. Some of the experts are trying to push the boundary even further, with the increasing level of data and information, they are arguing for smart cities to be 'self-aware'. Taking London as an example, one expert said that *"in 10, 15 or 20 years, London will become self-aware, it will know it is London. This is how it meant to run, it knows how it's running in the past, so it can begin to run itself, it becomes self-aware."* In this sense, the panoptic gaze that a smart city holds is not only an outwards gaze that has been cast upon its citizens but also an inward gaze cast upon itself.

However, the ultimate question is why should we care about the way the smart city sees? It is the panoptic view and surveillance potentials and capabilities embedded in seeing like a smart city that concerns me. McGrail argued that despite the more 'balanced' approach (e.g. [145][89]) being cautious and concerned about what he called an "electronic surveillance" cannot be overstated [149]. In Deleuze's opinion, we are beyond fixed and closed spaces of panopticon and must consider it in a fluid way [29]. And the way a smart city is seeing presents us with a great example of the panopticon that is fluid, flexible and in many cases ambient. Thrift and French have also pointed out how these codes, software and algorisms operate their power from a distance yet we are schooled to ignore them and take it for granted

[207]. To unpack the gaze smart cities cast upon us, would be an attempt to map out its impact. What does such as a way of seeing mean to us? How could it affect us? Regardless of Thrift and Amin shouting out that *"they (the ordering imposed through software) should not be allowed to take us unaware"*, and concluding their paper with a positive tune that *"automatic can be for the people"*, automautomatic today in the form of smart city development is rarely for the people [5].

5.5.4   The ultimate self gaze

"Visibility ceases to be a trap. You want to be seen and it is precisely the possibility of not being noticed that is frightening."[19]

One of the impacts I picked up on while exploring the smart city gaze, and the idea of being seen by a smart city, is how this visibility changes how we behave in a smart city setting. Many have argued that after being seen, or through knowing that one is 'under the gaze', we develop a performance [214][112]. As Hillier claimed *"the gaze both gives power to all-seeing so that they might cure the ills of the gazed upon and renders its subjects into self-policing docile bodies which behave in the 'approved' manner."*[14]

Another interpretation of such a 'performance' for the gaze is very well articulated in Butler's concept of what female gaze would be. In 'Gender Trouble' Butler argued that the female gaze, how women view the world and themselves, is created as biased toward the males' taste in women, and it is a powerful gaze such that when such a gaze becomes a norm, females would start to examine themselves through such a gaze and alter their behaviours according to such a gaze[27]. And in Foucault's term, the real danger of the ultimate self gaze is that *"there is no need for arms, physical violence, material constraints. Just a gaze. An inspecting gaze, a gaze which each individual under its weight will end by interiorising to the point that he is his own overseer, each individual thus exercising this surveillance over, and against, himself."*[66, p. 150]

In the smart city context, from the expert's description of such a technology or gaze, it is clear that people will feel "under the gaze" even if no official is actually physically present to 'capture' them via the screens. So eventually people may only act in ways appropriate for "the gaze" (which is definitely not in any anti-social fashion), even if they are not actually under the gaze. There is thus the interiorisation of the gaze, a universal visibility that exists

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[14]The performantive element have an inseparable connection to Thaler's 'nudge theory'. In *Nudge*, Thaler and Sunstein wrote *"by knowing how people think, we can make it easier for them to choose what is best for them, their families and society."* The merit of this theory resides in its emphasis on prevention so its application can be found in healthcare (e.g. [170]) as well as in 'design against crime' research (e.g. [124][162]

to serve a meticulous, rigorous power, as Foucault documents in his writing the institution of incarceration.

As Greenfield noted, there's another way for people to interiorise the gaze [94]. In addition to the performance element, people use the same approach to know a city in their homes and on themselves. Internet of Things devices and services are deployed almost everywhere. IoT at a body scale, enables us to be 'quantified selfers', everyone who has access to these linked devices would know oneself inside out, from the quantitative figures of how many steps one walked, how many calories one burnt to more qualitative measurements of moods; at a household level, IoT deployments equip us with smart homes such that we now can command the house just as Iron Man does in the films; and the IoT application at a city scale is what we know as the smart city.

5.5.5   The expert gaze v.s. the citizen gaze

"Thus, as will become clear, in becoming a viewer one not only stakes a claim to be able to 'see' the objects of cultural regard; one also makes a bid for entry into the domain of the visible, makes one's self visible, into an object of regard, a citizen in the demos of taste." [50, p. 7]

The 'data gaze', like all the other gazes, uses specific methods to put its meaning together. For instance, when an 'expert' or professional looks at the city through data (or though the CCTV footage in the central control room), what they may see is an *"efficient"*, *"effective"* and *"smart"* way of managing and governing. They see that *"nothing that happens in the city goes un-seen"*. The expert gaze is also incredibly biased towards their background and their expertise. Firstly, how their past training is impacting what they see. One expert has been in the field of urban planning for twenty years has expressed what interests him in the smart city is of course how urban planning could be transformed. Other experts who have background in computing science would in the same project see the technical issues and trying to develop more of a technological solution. Therefore, the second consequence of such an expertise bias or domain bias is that it would challenge how we approach cross and inter disciplinary collaboration in smart cities. As we are calling upon more collaboration across disciplines, we need to acknowledge that, using one of my expert words, *"this is not to 'force' people to learn how to code if they're a designer, or to learn to do graphic design if they're a coder.... but rather so that each 'type' of person can learn more about how to collaborate and speak with the other types."*

The citizens, on the other hand, may see security concerns, potential privacy violations and even surveillance in the data gaze. They see that 'big brother is watching'. It seems to be an easy and obviously association for people to make. After the whistle blower Snowden

came out in 2013 with the mass surveillance scheme from U.S. government, the sales of George Orwell's *1984* experienced an astonishing surge on Amazon.com.[15] The sales number itself of course does not tell the whole story, but the significant sales growth does indicate at least people's concern of the world turning into a data-driven dystopia. Hence, our interest is in researching and documenting exactly how both ordinary citizens and experts perceive the notion of the smart city and the data it generates; and the proliferation of potential 'data gazes' that might thereby be produced to influence both design and public policy. From our interview with the citizens living in Glasgow, Manchester and London, three cities that all have smart city development agendas have demonstrated that the people not only see security risks in smart city differently but they have a very different 'gaze' upon the city they live in too.

When asked about whether they know of smart city and what a smart city means to them, their answers predominantly are *"never heard of it"* or *"I have heard the term but no it doesn't really mean anything to me"*. Only a few of them whose work are associated with smart city have heard of the term and for them it is still ambiguous for instance, *"yes, I have heard about it and have been discussing it quite a bit as well. But I think it's quite unclear what it actually means and I think it means different things to different people. I am not sure either, because it could be so many different things and probably should mean all of them."* Whereas for the experts, smart cities contains a relatively defined meaning that is the deployment of ICT and data gathering technology in urban development and regeneration.

And when asked how people envision a smart city they would like to see, their emphasis is on democracy, on people, on changing the status quo of nation state governance, and the expert focus is mostly on solving the problems the cities are faced with the help of technology. Whether technology and how much technology should be involved in this process is where I see the divide between what people would like to see v.s. what experts would like to develop or are currently developing. One example of this kind of divide is on how infrastructure is regarded by people and by experts. As noted in the previous section on smart city gaze, that the technology is changing how experts see infrastructure. Basic infrastructure in the smart city context is no longer fashionable or favourable. Instead, infrastructure with a data gathering element is the one being invested, procured and deployed; whether that is the IBM sensors detecting the leak points in sewage system in New York, or the noise sensors in smart street lamps in Glasgow. However, people on the other hand see the infrastructure with the

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[15]According to this news article that *"one edition is now the third hottest book on Amazon after sales jumped by almost 10,000 percent. The edition, with a foreword by Thomas Pynchon, is now ranked 123 overall on the site, up from 11,855. A later edition, with new cover art, has risen to 181 on the site from 626. A bundled version that includes Orwell's 'Animal Farm' has jumped 191 percent to a sales rank of 225."* http://money.cnn.com/2013/06/12/news/1984-nsa-snowden/index.html

aim of monitoring as a social change rather than simply an infrastructural one. One of the citizens we interviewed told us the story of smart meter rollout:

> "so smart meters were introduced for homes for water meters to tax people on their water consumption. This did not go down well with the Irish public. People were given a year in advance, which is probably not enough for a big social change, **because that's not just infrastructure change, that's social change, as well**. You're expecting people to now pay for something that they always got for free. So that's a bit. I don't think that was done too well. I think there's a series of steps that should be taken if you want to introduce something like that. I understand that the economy may warrant it, it may be necessary, um, but you would need to make sure the public understand what [they are] and what they are not paying for, em, if it is mandatory, minimal effects should be placed on the public themselves, so it should be installed by some government body, em, it should be totally hassle free, as much as possible to the customer, and of course if you're installing a meter that they're going to be paying tax on, I don't think they should pay for the meter. you should install that, they will then pay for the water, but not for the meter."

