Title
Smart & The City: Investigating the Participation of Citizens in the construction of American Smart City Plans

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Publication Date
2020

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

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Investigating the Participation of Citizens in the construction of American Smart City Plans

A thesis submitted in partial satisfaction

of the requirements for the degree Master of Urban and Regional Planning

by

Amy Zhou

2020

ABSTRACT OF THE THESIS

Smart & The City:

Investigating the Participation of Citizens in the construction of American Smart City Plans

by

Amy Zhou

Master of Urban and Regional Planning

University of California, Los Angeles, 2020

Professor Anastasia Loukaitou-Sideris, Chair

As high-profile smart city projects and technologies continue to pervade cities all over North America, this thesis seeks to answer two interrelated questions: what are issues relating to resident participation that arise in smart city plans and strategies in large cities across North America, and how are cities envisioning public engagement and the role of their citizens in smart city initiatives? To answer these questions, this thesis analyzes smart city documents (including smart city roadmaps, smart city plans, and relevant websites) of nine American cities, and conducts interviews with smart city staff at three cities. Consistent with much of the existing scholarship, this thesis concludes that the presence of the citizens in both the projects and initiatives being developed in the smart city, and in the engagement processes of these smart city plans, remains largely absent.

The thesis of Amy Zhou is approved.

Kian Goh

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2020

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Introduction

In 2019, a search for "smart city" or "smart cities" in news database Factiva returned over 43,000 news articles worldwide, indicating the topic's nascent popularity. Many of these stories question the ethics and implementations of technologies like facial recognition software, issues like data privacy and surveillance through sensors and transit data, and present innovations like smart grids and meters. Some of these stories are glowing public relations pieces from cities eager to proclaim their "smartness" and advertise their new technologies as signals of their innovative natures. However, these stories often do not address the effects of these technologies on the people living within the city, or how their lives might change as a result.

How *do* these smart technologies affect the way residents, citizens, and people live within the city? The answer to this question is vast, multifaceted and beyond the scope of a graduate thesis. Instead, what this graduate thesis will do is establish the foundation to answering this question by investigating the nature of the relationship between the municipal government implementing these plans and the inhabitants of the city.

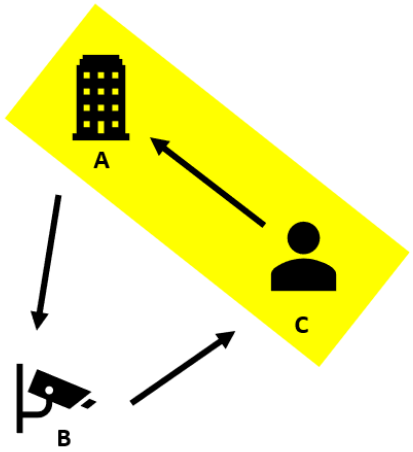


Figure 1: Relationships of Power

An easy way to frame this relationship is to consider **Figure 1,** which outlines how power travels between local governments and city residents:

A. Government (with the influence of private industry) implements the technology;
B. The technology collects and analyzes the data collected from various sources, of which a prominent one is the inhabitant of the city; and

C. Residents (provided they are in a liberal democracy) should have some influence over the way they are governed, whether through public participation or other methods.

This thesis will focus specifically on the relationship between the highlighted components of the Figure: A and C, or government and inhabitant. Specifically, I will investigate the following questions:

> Question 1: What are issues relating to resident participation that arise in smart city plans and strategies in large cities across North America?
>
> Question 2: How are cities envisioning public engagement and the role of their citizens in smart city initiatives?

I will center these questions on nine prominent American cities: New York, Los Angeles, Chicago, Dallas, Houston, Philadelphia, San Diego, San Antonio, and San Jose. To foreground my analysis, I will provide a literature review on the background of smart cities, smart city technologies, citizens in the smart city, and smart city imaginaries.

The methodology for this research will be twofold: 1) a review of relevant documents from each of these cities (examples of possible documents include plan roadmaps, strategies, RFPs, and more); and 2) interviews with city officials to gain perspectives on the design of their strategies, in addition to how these strategies may have been influenced by how they envision the inhabitant and citizen fits into the smart city.

