

Governing Urban Transformation

Community engagement as design strategy for bottom-up Smart Cities

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Author declaration

I, 8580579 confirm that this report is based on my own work and that I am happy with both my own and my partner 9027600's contribution to the final submitted version.

Abstract

This report was set by the organization Future Everything, with an aim of recommending ways in which Manchester city could implement bottom-up strategies using community engagement and participation. Bottom-up approaches to Smart Cities are becoming more widely used as efficient and sustainable ways of governing cities. We argue that although there are many interlinked challenges involved in this process; The pretence of engagement, the digital divide, and a one size fits all approach, if these are tackled ethically and appropriately, community engagement based design approaches could be successful. We present a range of examples using a four part frame work and Case studies from India and Boston. Citizen engagement plays an imperative role in the extent to a Smart cities success.

Keywords: Smart City; bottom-up; projects; community engagement; citizens; participation; digital; technology; challenges; literature

Contents

List of Figures	Page 5
Chapter One: Introduction	Page 6
Chapter Two: Research Context	Page 7
Smart City	Page 7
Bottom-up approaches	Page 7
Importance of citizen engagement in Smart City designs	Page 8
Focus on information technology to engage with citizens	Page 8
Key Questions.....	Page 9
Chapter Three: Methodology	Page 10
Secondary data	Page 10
Initial search	Page 10
Chapter Four: Key challenges	Page 12
Pretence of engagement.....	Page 12
The digital divide	Page 13
One size fits all approach	Page 13
Chapter Five: Recommendations and Case studies	Page 15
Chapter Six: Conclusion	Page 18
Bibliography	Page 19

List of Figures

Figure 1 – Search approach	Page 10
Figure 2 – Primary Literature Search Results	Page 11
Figure 3 – Bottom-up framework for Smarter Cities.....	Page 16

1. Introduction

Smart Cities have emerged as a response to rapid urbanisation and population growth. Thus, it is crucial to implement strategies that allow for a more efficient and sustainable ways of living (Joshi et al., 2016). The explosion of social online networks and personal mobile devices has made participatory engagement with communities much more achievable in Smart Cities (Odendaal, 2003). In this way, smart technology is the vision of the future. This report has been produced to address the challenge of community engagement as a design strategy for bottom-up Smart Cities, set by the organisation Future Everything.

Future Everything, established in Manchester in 1995 focus on connecting creative communities with academic research, policy makers and business sectors to build networks between artist, designers, urbanists and developers. They maintain an emphasis on human centred design using citizen engagement as a way of combating real problems people face. Thus, Smart City approaches are relevant to Future Everything as they have the ability to make for more effective and sustainable cities by using technology and digital intelligence (Future Everything, 2017).

We will firstly outline the key questions which will frame the report, then discuss the literature around community engagement. Subsequently, we will describe the methodology used, and provide various case studies of bottom-up approaches where community participation has been the focus, before finally concluding with recommendations for Manchester.

2. Research context

This section will look at the Smart City as a concept and bottom-up approaches as a whole, providing an understanding of why it is important to engage with communities in Smart City projects.

(i) Smart City

The Smart City is a complex concept which has emerged as a way of combatting current urban problems associated with rapid urbanization which has left cities in need of finding smarter ways of becoming more sustainable, liveable and efficient (Alawadhi et al., 2011). With more than half of the world's population living in urban areas, cities are required to tackle these issues in terms of socio, technical, physical and organisational practices (Alawadhi et al., 2011). The urban problems resulting from this are waste management difficulties, traffic congestions, high crime rates and air pollution (Washburn et al., 2010).

There are a myriad of definitions of Smart Cities as an approach. Some explanations emphasise the role of technology, Monteiro et al. (2015) define Smart Cities as "cities that use Information Technology to improve the effectiveness and efficiency of their services" (p 196). Caragliu et al. (2011) emphasises that a city is smart when investments in human and social capital and traditional and modern communication infrastructure generate sustainable development and a better quality of life.

(ii) Bottom-up approaches

The use of bottom-up strategies in Smart City projects provides an opportunity for citizens to engage in city planning more directly (Neirotti et al., 2014). The effort to include appropriate stakeholders ensures that all people affected by or are interested in the project have the potential to influence decisions made about a particular project (Giovannella et al., 2016). These grassroots initiatives therefore allow the cross-linking of knowledge of sectoral developments through collaboration (Schaffers et al., 2011).