5.5.6   Reflection on the smart city gaze

"The computer and the Internet were designed, but the ways people used them were not designed into either technology, nor were the most world-shifting uses of these tools anticipated by their designer or vendors"[180, p. 182]

To conclude this section, I would like to borrow the framework Urry summarised to characterise the tourist gaze in *The Tourist Gaze "revisited"*. The smart city gaze in this section could also be summarised as such. First, many of these gazes are self-consciously organised by professionals. These include the experts who interviewed and more. The ones that are writing algorisms and software to capture, calculate and analyse the urban data, the ones that try to utilise these data to ground and guide their planning and the ones who endeavour to harvest the success of such a way of working, commodify this way of working and profit on it etc. Or as Thrift and Amin noted *"it would acknowledge intelligences already at work in the city, address situated problems and set urban governess as a challenge of harnessing this plurality rather than subjugating it to a master intelligence."* [6, p. 25]

Second, different gazes are authorized by different discourses, these include technology advancement, as in both the development of machine leaning algorisms for urban environment

and the development in hardware to match the software advancement; civic engagement, as in how new ways and forms of engaging citizens in not only urban generation and regeneration but also in ways and forms of data contribution; greater social and environmental good, as in the encouragement and pursuit in both reducing energy consumption as well as incorporating sustainable development plans. As Foucault argued that *"discourse is not the majestically unfolding manifestation of a thinking, knowing, speaking subject, but on the contrary, a totality in which the dispersion of the subject and his discontinuity with himself may be determined. It is a space of exteriority in which a network of distinct sites is deployed."* [69, p. 60] There is and should not be a universal smart city gaze. We recognise a city or tell a pair of twin apart through identifying the difference, nuances not really the similarities. We see it, but that is not what helps us to tell them apart. It's what makes them a twin but what makes them the individual. And standardisation embedded in a universal gaze casted on cities would kill this individuality.

Third, there is a distinction to note between the expert or specific vision and the collective citizens' gaze. In the former, the emphasis is on the specific problems and issues that face both the municipal government and the cities as the object of the gaze. Whereas the latter one held 'people' and their needs and concerns at the heart of this gaze. When concluding the chapter Smart Mob: The Power of the Mobile Many, Rehingold wrote *"the computer and the Internet were designed, but the ways people used them were not designed into either technology, nor were the most world-shifting uses of these tools anticipated by their designer or vendors."*[180, p. 182] After 15 years, this statement is also true while contrasting the gaze the experts hold and the one the citizens hold on the same object: the smart city. As Thrift and Amin have proposed that *"to know the complex city is to draw on this broader spectrum instead of privileging experts and models"* in order to resist or balance the centralised and monitory tendency of computational governance...It would recognise the many ways in which urban knowledge is acquired and maintained, including learning and cognition, sensory and bodily perceptions, conversation and storytelling, memory and archive, formal and informal expertise, symbolic and computational intelligence."* [6]

While unpacking the gaze the smart city casts on us through the sensing technology, the CCTV cameras and the advanced algorisms, I presented the argument as if the smart city is an entity, or an overlord, who has its own agency to cast its gaze upon us humans, citizens, people. As Sassan [186] and Thrift and Amin [6] have all advocated, we need an alternative *"science of the city"* which is more open and modest, which *"concerns itself with making visible, rather than taking for granted, the hidden work of algorithms, machines and codes behind the city's many sociotechnical system and their effects, so as to make the city fabric heuristic space in which public can engage with machine intelligence."* This is to say that

though the smart city, much close as gets to be an artificial intelligence, it still is not one just yet. The gaze the smart city casts upon is probably not one held by someone whether that is operators in central control rooms, the data analysts in front of screens, software/hardware engineers busy designing next generation smart city technologies, the researchers (academic or industrial) busy reporting their findings, the city managers and public administrators in the town hall, or the faceless techno-god such as IBM, Cisco, Samsung, Huawei, and Google to just name a few.

5.6   Final Remarks – Reflections on Foucault and the Smart City

"*'The visible' or the order of visibility is what is seen, and the invisible is the processes and the practices involved in the making visible of the visible which are not themselves visible.*"[44]

By adopting a Foucauldian approach to analyse the discursive formation a smart city, I intend to deconstruct the discourse of the smart city. I started with the intention to investigate what a smart city is and where the discourse coming and through this process I learned more about how to 'see' and describe what was previously 'invisible' to me. The 'invisible' here refers to how a discourse is carefully crafted and how it is beneficial to leave a definition consciously ambiguous. I then conceptualised the smart city as a heterotopia space in order to capture some of the complexity of a smart city and the contradicting visions of a smart city. It is also an attempt to analyse the spatial discourse of the smart city what spatial elements made into the construction and development of the smart city and their functions. Though some of these spatial elements remained conceptual, some of them are physical, such as the data gathering infrastructure which consists of various sensors and cameras. Hence the last step of the Foucauldian analysis developed the smart city gaze to map out how the smart city discourse and projects so far have influenced and impacted how we perceive technology, cities and citizenship. Ultimately what I sought to achieve by adopting a Foucauldian analysis is as I stated at the beginning of this chapter, which is to conceptually add another dimension of understandings to the smart city especially through the eyes of the experts. This means, empirically and methodologically it constitutes an attempt to look at the smart city from a different perspective. Rather than looking at it as a subject matter, I seek to understand the subjectivities (i.e. who holds gaze and who has the power to decide the discourse) and inter-subjectivities (i.e. both being seen and seeing like a smart city and the relationship between the expert intentions and the citizens perceptions) behind such

the formation of this concept with the aid of a Foucauldian lens. Therefore, the theoretical merit and novelty of thischapter comes of the application of the Foucauldian approach in a new context – the smart city. In *Sociological Theory: What went Wrong?: Diagnosis and Remedies* Mouzelis writes in defence of theory that *"By maintaining its specialized logic and orientation it is capable of providing a set of conceptual tools that can operate as a theoretical lingua franca, as a flexible vocabulary with no foundationalist pretensions, which can help sociologists establish bridges between their own and other disciplines, as well as between competing social science paradigms. This is to say that sociological theory should not aim at the establishment of some sort of monolithic paradigmatic unity, but at strengthening the present pluralism by removing the obstacles that are a hindrance to open-ended communication between the differentiated sub-disciplines or paradigms."* [157, p. 9]To the extent that there are theoreticians working in HCI/CSCW – e.g. activity theorists, lovers of distributed coordination, 'practice' theorists and so on – I suspect they would probably make very similar arguments. Except, of course, such theorists often do have foundationalist pretensions (they do make epistemological and ontological claims); they rarely are interested in 'building bridges' but instead operate some sort of 'fictive consensus' which rarely amounts to 'pluralism' or 'open-ended communication' – but simply seeks to avoid trouble or confrontation by avoiding any argument (and, thereby, the possibility for intellectual development through argument). I don't consider this to be an especially persuasive defence of theory or 'theoretical frameworks and so I intend to conclude this chapter once again by considering how this approach plays out in terms of the attributions of theory that Halverson documents, whilst also suggesting that such an approach is 'interesting' and intellectually 'fertile' [100].

The first power or attribution Halverson calls 'descriptive power', which refers to a conceptual framework that helps us make sense of and describe the world. She notes how this can include both a description of the context and a critique of technology in that context. Relatedly, Halverson describes how a theory can have power in terms of "application" – that can be used to guide system design through describing the world at the *"right level of analysis"*: this right level of analysis has to include both technical or technological levels as well as social and cultural levels. The Foucauldian notion of discursive formation has helped me draw out contextual features – how the smart city discourse emerged from a process of absorbing features of other urban imaginary came into existence. How the nature of this smart city discourse made it hard to pin down a universal definition and thereby made it possible for many different technologies, disciplines and topics to rub shoulder with the smart city. Halverson continues to describe how a theory needs 'rhetorical power' or the capacity to *"talk about the world by naming important aspects of conceptual structure and*

how it maps to the real world". I suggest that the genealogical and archaeological way of analysing assisted me to argue that from the shared 'important aspects' between the smart city discourse and other discourses (e.g. intelligent city, sustainable city, green city etc.), that the smart city emerges as neither new nor unique. Though the smart city does not exist to be an exact embodiment of any singular urban imaginary but a refined and updated collective of several rhetorics that makes it even more fitting, promising, and attractive. Similarly, a Foucauldian heterotopia perspective provides great 'inferential power' to understand the smart city, as being a heterotopia that none has claimed to have fully decoded. And lastly the Foucauldian gaze concept provides a great 'application' attributes for me to critically reflect upon the 'design' of the smart city. By introducing the Foucauldian way of thinking into the smart city research and analysis, I try to understand the features, unpack the discourse and describe it 'better' (or at least providing a counter perspective) so that the next set of design, development, research and policy decisions can be made with particular groups of people and citizens in mind, anticipating a future we are heading towards with the current smart city discourse.