The impetus for this thesis comes at a time when conversations around smart cities are exploding both in the academic scholarship and in popular culture. In 2019, facial recognition bans were being considered across North America; Google sister company Sidewalk Labs battled community residents in their development of a smart neighborhood in Toronto, Canada before

finally pulling out of the project in Spring 2020. Media outlets like Forbes opined that New York's Hudson Yards, a neighborhood with a microgrid that can connect to New York's larger energy grid, is "helping the public understand the potential that internet of things plays in developing a more efficient community" (Tuerk, 2019). Smart technologies are increasingly infiltrating the city, moving into the popular consciousness and are prompting questions of equity, surveillance, data ownership, and engagement from both the public and public advocacy groups like ACLU and Sunlight Foundation (Conley, 2017; Jordan-Detamore, Honker, and Asli, 2019). Issues of inequity have been pervasive in urban spaces for centuries; the addition of technology to urban spaces provides even more opportunities to divide and separate. Issues that have arisen, however, include increased modes of surveillance in domestic and public spaces, algorithmic bias in predictive policing, questions of privacy rights with more sensors built into the urban environment.

As smart city plans, many of which deeply involve these technologies, proliferate around North America, it is clear that the governance and operations of the city are evolving in ways that include these "smart" technologies. The process to develop smart city plans will likely evolve along with the technologies and initiatives changing the fabric of cities. As such, this thesis attempts to provide some foundation in the evolving conversation around participation and agency in the development of these plans; it will do so by identifying how cities are interacting with their residents during the development process of the smart city, in addition to what cities perceive as the roles of citizens *in* the smart city.

Literature Review

Background: How do you define a smart city?

In broader public conversations around smart cities, one of the first questions to arise is simply *what a smart city*? Solidifying a core definition of a smart city is further complicated by the diversity of explanations between the corporate private sector, government, and academia, each with their own motivations for defining it the way that they do. Even within one sector, the definition can be wide-ranging.

As an example, the U.S. Department of Transportation's definition of a "smart city" is heavily associated with technologically-driven systems and innovation. This deviates slightly from the definitions of smartness from the municipal perspective: in Atlanta, Baltimore, and Kansas City, for example, smart city strategies draw connections between ideas of "smartness" and a variety of different elements. In Atlanta, smartness is thought to contribute to increasing the "quality of life" for its residents ("SmartATL", n.d.), while Baltimore's idea of the smart city situates itself on keeping the "city safe, citizens engaged, economy growing, and quality of life improving" ("Smart City Committee", n.d.), and Kansas City focuses on improving the lives of residents, protecting privacy, and economic opportunity ("Emerging Technology Initiative (Smart City)," n.d.; Sarma and Sunny, 2017). These three cities all deviate slightly from each other in their interpretations of the smart city.

Scholarship around the smart city has evolved to congregate around specific themes: one is the definition and concept of the smart city, and another develops theory on how municipal governments and private companies take advantage of the looseness of the term to reinforce ideology or neoliberal governance structures (Engelbert, 2019; Wiig, 2015).

Smart City as Technology

Investigations into the relationship between the city and digital technologies began before the 1990s with a variety of conceptualizations of their relationships: there was the "wired city" (Dutton, 1987), the "informational city" (Castells, 1990), and the "information city" (Hepworth, 1990; Graham and Marvin, 1996). However, the iteration of the city most related to our concept of the smart city mostly began in the 1990s (Graham and Marvin, 1996).

The term "smart" itself stems from two distinct influences: the first, from the concept of smart growth developed in the 1990s and influenced by New Urbanism, and pushed for the incorporation of various ICT systems to draw upon innovative methods to govern, create smart communities, and promote sustainability. The second distinct influence comes from the idea of the "intelligent city", which draws connections between cities and ICT (Vanolo, 2014; Hollands, 2008).

In the mid 2000s, various private sector companies evoked the "smart" term to sell their products ("Smarter Planet", n.d.). IBM, particularly, was noteworthy for incorporating this language into their products. The company started the "Smarter Cities" challenge, which invited cities to compete for the opportunity of having IBM consultants visit their cities and offer smart technology solutions to perceived challenges (Wiig, 2015; Harrison et al, 2010). In 2011, IBM engineers posited a new theory of smart cities that centered on being "an urban system", which is seen as a "generic term for a process in any of the kinds of networks of system" (Harrison and Donnelly, 2011). This specific idea of the smart city presented "layers" of the smart city (which they established as the social system, services, resources, infrastructure, natural environment) that would interplay with each other. This "urban system" would ultimately be focused on the implementation of some level of technology (Harrison and Donnelly, 2011).

IBM's "Smarter Planet" initiative, launched in 2010 and described as their "overarching framework for IBM's growth strategy", was a direct evolution of their "Smarter Cities" initiative ("Smarter Planet", n.d). It was one important contributor to the sudden growth of the "smart city" term (Wiig, 2015; Cocchia, 2014).

However, in policy and scholarly fields, the definition of "smart" in relation to cities moves away from technology, and back toward policy and municipal initiatives.