(iii) Importance of citizen engagement in Smart City designs

The purpose of a Smart City is to introduce technologies and applications to enhance the wellbeing of citizens and move towards a sustainable and efficient city (Manville et al., 2014). In achieving this, bottom-up strategies are key as they allow city projects to be implemented collaboratively and more successfully to transform the city (Dameri, 2012). Due to the unprecedented growth of urban population in recent times, there is an increasing need for community participation in Smart City designs as people are becoming more concerned with the changes occurring around them (Lee, 2014). They want to be included in discussions around the modification of their city as it affects them (Alverti et al., 2016).

Enyedi (2004) further asserts that “planners (experts) have a limited knowledge of local problems. Statistical data on noise pollution or on crime rate cannot express exactly how local people feel about these conflicts or how the suggested solutions fit into their cultural traditions” (p. 15) Therefore it is crucial to engage with citizens in city planning as it allows for much needed insight from ‘local experts’. IBM (2017) contributes to this discourse and advocates that without collaboration with all actors involved within the city, a city will struggle to become smart: “a city is an interconnected system of systems... that relies on strong support for and among each of its pillars, to become a smarter city for all”.

(iiii) Focus on information technology to engage with citizens

Smart City technologies deliver vital tools for cities to become more efficient by providing improved services to citizens through “delivering real-time information that may help them to make the good choices and contributes to solve everyday problems in a city” (Doran and Daniel, pp. 58, 2014). The emphasis on IT is to provide rapid information to citizens and offer services across sectors such as transportation, energy and traffic more resourcefully (Odendaal, 2003). Thus, IT allows access to information and may empower the community to participate in a new and more active way (Bulu, 2014). This in turn increases the positive interaction between the community and the city (Treib et al., 2007). Indeed, Coe et al.

(2001) advocate that the internet is essential for community participation as it acts as a driving force for change and communication.

Key Questions

1. What are bottom-up strategies for Smart Cities and how have they been implemented?
2. Why is community engagement important for facilitating Smart City strategies?

3. Methodology

This section will look at secondary data as useful method to draw out literature on challenges regarding citizen engagement in Smart City projects. Through the use of bar and flow charts we will present how we approached our initial search and the results gained from using *Google Scholar*, *Jstor* and *Scopus* [See Figure 1&2].

(i) Secondary data

Secondary data was used throughout the research to draw out literature that captures best practice across the Smart City discourse. Johnston (2014) defines secondary data as an empirical “exercise that applies the same basic research principles as studies utilizing primary data and has steps to be followed just as any research method” (pp. 619). This method therefore provides us with the appropriate knowledge about Smart Cities that is already published (Smith et al., 2011). It also allows us to come to an informed conclusion and offer recommendations from reviewing a variety of literature (Andrews et al., 2012).

(ii) Initial search

Figure one below illustrates the steps taken to obtain desired literature to scope out the challenges in governance when it comes to bottom-up Smart City approaches.



Figure 1: Search approach

Research into citizen engagement in bottom-up Smart Cities was first performed in late April 2017. From this, a broad range of results surfaced under each of the search terms.