Chapter 6

Conclusion – How to recognise a smart city when it lands on you?

> It *is* the best of times
> It *is* the worst of times
> It *is* the age of wisdom
> It *is* the age of foolishness
> (Adapted from *The Tale of Two Cities* by Charles Dickens[53])

This thesis is not an attempt to recreate the spirit of Charles Dickens's great tale by praising what some would call "the fourth industrial revolution" – a time where endless possibilities of networking, communication, and connections are promised.

This thesis is an attempt to clear some ground, that we—as academics, developers, theorists, or people living in cities—need to get away from the kind of "good vs evil", "innovation vs stagnation" binary themes that are so prevalent in smart city—and technology—discussions, and move towards more nuanced and diverse discussions of the complexity surrounding us in hope that some new sense of the smart city might emerge. The smart city, as I illustrate in this thesis, might be a destination we will never truly arrive at, there may always be a gap between what we aspire to achieve and what we are actually building. Whether that is a gap between the rhetoric and the practice, or a gap between the technology development and the mundane life, or the gap between different regions, there will always be gaps. Like William Gibson famously said, the future is already happening, although it is not evenly distributed.

In the literature review, I included several topics of interest that helped me decide my research direction, field work questions and research methodology. The smart city as a concept is decidedly ambiguous and it is not especially original as an idea either. Going back

to the very beginning of the smart city discourse i.e. how we started to talk about smart city, what I found is that the smart city is nothing new. It is a newest incarnation of combining or applying information and communication technology (ICT) in urban development and management. We have been experimenting with a very similar concept since the beginning of this millennium, some may even argue that we started in the mid and late 90s [41]. We went through different rhetoric with a similar narrative that goes: with the aid of the cutting-edge technology the cities will become more efficient, sustainable, resilient, and ultimately 'better'. This narrative was to be found in other urban imaginaries such as 'connected cities', in 'information/ intelligent cities', 'sustainable cities' and in 'resilient cities'. Some of the smart cities discourse also borrows narratives from notions of the Internet of things or e-government. However, why do we want to believe that the smart city is a new, novel or even radical idea? Thrift sheds some light on our obsession with the 'new'. He argues this obsession is the result of our limited lifespan and our desire and ambition to be significant in history [205]. In addition, he also points out that "because novelty is a value we have been taught to cleave to, and as a consequence, we have found it difficult to find a language which can describe certain aspects of practises as 'new' and others as 'old': it is all or nothing." ([193][137] in [205]) That is to say, considering the continuance of other urban imaginaries inherited and embedded in the smart city, it is not a new idea, rather it is the newest update of this continuous narrative on technology and urbanisation.

With the discourse of the smart city going through a constant updating, the practice in terms of how we actually apply technologies, how we build a city and how we construct infrastructures is also changing. However, with these two things moving at different speeds we ended up with a dissonance between discourse and practice. It is in this dissonance I saw a chance for my explorations of the smart city. As presented in the methodology chapter, I conducted expert interviews with the experts of experience (citizens) and experts of knowledge (smart city experts). With the citizens, I discussed their familiarity with the term the smart city, the meaning of 'smart' from the citizens' perspective and what would be desirable in a city for them. With the experts, we discussed their involvement in the smart city, their understanding of the idea of the smart city, what the smart city meant to concepts of democracy, knowledge production and policy potentials in the smart city.

6.1   Summary of arguments

Through a thematic analysis I contend the definition of this concept is decidedly ambiguous. And because of this definitional vacuum, whoever would like to participate in this field can approach the smart city via their own interpretation. This is illustrated through how the

experts of knowledge came into smart city from their defined area of expertise and their efforts in shaping the smart city based on their own disciplines. Smart cities for some of these experts served as career stepping stones, whether that was a way for them to prove their ability to apply their knowledge in another domain or this served as an area with 'hot money' that they could demonstrate the capability to attract investment and secure funding.

The lack of an agreed upon definition is not only shown in practice but also at the policy level. Amongst all the experts who I talk to, despite the level of involvement they have with policy making, none could point out a clear smart city policy that we base our current smart city endeavours on. Through the interviews I found that not only the people were confused by the concept of smart city, these experts were not entirely sure either, indeed that one of them called it the 'wild west' of smart cities. And we are still in the murky phase to reach a guidance or an agreed upon strategy for the smart cities. Within smart cities, we are not only dealing with the contesting priorities within a city, we are also dealing with complexity in the layers of governance. At a city level, there are cities such as London that has far too many boroughs to co-ordinate. At a national level, there is also the lack of a platform for cities to share experience easily, instead, cities who are going through the smart city transitioning are treating smart city development more as a competition rather than a collaboration. Meanwhile another fact we could not ignore is the uncertainly we are facing politically. One main issue that is facing any smart city project that is funded through EU funding within the UK is the of question what happens after Brexit? And no one has a satisfactory answer to that. We are faced with such a dilemma and some call it democracy.

Since the majority of the interviews were conducted before Brexit and Trump, most of the experts saw the future of democracy in the smart city era quite optimistically. However, I wonder if I were to go back and ask them the same question again, whether they will remain positive. The spread of ICT, mobile devices and digital democratic tools does have an impact on how we can explore the different forms of civic participation, whether that's through the civic participation applications and platforms or the increasing numbers for participation in election polls on twitter and Facebook. What we still don't have a definitive answer to is if such an impact is all-positive, does it change the nature of the representational democracy we have been practicing for decades of years?

However, instead of seeing the steady growth in research that has a political, sociological and humanitarian touch, we still experience the imbalanced emphasis on research efforts in smart cities focusing on technology and technological aspects. One of the explanations is due to an inherited bias concerning who funds research in the smart cities and the different politics and biases embedded in this funding. Meanwhile, the universities struggle with finding their own voice not only concerning smart cities but in general as research institutions. Supporting

technological research still seems the safer option due the not only the publications it generates but also the amount of finding it attracts and research spin-outs it creates.

As the discussion regarding the smart city went further with these experts, what I realised was that it is not just the smart city that needs to change. It is a bigger organisational, institutional and societal change that needs to happen. How we evaluate ideas about research, development, success and impact needs to change, which means that how we incentivise these efforts needs to be changed too. It means that instead of working in silos we need to communicate and collaborate rather than compete. Or else, regardless of the high hopes we have for smart cities, the smart city will never arrive. We will have become stuck in the loop of re-inventing the wheel, talking over each other and creating yesterday's tomorrow.

A considerable body of work in smart city is still at the discourse level, that instead of being able to build a smart city, we are trying to make a case for the smart city. What I attempted to demonstrate through the thematic analysis is how the experts influenced the discourse of the smart city through their practice (what project they were employed on), their subjectivity and their authority. The aspiration to look closely into the intricacy and interplay between power, subjectivity and knowledge production of course led to my interest in adopting a Foucauldian approach, since, according to Foucault, "a critique is not a matter of saying things are not right as they are. It is a matter of pointing out on what kinds of assumptions, what kinds of familiar, unchallenged, unconsidered modes of thought the practices that we accept rest." [71, p. 55]