In tandem with the developments of IBM's interpretation of the smart city were policy movements in Europe that pushed for "smart growth", such as the Europe 2020 Strategy, initiated in 2010 by the Covenant of Mayors ("Europe 2020", 2010.). In academia, investigations focused on how smart city technologies were influencing urban policy in such a way that prioritized technology as a solution to urban problems (Leon and Rosen, 2019); how existing neoliberal and inequitable systems were perpetuated in the smart city (Cardullo and Kitchin, 2019); how issues of surveillance and privacy were intertwined with the field (Sadowski, 2019; Sadowski and Pasquale, 2015; Murakami Wood and Mackinnon, 2019; Schulenberg and Peeters, 2018; Firmino and Duarte, 2016; Iveson and Maalsen, 2019); who were excluded as citizens in the smart city (Datta, 2018); and how participation and civic participation functioned in the smart city (Hollands, 2015; Foth, 2017).

There was also a departure from focusing solely on technology as the source and outcome of a city's "smartness": this included scholarship on cities that included human capital rather than technology as element making a city "smart." (Neirotti et al, 2014; Nam and Pardo, 2011). Other scholars emphasized the importance of elements like innovation, participatory governance, and privacy and security (Stratigea, 2012; Joss et al, 2019; Angelidou, 2017; Albino, Berardi, and Dangelico, 2015).

Presently, individual governments in different parts of the world understand the smart city differently. For some, it is an opportunity for economic growth and knowledge production; for others, a method of increasing the quality of life if their residents (Albino et al, 2015). For others, the smart city is an "entrepreneurial development" that could stimulate the economy through innovation, creativity and entrepreneurship (Verrest and Pfeffer, 2019; Hollands, 2008).

Imaginaries

These sometimes conflicting and other times complementary ideas of what the smart city is emphasizes the variability on how they are defined in the scholarly literature, public sector, and private sector. These varying perspectives and visions of the smart city, each from different stakeholder groups, point to differences in how the smart city is conceptualized. Corporations and governments, being the parties purchasing, designing, and implementing these technologies, are able to construct ideas of how these smart cities may look: they, after all, create plans and write documents on the types of data portals they are constructing and the types of sensors that they are installing.

In this way, cities and governments are able to participate in the creation of a vision of a smart city, and one that, in the scholarship, is frequently a vision of the future (March, 2016; Hollands, 2008; Sadowski and Bendor, 2019), or even *imaginaries* of potential futures (Vanolo, 2016). Imaginaries, conceptualized by theorists by Taylor (2002), provide frameworks "in which people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deepening of normative notions and images that underlie these expectations". Some such imaginaries in the scholarship include dystopic environments with subjugated citizens, "active citizens as sensors", and one where citizens are completely missing from the image of such smart cities (Vanolo, 2016).

As technologies are revealed to reflect the biases and the beliefs of the society in which they operate (Noble, 2018), the imaginary of the smart cities can reflect the social structures within which they are created. They can replicate existing neoliberal social structures in its design, potentially disenfranchising a city's residents by removing their agency to make changes over the physical spaces they inhabit (Purcell, 2002; Brodie, 2000). Corporations like IBM in particular have been attributed as contributing to a "global imaginary" or a vision of a world fraught with problems, that is used as a way to justify the construction of smart cities—particularly the ones that they are pitching and proposing as products (White, 2016). In the literature, one of the most popular imaginaries of the smart city is as an increasingly neoliberal site (Verrest and Pfeffer, 2019; Cardullo and Kitchin, 2019; Martin, Evans and Karvonen, 2018; Shelton and Lodato, 2019; Sadowski and Bendor, 2019; Leon and Rosen, 2019; Vanolo, 2014).

These imaginaries of the smart city easily become visions of the future for these cities: in developing and creating imaginaries for what they look like, they can be constructed.

For many cities, the implementation of smart technologies became a method for cities to take on a competitive appearance and build a vision and *imaginary* of future competitiveness against other cities. Corporations and governments, who still do much of the promotion and image-making of the smart city, push for an entrepreneurial visioning of the smart city (Verrest and Pfeffer, 2019; Hollands, 2008). Corporations paint pictures of their smart city imaginary through marketing materials and advertisements and typically have a large amount of agency to do so as they produce the smart city technologies that contribute to the construction of the smart city. Governments, in being able to dictate technologies to be implemented and constructed into the fabric of the city, have a large amount of agency in being able to construct their imaginary of the smart city. Directly because of this desire, the City of Camden implemented an intensive smart

surveillance system to earn $2 billion in funding so that they could appear more competitive by increasing the perception of city's safety (Wiig, 2018).