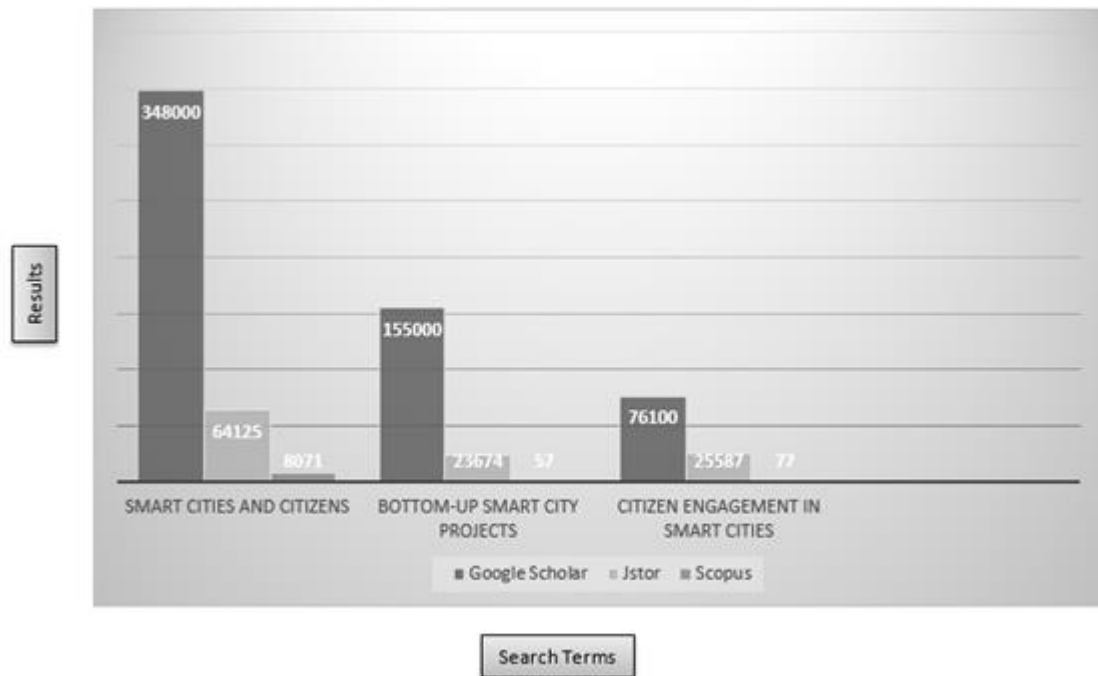


Figure 2: Primary Literature Search Results

Due to the size of returned search results, significance was placed on most relevant articles that have written about citizen engagement as a key factor in governing urban transformation and examples of community participation in Smart Cities. From the resulting set of research, irrelevant literature were manually eliminated (screening) (Glass, 1976) . This applied to literature on bottom-up Smart City projects where many articles focused more broadly on the implementation of smart services rather than citizen engagement.

4. Key challenges

After reviewing some of the key literature written on bottom-up approaches to Smart City projects, three fundamental challenges emerged in which we attempt to address, although all challenges are intrinsically interlinked, we have separated them for the purpose of this report as follows:

(i) Pretence of engagement

The most prominent challenge of this approach is the extent to which citizens are actually involved (Komninos et al., 2013). Komninos et al. (2013) have argued that central planning of smart applications makes many assumptions about citizen's needs, and thus fails to meet their genuine requirements. Collins et al. (2002) and insinuates that there is too much emphasis on finding uses for new technologies rather than finding the right technology to solve the real problems that people face. There is a gap in the research on community participation and the impacts of technology on people's lives (Peng et al., 2016).

This is highlighted in Peng et al.'s (2016) study of *Smart Parking* in London. Through connected sensors to parking bays, the 'ParkRight' application allows drivers to book an empty parking space in advance, reducing traffic congestion, and environmental and health benefits (Holman et al., 2015). However, Peng et al. (2016) argued that a lack of integration of the people who would be the end users of the application led to its failure. Complaints over the complexity and difficulty of using the application suggested that there was a lack of citizen awareness and education, and therefore less potential for the economic and environmental benefits to deliver. The importance of appropriate marketing campaigns and designs of smart approaches are crucial to their success (Van der Graaf and Veeckman, 2014). Smart city application involves a high level of commitment to citizens' integration in terms of co-creating internet-based applications (Komninos et al., 2013).

(ii) The digital divide

The ethical challenge of the 'digital divide' (Chourabi et al., 2011) which explains "the social implication of unequal access of some sectors of community to Information and Communication Technology [ICT] and the acquisition of necessary skills" (Foster, 2000, p. 445) presents the second challenge. As we live in a digital age, communication is rapidly taking place in the electronic environment, therefore those who are not educated in this way become naturally excluded from the benefits of smart initiatives in social, political and economic life (Hongladarom, 2004). Partridge (2004) argues that the nation is being divided into those who are information rich and therefore can utilise smart technology and those who are information poor who cannot.

Education, employment and age have been argued to be primary factors influencing this divide. However, Partridge (2004) also argues that there are key psychological, social and cultural factors which also contribute to the divisive nature of such technologies. Once these challenges are researched and new approaches trialled, citizens will have ability to become more engaged and active through the bridging of this technology gap. Floridi (2001) has argued that a key problem is that within our 'information society', technological development has been much faster than humankind's ethical development. Old solutions to past ethical problems cannot be used and reapplied to the new problems that smart technologies are producing, thus more research is needed to understand how to bridge the digital gap (Epstein et al., 2011). With an end goal of creating an information rich society for all, the challenge of community engagement as a design strategy for smart cities becomes; how to best construct an information society that is ethically comprehensive and inclusive (Amos and Warbuton, 2007).

(iii) One Size fits all

Due to a lack of in-depth empirical case studies of smart city strategies, 'One Size Fits all' narratives have appeared, which highlights the third challenge (Hollands, 2008). Cities are complex social, cultural and political systems (Komninos et al., 2013) with a range of issues relevant to each; therefore bottom-up approaches must be unique to each city.