By adopting a Foucauldian approach to analyse the discursive formation of the smart city debate, I intended to deconstruct the discourse of the smart city. I started with the intention to investigate what a smart city is and where the discourse is fashioned. Through this process I learned more about how to 'see' and describe what was previously 'invisible' to me. The 'invisible' here refers to how a discourse is carefully crafted and how it is beneficial to leave a definition consciously ambiguous. I then conceptualised the smart city as a heterotopia space in order to capture some of the complexity of a smart city and the contradicting visions of a smart city. It is also an attempt to analyse the spatial discourse of the smart city, what spatial elements were incorporated into the construction and development of the smart city and their functions. Though some of these spatial elements remained conceptual, some of them are physical, for example, the data gathering infrastructure consists of various sensors and cameras. Hence in the last step of the Foucauldian analysis I developed the notion of the smart city 'gaze' to map out how the smart city discourse and projects so far have influenced and impacted how we perceive technology, cities and citizenship. Ultimately what I sought to achieve by adopting a Foucauldian analysis was to conceptually add another dimension of understandings to the smart city especially through the eyes of the experts. This means,

empirically and methodologically it constitutes as an attempt to look at the smart city from a different perspective. Rather than looking at it as a subject matter, I seek to understand the subjectivities (i.e. who holds gaze and who has the power to decide the discourse) and inter-subjectivities (i.e. both being seen and seeing like a smart city and the relationship between the expert intentions and the citizens perceptions) behind such the formation of this concept with the aid of a Foucauldian lens. Therefore, the theoretical merit and novelty of this thesis comes at least in part from the application of the Foucauldian approach in a new context – the smart city. As Thrift argues *"we can be much clearer about the mistakes of the past than we can be sure of the certainties of the future."*[205] And what Foucault provides is precisely a critical lens for us to look back at the history in the hope that we will learn from the past mistakes. Though Hegel rightly points out "we learn from history that we do not learn from history". At many level, we never learn, we repeat ourselves over and over again. We paint over the vision for a future city over and over again with a different prefix each time. By 'learning from the past' what I really mean is how can we change things? how can we make a difference at all?. As naïve as it may seem, I still think there's always something to do and some way to change, even when that change is only intended to hold the network in its current state. We can/should have a different debate all together on this subject alone. The participation in civil society might be a joke, but a Zizekian type of joke that we don't know whether to weep or laugh. As a joke, it carries a great deal of reality, it captures the status-quo of this (networked) civic society – tragic, hopeful and laughable.

6.2   Contribution to knowledge

Empirically, this thesis is one of the first attempts to bring together how the experts of knowledge and the experts of experience understand the smart city. It is predominantly based on an empirical study of the smart city. It managed to gather a comprehensive review of the apparatus of the smart city from both the experts' and the citizens' perspectives. The merit of such as an approach is not that it is an empirical study, several studies in the smart city have also employed an empirical approach. And this is not necessarily to say that an empirical approach is superior to the research of smart city that's based on document analysis or other approaches. The merit of this approach or this thesis lies in looking at the smart city through both the experts' and citizens' eyes. It is in these comparative and often conflicting views that we might find a way to balance people's needs and desires in their cities, the development goals the administrators aspire to, the research interest and curiosity us academics have, and the profit the private sectors looking to make. Through this empirical investigation of the smart city, I assembled a corpus to describe, abstract, compare and theorise the smart city

with different groups of interest. The value of such a corpus is that it forms a vocabulary, a semantic resource and a 'common-sense' that people use to understand the smart city which could potentially bring some clarity to this ambiguous concept.

Conceptually, it is the one of the first attempts to introduce Foucault in the smart city research, especially in the field of Design and CSCW/HCI. Foucault is no stranger to geography and urban studies and indeed there have been endeavours that employ a Foucauldian approach to examine the smart city. Vanolo applied a Foucauldian governmentality framework to analyse policy documents focused on the smart city in Italy [218]. Klauser, Paashe and Söderström published two papers in 2014 using Foucault's theory to analyse their case studies – smart electricity management cases in Switzerland [129][198]. Their focus too is on Foucault's commentary on governmentality. What makes my thesis novel and original is that I embraced Foucault's school of thinking in a more comprehensive manner. Foucault offered us more than his approach to depict governmentality. Governmentality is one way to establish and achieve power, but there are other ways that Foucault shed light upon, such as his analysis of the discursive formation, his understanding of gaze, and how he explains the intricacy, utility and order things of by regarding a space as a heterotopia.

By regarding the smart city as a heterotopia, we have a chance to see beyond the current utopian/dystopian analogy binary in the smart city, as a heterotopia has the elements from both a utopia and a dystopia and more. By analysing the smart city as a heterotopia, we can not only see the difference and uniqueness of the smart city by comparing to an ordinary space or city that we are familiar with,, through the heterotopic analysis, we see the power of these exemplar smart cities as they set the example, standard and ideals for how we approach the cities of the future. Together with this ideal type of the 'smart city', specific objectives, strategies, ideologies and political choices may be presented as 'natural' and 'univocal' approaches. Like any other urban development issue, the 'smart city' will trigger restructuring which in turn will produce subjects that are either included or excluded, visible or invisible, people who will benefit and people marginalised from the circuits of power (Holland, 2008). The risk is that the current thinking of the 'smart city' is often reduced to a single techno-centric vision of the next future city, and that this will not only hinder the vision of any possible imaginative urban development approaches, as well as restrict alternative solutions to the problems of the present and the next.

Meanwhile, the virtue of the smart city gaze, in addition to mapping out generally how the current smart city vision has tinted our views of the infrastructure, the city, and our identities as citizens, lays in the analysis of surveillance. In the smart cities, it is often difficult to see directly who cast the gaze through the technological lens. One could argue that there's a function for this watching or surveillance. However, with the ultimate, constant and

ubiquitous gaze cast upon us, people are categorised as being either 'good' or 'bad', 'normal' or 'deviant' by virtue of their behaviour in an urban space. It is through analysing the smart city gaze I highlight how by living with and in such as constant gaze without questioning it, we are normalising both the gaze and being under the gaze. In the smart city context, it goes beyond the normalisation of the more obvious gaze, such as the acceptance CCTV cameras, but it is slowly changing our perspectives on data gathering, even sensitive data. The ultimate questions here are where do we draw the line between ethical and unethical? Is this really necessary and is privacy truly dead?

A Foucauldian approach/theoretical framework does not necessarily provide a data collection methodology but what it does provide is an alternative analytic viewpoint to seemingly established knowledge and power structures. By looking at how certain 'norms' are different and unpack what constitutes these 'norms' what we can get as researchers and designers is a different way to think about and conceptualize the research space and any subsequent design recommendations. This is what conceptual analysis is for. Halverson summarises this argument well in her paper on what theory can do in CSCW/HCI and ultimately for design in the broader sense that theory provides us *descriptive* power; how we portray the world we live in to describe the phenomenon, a *rhetorical* attribute provides us with the corpus we need to facilitate how we can talk about the world, then the *inferential* power links the abstract theoretical talk to the reality, that we need to be able to bring the abstract level talks into real world, thus the last point on *application*, how exactly we can apply theory in guiding real-world action. Bijker encapsulates my own approach to theory: *"theoretically informed and empirically grounded insight."* [20] Hence, I examine smart cites by mapping the empirical data against a Foucauldian theoretical framework, which provides us with a powerful tool for sense-making, and a support for analytic work, in making more and different 'smart city' knowledge (rather than the technical ones) available for policy and design. Halverson presents an abstract model that captures the knowledge production processes from phenomenon to theory then to action. Foucault affects how we look at the phenomenon, what theory we can generate from that, and then that in turn alters how and what we can carry out as actions.

Theoretically, this thesis is an original demonstration and update of the application of Foucault's theoretical framework in yet another context concerning space and spatiality – the smart city. Thrift points out what he considers as four blind spots in Foucault's work in the context of spatiality. According to Thrift, the four blind spots are: poststructuralist antihumanism, an aversion to discuss affect explicitly, and space and things [206]. I contend that the theoretical merit of this thesis lays in how it provides answers to these 'blind spots' and demonstrates the versatile utility of a Foucauldian approach. Firstly, Thrift criticises

Foucault's poststructuralist antihumanism by pointing at the lack of subjects in his work and most notably in *The Order of Things* and *The Archaeology of Knowledge* that processes are conceived without subjects. In this thesis, however, the lack of subjects is complemented by the ethnographic approach that the subjects are in place. The entirety of the two data chapters are there to display the subjectivity of my participants and how they used their subjectivity to create meaning. Secondly, this thesis does not avoid discussing affect, quite the contrary, the point of this work is to discuss the foreseeable, unforeseeable, known and unknown affect the smart city has on the civic society and humanity. This is most evident in the Foucauldian chapter where I propose the smart city gaze. The third blind spot, space, happens to be the centre of discussion in this thesis too. Thrift's critique of Foucault in relation to space is that Foucault does not have a clear formula to approach space and Foucauldian spatiality is left to other authors to construct, and in this case, I am the other author. Foucault may not have constructed a clear formula to a spatial analysis rather he offers a toolkit or repository of means for us to construct our own approach. I would like to argue that this 'blind spot' is actually an advantage in the context of smart cities. Because the smart city is an alternative space in the sense it is both physical and digital, both actual and conceptual, if Foucault were to have a formula of spatiality then it may or may not be fitting in this context. More importantly, in addition to the biopsy of space, Foucault also has extensive commentary on temporality which is of great significance in the smart city, because it is what Harvey would call an ultimate spatial/temporal compression. And this thesis draws upon both Foucault's understanding of spatiality, temporality and order to strive for a way to approach, understand and unpack hybrid spaces like the smart city. Fourthly, Thrift raises this point that Foucault talks about technology and things in a general sense. Though I appreciate that Foucault never limits his comments to one specific technology which makes it more versatile and applicable, despite this it might appear generic. Because again, in a fashion similar to how I overcome blind spot three, Foucault 'not making it specific' does not mean when we apply this theory we cannot make it focused. In this thesis, the thingsness that Foucault lacks is complimented by how I picked the ICT infrastructure, sensing technology, data mining in the smart city as my main focal point.

Finally, this thesis is a contribution to interdisciplinary research in general. This thesis in itself is an interdisciplinary one, that draws upon the empirical elements of ethnography, thematic/sociological analytical approaches, and inspirations from geographers, philosophers, technologists and anthropologists. The interdisciplinary is also deeply ingrained in the subject matter, the smart city. It is through conducting the doctoral research, writing this thesis and overcoming many panic moments filled with the great sense of displacement that I realised interdisciplinarity is not to make myself, or anyone, an expert of everything, rather a

polymath who might have some expertise but with an appreciation of many other disciplines and respect for knowledge in general. Accordingly an interdisciplinary researcher is not a 'jack of all trades but master of none', we are, at the very least, masters of interdisciplinarity.

6.3   Implications for design

In this thesis, I contrast the difference between 'what we say' (i.e. the literature review) and 'what we do' (both the thematic and Foucauldian chapter) in smart city development. Upon reflection, I notice and acknowledge that my perspective on the smart city has been updated. Initially, especially shown in the literature review, I was trying to make the point that regardless of whether it is called the smart city, or cities with other prefixes, it rarely is not about the idea of a 'city'. The more I get to know this field, the deeper I dig into my research subject, I started to recognise and understand the complexity behind the scenes. For instance, the number of different interest groups there are involved in this process of making a smart city, from citizens, to community groups, from institutions to industry, from public administrators to policy makers. All of these groups of people and more are part of the process. And all of these groups have different visions, needs and imaginations of what a smart city and desirable version of the future should be.

Therefore, no singular vision of the smart is going be perfect for everyone, and if we don't like the current vision, we have to act to make a difference, because no one else will do it for us. We need to reflect upon our relationship with the current power structure while creating the alternative. If the current smart city is not going anywhere, then how do we build bridges to help create avenues for adaptation? Because I think that only presenting an alternative is just not good enough anymore. On that note, I want to conclude this thesis with a few more implications for design and 'design' in its widest sense. This is also an attempt to continue and broaden the notion of 'implications for design' that has already been both explored and challenged by Paul Dourish in his 'Implications for Design'[55] and 'Responsibilities and Implications: Further Thoughts on Ethnography and Design' [56]. Dourish problemtises the incorporation of ethnography as a research method in HCI and CSCW work. He argues that the use of ethnography in HCI and CSCW has been far too simplistic in that it strips ethnography down to the extent that it becomes a mere toolbox rather than fully embracing and incorporating the entirety of this methodology (ibid). According to Dourish [55], the inherent vice of this simplistic approach includes "the marginalisation of theory", that ethnography is more than the descriptive account it can provide, since the merit of ethnographic work often resides in the how the ethnographer theorises, abstracts and interprets the phenomena. Such an approach reveals the "power relations between disciplines"

which begins to problematise the prioritisation of 'hard sciences' over sociological or social sciences. What results then is, "a restricted model of the relationship between technology and practice" whereby the ethnography's purpose is not to close the gap between design and practice but rather it lends us an exploratory lens to look at these gaps. Lastly, Dourish comments on "the problems of representation and interaction" which is to iterate that the power of ethnography goes beyond a methodological toolbox that it requires a move beyond being restricted and evaluated against some simplistic "implication for design". Primarily, Dourish raises our awareness of the misplaced focus on "implication for design" and how such a focus may lead us to miss the point of ethnography entirely [55][56]. The contribution I make here is to advance theory, specifically on how theory can motivate and catalyse technological and the urban developments in a process of co-production and co-envisionment. That is, to argue in essence that 'theoretical development' too can also become a form of 'implication for design'. And 'implication for design' should not be the only evaluation criteria for ethnographic or broadly speaking sociological work in HCI/CSCW or design. I would like to echo this sentiment by discussing the implication for policy, for ethics and for future work as a broader understanding of 'implications for design'.

6.3.1   Implications for policy

Thrift [205] points out that since we cannot know the future, that it is better to have policies that allow for "disagreement, redundancy and mistakes" in cites. He cites Grabher and Stark [88] to stress the importance of allowing "cities to be adaptable rather than optimal". This is because "from an evolutionary perspective, . . . although such institutional homogenisation might foster adaptation in the short run, the consequent loss of institutional diversity will impede adaptability in the long run. Limiting the search for effective institutions and organisational forms to the familiar quadrant of tried and proven arrangements locks (cities) in to exploring known territories at the cost of forgetting (or never knowing) the skills of exploring for new solutions." ([88] in [205]) Moreover, "institutional friction preserves diversity; it sustains organisational routines that might later be recombined in new organisational forms. Resistance to change, in this sense, can foster change. Institutional legacies embody not only the persistence of the past but also resources for the future. Institutional friction that blocks transition to an already designated future keeps open a multiplicity of alternative paths to the future." (ibid) What Grabher and Stark have recognised would also apply to the smart city policy development. That we need to develop policy that allows for failures. We need an iterative process such that we can correct and learn from those failures too.

- Generative models of policy-context-specific policy

A lot of smart city literatures follow a certain pattern. They start with the statement that X amount of us will live in cities and facing X, Y, and Z urban crisis (optional), but we have computers and ICT, moreover we could innovate more digital + physical solutions, hence smart cities. Various urban challenges have been described to be amenable to computational management. The smart city, therefore, sounds like a universal-seeming solution to us all. However, what we need to acknowledge is that the smart city agenda should be a context specific one as, regardless of how generic modern cities and metropolitans are, each single city has its own uniqueness and idiosyncratic characteristics. Hence the design for each smart city development should be wary of generalised solutions and focus on the particular specific city. Smart city policies therefore should highlight and acknowledge the difference between cities in order to inform different designs for distinct smart city contexts.

- The problem of smart city development

Within smart city development the prevailing discourse has been that technical solutions remedy urban issues. Over generalisation has posed a danger in smart city development because if technology is the solution, then what's the problem? Smart city development is commissioned to solve urban problems, but it often seems to be a solution in search of specific users. Additionally, there is the reluctance to discuss policy and politics in the smart city discourse which may result in depoliticising sometimes highly political causes i.e. simplifying urban issues to a technical problem and promising technological solutions. High tech companies like IBM, Cisco and Intel have offered a range of solutions, from large scale technology installations to portable smart citizen toolkits, to address various urban problems such as energy usage, transportation, and environmental challenges. However, these approaches fail to discern the importance of political causes and political solutions thus leave us with many open-ended designs in the yet to come smart city vision. Furthermore, whether those smart city toolkits are truly empowering people or simply turning people into part of the infrastructure is another question to be answered. Policy needs to be in place to strike the balance of inclusion.

- Uneven economic relations

"No design takes place outside of a series of economic conditions that makes it possible." [120]

Smart city development regimes have historically been aligned with the interests of politically powerful commercial and capital market actors. Even the term 'smart city' was made a trade mark by IBM. Apart from these techno giants, there are other bigger players in the smart city arena who wish to benefit from better access to the big and open data that

smart city ICTs will produce. This fact would lead to two possible problems. Firstly, it is hard for any grassroots smart city initiative to participate in the smart city discourse and their perspective is often ignored. Furthermore, smart cities will not deliver the promise of more smart city or digital economy entrepreneurs as they don't have the same access to resources to power their innovation. Smart city policy could potentially help to make it a fairer game and easier for grassroots initiatives and individual citizen to take part.