Chourabi et al., (2011) highlight the importance of taking into account the political and governmental elements of each city for a community engagement approach to be successful. For example in the case of Japan where smart grid technologies aim to optimise energy management, Graniera and Kudo (2016) argue that citizen engagement was not successful. This was due to aspects of Japanese culture, associated with a distinct democracy and political ideologies, which are ill-suited to the practice of public integration and citizen engagement. They go on to argue that Japanese citizens often prefer social order over individual freedom and are reluctant to protesting publicly (Graniera and Kudo, 2016). In this sense, community engagement bottom-up strategies are not always the most applicable strategy (Dagnino, 2007). New smart technologies will only be successful when adapted to suit particular cultural contexts. This will allow for greater citizen engagement (Saunders and Baeck, 2015). Thus experimentation and testing of ideas are needed to decipher the most applicable approach for each city.

5. Recommendations and Case studies

We will present a few key case studies which we think could be implemented as part of a bottom-up scheme to make Manchester more sustainable. After analysing the literature, these challenges emerged:

- *Citizen Wash': The pretence of engagement*
- *The digital divide*
- *One Size fits all approach*

If these challenges are tackled appropriately we would argue that grass-root strategies focusing on community engagement would be much more effective and sustainable in Manchester, rather than top-down approaches. The most efficient use of resources is to support digital tools which enable people to make better use of underutilised assets, such as underused spaces in cities, and underused resources.

More broadly, 'Next Bengaluru' (India) provides an international example of how citizen engagement works in urban transformation initiatives if they are actively involved from the early stages of the project (Batty et al., 2012). This was done by generating a website where residents could voice their concerns and contribute towards ideas for the redevelopment as well as visit sites of interest where transformation could occur. The initiative helped to create a vision of what the local residents wanted in their vicinity, it also encapsulated their daily needs and drawbacks (Saunders and Baeck, 2015). Through citizen engagement, planners and decision-makers were able to map out derelict land, this then sparked debates about what should be done on these urban spaces (Baka, 2013; Nextbengaluru.com, 2017). The project was deemed extremely successful due to its focus on community participation and using the citizens to draw out local knowledge which allowed planners to work in collaboration with the residents (Appadurai, 2001). This case study presents a practical example for Manchester in terms of community participation where urban transformation within the city could be made more engaging through site visits similar to the Next Bengaluru project (Coe et al., 2001).

The four part framework presented by Saunders and Baeck (2015) for grass-root strategies is extremely useful to think of in terms of Manchester.

Collaborative Economy	Connects groups of people through the internet to make better use of resources, skills and space, especially where resources are limited.
Crowdsourcing data	Citizens can use low cost sensors to create maps of their environments. City governments can crowdsource data from social media sites and sensors in mobile phones, as a supplement to city-wide Internet of Things networks.
Collective intelligence	Emphasising the decision making and problem solving processes to be of a collective nature, as these are usually left to the experts and policy makers. Therefore new digital tools are making it possible for cities to be smarter and more democratic.
Crowdfunding	Citizens can connect online to fund community projects and the city governments can analyse this to make accurate decisions on spending, to the actual needs of citizens. This would also help to bridge the digital gap.

Figure 3: Bottom-up framework for Smart Cities
(Adapted from Saunders and Baeck, 2015)

Crowdsourcing can be applied in Manchester through the use of smartphones. For example, the Boston Street Bump application uses accelerometer in mobile phones to sense when a driver hits a bump in the road, the data is then sent back to the city government. Smart apps like Uber are widely used across Manchester; their success rates imply that other smart app ideas could be successful.

The Smart City artefact proposed by Monteiro et al. (2015) is also a useful example for Manchester. A single portal which can be used by private businesses, citizens, non-profit organisations, local governments and academic institutions to discuss and collaborate on community related projects that would make the city smarter and more environmentally friendly. Citizens who are passionate about sustainability can express their ideas on a multi-

sided platform to a range of stakeholders, turning ideas into real projects. Not only promoting sustainability, it also promotes social welfare (Monteiro et al., 2015).

6. Conclusion

Many academics suggest that Smart Cities may be the solution to environmental and citizen needs through the application of information communications technology to enhance urban services and living (Hollands, 2015). However, there is a key discourse which implies that without effective citizen engagement in the planning and decision-making process of Smart Cities, projects may not be successful due to local objections (Vasseur and Dunkels, 2010). Campbell (2009) further insists that citizen participation plays an imperative role in the emerging initiatives of Smart Cities as they provide city planners, architects and developers with local knowledge and needs of the citizens in the area. It also allows all relevant stakeholders to work collaboratively and effectively towards a common goal (Hancke et al., 2013).

Lelite et al. (2016) insinuate that working with citizens and various other stakeholders allows for the development of social innovation solutions to urban challenges. The emphasis is placed on social aspects of Smart City projects as innovation needs to occur in a wider context with the involvement of people from the early stages of a project (Mohanty et al., 2016).

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