- Knowledge and voice

This last comment points to HCI interests concerning what knowledge contributes to the smart city development and whose 'voice' can be and should be heard. How we might mobilise knowledge to make it portable seems to be an ongoing topic in HCI and well discussed within this community. In the smart city context, not only the 'how' to mobilise knowledge should be fully explored but more importantly the 'why'. Smart city development often involves multi-players and stakeholders in the process. As we are designing the city for the many rather than for just a few?, we could (and should) use policy to facilitate an understanding of exactly what knowledge and whose knowledge should be included in the 'smart city' debate.

6.3.2   Implication for ethics

Both when I analyse smart gaze in the Foucauldian chapter and contrast what citizens' view and experts' view of 'the smart' in the thematic chapter, I notice that one of the telling differences between these two views of the smart city is about privacy. In the paper *Repacking 'Privacy' for a Networked world*, Crabtree et al propose that 'privacy' has little utility as a design focus, rather we should put an emphasis on supporting people's interest in managing their interpersonal relationships in and with the networked world [43]. From their research, they identify that people do not distinguish clearly between the what might be a security issue and what might be a privacy issue. Such distinctions are more of interest for design (ibid). In *Unpacking privacy for a networked world*, Palen and Dourish argue that privacy is a process [171]. And that privacy management is not about setting rules and enforcing them. Rather it is a constant negotiation that depends on the disclosure boundary, identity and temporality. Therefore the implications for ethics and specifically for privacy in the smart city should draw inspiration from these researches. However, in the smart city context, privacy is not set up for negotiation. As the disclosure boundary is often unclear if not unknown. People don't necessarily have any knowledge about who holds what data about them or who sees their face through the CCTV cameras. Secondly identity, in Palen and Dourish's paper is about

the boundary between self and other, however, I would like to focus this more on the self. If we follow the continental philosophy's view on privacy that it is part of human dignity then it is part of one's identity, then it shall not be neglected or dismissed but what if it is not viewed as human dignity? Lastly temporality, the persistence of the information means what may not be a private matter might become a privacy related issue later on and vice versa. As Saskia Sassen put it there is a fine line between 'sensorship' and 'censorship'.

Rehingold wrote "the computer and the Internet were designed, but the ways people used them were not designed into either technology, nor were the most world-shifting uses of these tools anticipated by their designer or vendors." [180] This statement still holds today and it should be carefully considered and worked into the design of the smart city. As Thrift and Amin [6, p. 25] have proposed "to know the complex city is to draw on this broader spectrum instead of privileging experts and models" in order to resist or balance the centralised and monitory tendency of computational governance. Sassan [186] and Thrift and Amin [6] have all advocated that we need an alternative "science of the city" which is more open and modest, which "concerns itself with making visible, rather than taking for granted, the hidden work of algorithms, machines and codes behind the city's many sociotechnical system and their effects, so as to make the city fabric heuristic space in which public can engage with machine intelligence." Behind the technology I criticise, there is a person, or persons whether they are operators in central control rooms, the data analyst in front of screens, software/hardware engineers busy designing next generation smart city technologies, the researchers (academic or industrial) busy reporting their findings, the city managers and public administrators in the town hall, or the faceless techno-god such as IBM, Cisco, Samsung, Huawei, and Google to just name a few. The implication for design I would like to propose here in addition to the alternative "science of the city" is an alternative "ethics of the city" that too needs to be openly communicated, clearly articulated and carefully worked into how we approach the design of the smart city and where we place our criticisms.

6.3.3   Implications for future work

Throughout the research on the smart city, efficiency is something that many smart city plans hold dear to. However, many would disagree, for example in a recent publication, Fraser and Kitchin advocates the benefit and value of slow computing [75]. Indeed, that efficiency may certainly be a worthwhile quality to work towards in some circumstances, but it is best considered as one of the many objectives for a city and its systems rather than the only or the overriding one. Therefor one of the future directions I would like to explore is the merit, value and means to be slow in a fast-moving world. Especially planning for slow processes

and long-term processes in urban development in countries like China and India whose sole purpose seems to be competing with each other in how to grow faster and faster.

The second future direction I would like to explore links with the ethical implications of the smart city. I would like to extend a Foucauldian analysis to the notion of privacy in the smart city. That means I would need to go back in time to uncover where the discourse and concern of privacy is coming from; what the conflicting views of the privacy are (e.g. how people would use privacy, security and trust interchangeably, and how designers would see privacy as a user issue and security as design issue); what would a Foucauldian privacy gaze looks like and finally could privacy be regarded as in some sense a heterotopic space.

The last direction might be one that links all my previous work together and also ultimately answers to the digital economy theme our doctoral training centre is based upon. I would like to look at the future of work in the digital economy. With the smart city one thing that no one really discusses is the economy behind this movement and its implications for work. I have discussed how in the smart city economy data becomes the main currency, but what I didn't have a chance to discuss and explore is what then is the 'means of production'? Connecting these thoughts with what I have witnessed in China: its encouragement towards digital entrepreneurship (such that makerspaces are in fact hardware start-up accelerators), its use of social credits based on citizens data ranging from online shopping habits to occupation and the wide-spread automation of factory and deliberate displacement of migrant workers. I acknowledge that I may never have a chance to carry out such an ambitious project but I do have the sincerest curiosity about where we are gearing towards in the future, whose future it is and on whose sacrifices, we are building this future. As what we build now, will be what we see in the future.

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Appendix A

A.1 Systematic Literature Review

The future as a system of systems: but what happened to the people?

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ABSTRACT

This note presents a systematic literature review of research relating to citizen engagement and the smart city. Through carrying out a systemic literature review of three computing databases we have established that there is a dissonance between academic literature and practices of engagement within the city. Despite increased calls for citizen engagement, smart city residents appear to have been largely uninvolved with smart city research. When citizens have been involved with research, they have only been involved during the technology design process after technological solutions have already been conceptualised by academics and practitioners. Citizens have also only been engaged through the use of a limited set of methods. These insights point to a broader set of opportunities to undertake research that could enrich the smart city discussion and practice, and they will be used to inform our upcoming smart cities research project.

Author Keywords

Smart cities; citizen engagement; systematic literature review.

ACM Classification Keywords

K.4.m. Computers and Society: Miscellaneous

INTRODUCTION

Prevailing discourses around smart cities have until recently been largely positive and self congratulatory [18], with primary focus placed upon technological solutions to the complex issues cities face [18, 17, 36]. These discourses appear to neglect the inhabitants, historical legacies, and spatiality of cities that face such interventions from technology companies [19, 26]. More recently however, discourses have begun to move towards human centric and inclusive approaches to technologies within the city, with an increase in references to the terms 'open' and 'citizen engagement', amongst others [26].

This shift in rhetoric motivated us to explore the question: 'what involvement do people who live in smart cities have in smart city research?' We sought to answer this question through a systematic literature review of three databases: the Association for Computing Machinery's (ACM) 'Guide to Computing Literature', the Institute of Electrical and Electronics Engineers (IEEE) Xplore, and the International Academy, Research and Industry Association's (IARIA) ThinkMind. The results and insights from the literature review will provide the framework for a project to be carried out in three major UK smart cities: Manchester, Glasgow and London.

The note is structured as follows; section II presents the context of our research, highlighting the motivation for this literature review. The methods employed for the review are presented in section III. This is followed in section IV by the results of the review. Section V addresses the implications of the results in terms of insights, weaknesses and strengths of the review. The note is concluded in section VI by outlining questions that were left unanswered in this literature review and presenting an overview of our research project, to be carried out in Spring 2015.

CONTEXT

Technological solutionism [12] has been a prominent approach throughout the evolution of the smart city paradigm [18, 17, 36]. However, there has recently been a decisive reaction against this solutionism. Many scholars have identified a need for smart cities research to evolve from being technology, management or governance focussed to being citizen-centric [18, 26]. Terms such as citizen engagement, participatory design and co-design are emerging as the new territories of rhetoric. These terms carry long and mixed histories of use in a variety of domains, including technology design, service design and healthcare design [20]. While there are legitimate concerns about the successes of these types of citizen-centric design [20], we suspect that a more fundamental issue affects smart city research. We suspect there is a dissonance between the amount of literature using citizen-centric terms and terminology, and the amount of involvement people have in that research. In order to identify whether this dissonance exists, we carried out a systematic literature review.

METHODOLOGY

A systematic literature review offers a well-established 'evidence-based' methodology that is transparent and replicable [37]. This method is frequently used in the healthcare industry and is increasingly popular in social, management, environmental, and computational sciences research [37]. This paper follows the guidelines created by Kitchenham [25] for software engineering PhD students who are undertaking a systematic literature review. Our question's primary audience, UbiComp 2015 attendees, defined the scope of this literature review. Based on the backgrounds of many previous presenters and panel participants, we determined that UbiComp attendees are a primarily technical audience. As such, we decided to review papers that are indexed and/or hosted by the ACM's 'Guide to Computing Literature' database, the IEEE's Xplore database, and the IARIA ThinkMind database, as these databases include a majority of relevant technical literature.

Our preliminary search, undertaken at the beginning of January 2015, identified 474 papers that included the phrase 'smart city' in their abstract. To narrow the focus of our review and answer our question, we selected several words and phrases, known as 'filters' [37, 25], used to describe human participation and involvement in urban and technical design projects. We filtered our results to include papers that used 'citizen engagement', 'participatory design', 'co-design', and 'consultation' somewhere in the body text. With these filters applied, we produced a set of thirty five articles to review. However, three of the articles initially identified were duplicates and two were irrelevant. Once we removed those five articles from our sample, we had thirty articles to review. The three primary authors of this paper conducted the review by reading through and coding each article, looking to address our research question: what involvement do people who live in smart cities have in smart city research?

RESULTS

This literature review established that people who live in smart cities appear to be largely absent from, and uninvolved with smart city research. Of the thirty articles identified for this review, only five articles directly and explicitly involved the residents of a smart city. From those articles, only one invited local residents to contribute to the definitional discourse about smart cities. In that article, Alawadhi and Scholl [1] present interviews with sixteen 'management-level city IT officials and senior IT professionals from various departments' in the City of Seattle. The interviews were used to compare the employees' 'practitioner' definitions with academic definitions and discourses [1]. Perhaps unsurprisingly, the practitioner definitions were mostly concerned with their immediate domain: city governance and services. However, academic definitions of the smart city 'go beyond the governmental realm and include elements or even the entirety of the urban space' [1]. Alawadhi and Scholl's paper highlighted a large gap between academic and practitioner definitions of the smart city. It also pointed to the possibility of an even larger definitional gap between non-practitioner smart city residents, practitioners and academics. This definitional gap remains an unresolved issue for practitioners and academics to address; what do smart city residents think a smart city is?

Three papers invited smart city residents to help with the development and design of smart city technologies [38, 11, 39]. Veeckman and van der Graaf [38] describe a multi-method, multi-case study research project that invited citizens in four smart cities (e.g. Ghent, Belgium; Issy-les-Moulineaux, France; Manchester, England; Athens, Greece) to co-design mobile application templates. The templates went through iterative cycles of development based on citizen feedback gathered in workshops, interviews and surveys. The co-designed mobile applications were openly available for all city residents to download, use, and discuss [38]. Similarly, Di Fiore, Chinkou, Fiore, and D'Andrea [11] describe their use of workshops, tutoring and shadowing to co-design a set of Smart Campus mobile applications with students at the University of Trento. They aligned their work with Trento's smart city vision, and labelled the end-result a co-designed mobile application. Vicini, Bellini and Sanna's paper [39] also presents a co-designed technology that they refer to as a mobile medical monitoring (M3) tool. To co-design the M3, Vicini et. al. held a preliminary workshop with expert users, 'including nutritionists, cardiologists, biomedical engineers and professional athletes' [39]. Once the researchers had developed a working prototype, they invited local residents to trial it, and keep journals and notes about the experience. The researchers used interviews and a survey to gather additional feedback at the end of the project [39], and drew on this data to redesign, develop and improve the M3 [39]. The common theme throughout these papers was the timing of local residents' involvment. In each paper, smart city residents were only invited to contribute to the project once researchers had already conceived of the technology domain (i.e. mobile applications) and, in some cases, the basic design specifications for the technology. No project brought residents and academics together from the outset to conceive of and design new services, technologies or experiences for the smart city.

The fifth and final paper involved smart city residents through a different method: participant observation [40]. Wang and Huang [40] use participant observation to study how people interacted with an existing smart city information point at a station in Taipei's Mass Rapid Transportation system. Their thorough and focussed participant observation project led them to recommend several changes to the information point, without having held a single conversation with local residents about their opinions or needs [40]. Their use of participant observation, a well-established service design and user-centred design method, adds another dimension to the ways in which people can be involved in smart city research. While many smart city researchers use interviews, workshops and surveys to involve residents in their research, these are not the only methods available. Other methods that are not usually employed, such as participant observation, discourse analysis, and ethnography, may offer equally useful insights to researchers.

Five papers from this review [34, 16, 27, 30, 2] outline projects that claimed to involve, or plan to involve, smart city residents. However, the details of the residents' involvement were either unavailable at the time of publication or unclear. For example, Shaffers, Komninos, Pallot, Trousse, Nilsson

and Oliveira [34] describe the promise of Living Labs for collaborative 'future Internet research' projects and smart city technologies. They briefly outline the SmartSantander, EL-LIOT (Experiential Living Lab for the Internet of Things), and Periphera projects, claiming that citizens and 'end users' were involved in each project's development. However, they offer no description of how, when, why or which people were involved with the projects. Similarly, Gaved, Jones, Kukulska-Hulme and Scanlon [16] offer a rich description of MASELTOV ("Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services"), a three-year project that will be co-designed by academics and local residents, many of whom are migrants. Although the paper stresses the importance of participatory, citizen-centred design, it does not provide any detail of how, when, why, or which local residents will be involved in the design and development of the application [16]. Kominos, Tsarchopoulos, and Kakderi [27] also mention that local residents were contacted and involved throughout their smart city service design project. However, once again, the authors do not provide any detail about how, when, why, or which local residents' were involved. Two work-in-progress papers [30, 2] outline upcoming projects that will use in-depth interviews to capture smart city practitioner definitions in six smart cities around the world, but the results were not available.

There was no clear evidence that people who live in smart cities were involved with the research described in the twenty remaining papers identified by this review. Ten papers [6, 31, 29, 5, 8, 3, 7, 4, 23, 9] offered a variety of nuanced theoretical discussions about the smart city, and at times called for increased citizen participation. However, the wants, needs, perspectives, and broader involvement of smart city residents was absent from these papers. The remaining set of ten papers [13, 32, 33, 28, 24, 21, 15, 14, 35, 10] presented smart city technologies that were being, or had been designed and developed, without the involvement of local residents. From the deployment of 'smart dust' [13] to the development of 'cloud-based big data analytics' [24], the involvement of local residents seemed to be an unnecessary issue for many smart city technology developers. As Khan, Anjum, and Kiani suggest ,"at the core of smart cities is the collection, management, analysis and visualisation of huge amount of data that is generated every minute in an urban environment due to socioeconomic or other activities. [24]" Their view suggests that people are not at the core of the smart city; they matter merely in their provision of the data that drives the smart city.

DISCUSSION
From our review of these technical papers, we have identified three insights: 1) although practitioners and academics have been invited to contribute to the discourse about what a smart city is, there were no examples of non-practioner, non-academic definitions of the smart city; 2) although citizens are occasionally engaged in the design of technologies within the smart city, this generally occurs after a design has already been conceptualised by academics or technologists; and 3) there is a paucity of diverse methods being used to engage

people in the city. These three distinct insights share a serious implication: opportunities to include diverse ranges of citizens who might enrich the design of smart city technologies and environments are being missed out upon. This carries serious implications for the future development of smart cities. After all, as Jane Jacobs says "there is no logic that can be superimposed on the city; people make it, and it is to them, not buildings, that we must fit our plans. [22]"

During this literature review, it became clear that no research had yet been conducted regarding citizen engagement in the smart city using the systematic literture review method. Although this method allowed us to produce a novel piece of research, there are at least two limitations to this review. The first limitation is that the review only focussed on technical, academic, peer-reviewed literature. It did not include non-academic literature (e.g. business literature, social media, mass media, etc.), non-technical academic literature, (e.g. such as smart city research in urban design, human geography, and public administration databases), or books that had not been peer-reviewed. The second limitation relates to the search terms that were used. While the terms were selected based on their usage in a broad range of literature related to citizen engagement, we acknowledge that we may have missed relevant literature that employed other terms, such as bottom-up approach or inclusive design. These limitations can be seen as opportunities for future research.

CONCLUSION AND FUTURE WORK
The aim of this literature review was to examine whether there is a dissonance between literature and practice regarding citizen engagement in the smart city. The results indicate that a gap betwen rhetoric and practice does exist. Moreover, the results also indicate that non-practitioner, non-academic residents are not involved in the deifinitional discourse about smart cities. People are also not involved in the smart city technology ideation process, merely the design and development phases. Lastly, the results also indicated that the methods used to conduct smart city research are limited and do not explore the full possibilities for citizen engagement.

This note contributes the first application of the systematic literature review process to research about citizen engagement in the smart city. The review forms the basis of our planned research project, the aim of which is to investigate what understanding people living and working in smart cities have of them. We will employ an urban ethnographic approach to explore this issue. Based on the results of this systematic literature review, we contend that our project will be the first application of urban ethnography to the smart city research domain. The three cities involved in our research are Manchester, Glasgow and London, all of which either define themselves or are defined by others as 'smart'.

Despite how this literature review has informed our research, it has left some unanswered questions. We therefore call upon the smart city researchers to come together in order to develop, extend, disprove or prove the relevance and scope of this work through empirical investigations that could address questions, such as: 1) Does the dissonance between rhetoric and practice exist in other fields of smart city research, such as

urban design, human geography and public administration?; 2) What is the reason for such a dissonance between rhetoric and practice?; 3) What are the best methods for meaningful citizen engagement in the smart city?; and 4) Do we need to re-imagine a new approach to citizen engagement the future? These are but a few of the unanswered questions from our literature review; however, we are not done yet. We hope to encourage further questions and research during the next stage of our research project.

ACKNOWLEDGMENTS

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Appendix B

Fieldwork Documents

B.1   Expert Interview

Section one: Smart city and you

- How did you first get to know/get into smart city research/development? When was that?

- What's your understanding of the smart city?

- How would you describe your role in the smart city research/development? or Could you please describe how your work relates to smart city research/development?

Section two: Smart city and policy

- Have you come across smart city policy or policy on the smart city before? (follow up if necessary)

- How do you see your work relate to policy development in smart city?

- How do you think your work could have influence on smart city policy making? Or the policy making in smart city would have an impact on your work?

- If we describe policy generation as a circle of knowledge to development, where do you see your work fit into this circle? (doodle with the interviewee if in person)

Section three: Smart city and democracy

- How do you envision the future of democracy/ civic engagement in future cities?

- How do you think we could use features like data gathering and digital connectivity of the smart city to encourage civic participation?

- What do you think of the potential in mobile media as the medium for more civic engagement/ participation in smart city? How could we explore it?

- Who do you think the current smart city is serving?

Section four: Knowledge production in the smart city

- What do you think the role that research plays in smart city development or development in general?

- What's the role of university or institution?

- What's difference between research embedded in smart city development and the ones carried out in academia?

- How could we mobilise and liberate the knowledge within smart city research and development.

B.2   Citizens' perspecitve on the smart city interview

- How old are you? (offer ranges: <20; 20-29; 30-39; 40-49; 50-59; 60-69; 70-79; 80<)

- What is your occupation?

- Where do you live?

- Haveyoubeenlivinginthiscityforoverayear?

- Please name the technologies that you would used aily (e.g. smart phones, laptops, tablemts etc.)

- How do you normally get around in the city?

- What do you like or enjoy the most about your city?

- Have you heard about Smart Cities? Does it mean anything to you?

- How would you imagine a smart city? What would some of its features be?

- Do you think you need to be consulted as people who live in the city when:

    – there will be smart meters installed in every household?

    – the bins have been equipped with wifi hotspot and start talking to you?

    – sensors are installed to monitor traffic?

    – your personal data is being made open access?

    – your personal data is sold?

    – a new technology is designed to support your lifestyle?

- Please tick the following urban issues that you feel are most relevant to address:

    – Water Supply

    – Climate Change and Air pollution

    – Traffic

    – Urban Waste Management

    – Urban Sprawl

    – Threats to Wildlife

    – Green Energy Sources

    – Public Health Issues

    – Crime

    – Transparent Government

    – Is there anything we didn't mention but you would add to this list?

B.3   Information Sheet and Consent Forms

TITLE OF RESEARCH:

    Unpacking the Smart City Discourse

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INTRODUCTION

You will be taking part in a research study concerned with understanding some of the dis-course regarding smart city research. We invite you to participate in a study that will in-volve the collection of interview data. As participants in Unpacking The Smart City Dis-course research we invite you to think about your experiences and practices concerning smart cities and provide some views or opinions on those experiences and practices.

It is important that you read and understand several principles that apply to all who take part in our studies;

a) taking part in the study is entirely voluntary; b) personal benefit may not result from taking part in the study, but knowledge may be gained that will benefit others; c) any significant findings will be discussed with you if you desire; d) you may withdraw from the study at any time.

The nature of the study, the risks, inconveniences, discomforts, and other pertinent information about the study are discussed below. You are urged to discuss any questions you have about this study with the investigator before you sign this consent.

In accord with all of our research protocols, privacy will be fully protected and confidentiality maintained at all times.

BACKGROUND PURPOSE:

This case study is concerned with current rhetoric and discourses in smart city related re-search – a relatively new focus for investigating long term deployments of smart cities.

In order to investigate the current smart city discourses, we plan to carry out expert interviews with practitioner in smart city related field about their professional experience and practice. Each interview will be 30-45 minutes long (in-person/on the phone/on Skype/via Google+). In the interview, these practitioners' experiences and practices of smart cities as well as their opinion and perspectives on the smart city discourse will be discussed.

STUDY PROCEDURE:

You are being asked to participate in a study that will require your cooperation in the fol-lowing:

Interview – individuals will be invited to be interviewed about their experience, practice and vision regarding smart cities. With your permission the interview will be recorded for anal-ysis.

In each case the audio recorder can be 'turned off' or data erased as you wish - your wishes are paramount during this stage. While you may initially be a little concerned or embar-rassed at being interviewed our general experience is that people soon learn to enjoy the experience.

When writing the results from the interviews into a project report or any other form of doc-umentation, steps are taken to ensure anonymity for all those involved in the study. No per-sonal details will be recorded. Confidentiality will be maintained at all times. Any record-ings that are made are the property of the researcher and will be kept in a secure environ-ment and destroyed at the conclusion of the research.

RISKS OF PARTICIPATION IN THE STUDY:

The risks of participating in this study are minimal. It is the investigators' intention that your identity in these studies will remain confidential. Your particular contribution to the study – what you disclose during interviews and what is observed – will be anonymized.

BENEFITS:

There may be no personal benefit to you from participating in this project. However, some personal benefits of this research may include learning and reflecting more about your own research and practice might impact the smart city discourse.

We believe this work can make an important contribution to current debates on the smart city research.

The 'smart city' has become an increasingly popular topic as a multi disciplinary approach in urban development, deployment and evaluation – both academically and commercially – so lessons of the case study are likely to be both timely and worthy of wider dissemination. The important aspects of discourse identified in the case study, of smart city research, city management, cross-sector collaboration, citizen engagement are likely to provoke consider-able interest and discussion. Furthermore, this case study also facilitates our ongoing inves-tigation of how technology is impacting and changing people's lives in the digital economy setting. Observing and documenting this research process has important and relatively un-der-explored implications for our understanding of vision the of the 'smart city'. Given the growing interest with the development of smart city, these research findings should build into a framework of more general concerns, lessons, practices and values that are relevant to a range of technologies and settings beyond those directly involved in the study.

COSTS AND COMPENSATION:

You will not be paid for participating in this study.

There is unlikely to be any cost - financial or other - to you for participation in the study.

CONFIDENTIALITY:

All information collected in this study belongs to the fieldworker and will be maintained in a confidential manner at Lancaster University. Nobody, other than the fieldwork researcher, will have access to the data. Any identifiable data (including recordings of participants' voices) on portable devices (e.g. audio recorders, etc) will be erased from it as quickly as possible and in the meantime the device will be stored securely. Any recordings will be de-stroyed at the end of the project. Transcripts will be anonymised and securely stored. Although rare, it is possible that disclosure may be required by law. Otherwise, the infor-mation will not be disclosed to third parties without your permission. If the study is pub-lished, your name will be kept confidential.

PEOPLE TO CONTACT:

If you have further questions related to this research study, you may contact the Principal Investigator, Ding Wang, PhD Candidate, HighWire CTD, Lancaster University

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Tel: 01524 510859

You may also if you wish contact an independent person about this research – specifically, Prof Gordon Blair, Director of HighWire Centre for Doctoral Training.

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CONSENT FORM

I understand that I am free to refuse to participate in this research project or to withdraw my consent and discontinue participation in the project at any time without prejudice.

I understand that I will not be paid to participate in this study.

I have had the opportunity to fully discuss this investigation and the procedure(s) with a study investigator.

All my questions regarding this project have been answered.

I agree to participate in the project as described above.

Subject's signature:

Date signed:

Subject's printed name:

A COPY OF THIS FORM HAS BEEN GIVEN TO ME [Y/N]