The smart city, then, becomes an important vision of the future of the city—it becomes a city's *imaginary*. It becomes a site where its current residents and citizens will, in the future, occupy. Corporations and city governments actively contribute to the construction of these visions, so where then, are the residents, both in the construction of and *in* the smart city?

The Citizen & Citadin Within the Development of the Smart City Plan

Previous literature has shown that the moniker of "smart" becomes a sort of branding exercise for the city: the term is used for a variety of different ends. While a critical question for these residents in the smart city should always be whether they are allowed to *be,* another foundational question is to ask how such allowance is developed while the smart city itself is being developed. In other words: how does the development process of the smart city allow room for residents and citizens in the creation of this future vision of the city?

In many smart city development processes, the involvement of citizens and inhabitants is largely absent (Mancebo, 2019; Perng and Maalsen, 2019), though some literature provides case studies of participatory envisioning and design thinking of smart cities (Van Waart et al, 2016; Schliwa, 2019). In other examples, it is the presence of their bodies in these spaces that allow smart and technological systems associated with these smart cities to use them as sources of data (Odendaal, 2013; Iveson and Maalsen, 2019). Ubiquitous systems, for example, collect information of an individual identified through separate surveillance technologies and create a separate data-body (a sort of digital twin) in the system that functions as a replication of their data, and as new datapoints in their system (Haggerty and Ericson, 2003; Smith, 2016). This

occurs through surveillance that collects the movement of bodies to create datasets and information. There are now many examples of the smart city that incorporate elements of surveillance into their construction, whether to control the individuals that they are monitoring or to use as points in an analytical dataset (Murakami Wood and Mackinnon, 2019; Wiig, 2018; Cuff, 2003; Monahan, 2018; Sadowski and Pasquale, 2015).

Within the critical smart city literature, the term "citizen" is frequently used to describe the inhabitant of a smart city (Vanolo, 2016; Cardullo and Kitchin, 2019; Engelbert, van Zoonen and Hirzalla, 2019). Citizenship, conceptualized as the presence of a set of rights that are civil/legal, political and social, helps define the citizen's status in a specific polity (Marshall, 1950). The heavy use of the term "citizen" implies a distinction that these citizens are part of a polity of the smart city, above mere inhabitants of the smart city. Citizens are afforded space in the smart city to contribute to its construction, but only because they have forms of expertise, ability or characteristics (i.e. cosmopolitan, affluent, innovative) (Engelbert et al, 2019; Shelton and Lodato, 2019).

Henri Lefebvre, in his concept of the Right to the City, develops the idea of the *"citadin"* (or inhabitant) as the person who inhabits the city, and has two core rights: a right to participation in the city, and a right to appropriation (where the citadin is able to "physically access, occupy, and use public space") (Purcell, 2002). This concept of the "citadin" is more than the idea of the national *citizen*, the identity for which is constructed based on national, geographic and policy boundaries. The simplicity of the concept of the "citadin" is that of an individual who simply needs to inhabit the space in order to have some right to the city (Purcell, 2002). Moreover, Lefebvre was the first to develop the concept of the Right to the City, which is rooted in the idea of moving decision-making away from the state and toward those producing urban spaces: the

inhabitants (Purcell, 2002; Lefebvre, 1996). Lefebvre noted the importance of incorporating the city into spatial understandings of the right to the city, beyond the urban. He argued for a "contract of citizenship", noting that rights are the outcomes of struggle rather than god-given rights and that new citizenship should invoke participation that is more than "speaking at a public hearing or serving on a citizen's panel"—it's that which incorporates power and eventually leads to an autogestion: a management of the citizens by the citizens (Purcell, 2014). Lefebvre's work on its own remains slightly ambiguous in what stands as the definition of the right to the city. Within the literature, scholars have applied the Right to City through the lens of the *smart city*, as relationships between citizens and the governance structures are re-organized and reinforce who lives at the margins of a city (Willis, 2018), and even as a framework for thinking about the smart city as emancipatory (Kitchin, Cardullo, and Di Feliciantonio, 2019a).

However, even if there are smart citizens with the explicit choice of participating in the smart city, they are still only able to participate within the existing structure of the neoliberal smart city: they are limited in their choices of engagement with the smart city (Cardullo and Kitchin, 2019). Potential citadins are those who are present but not considered a part of the polity of the smart city. They may be thought of through the lens of urban citizenship and subalternity, where subaltern subjects are "silent and invisible subjects, deprived of credibility and agency; they cannot express their ways of knowing and thinking, and instead they must conform to dominant cultures", and are the ones pushed to the margins (Vanolo, 2016; Datta, 2017; Willis, 2019).

Participation and engagement was found to be a tension in the smart city, as some cities were found to disempower and marginalized residents or even leave them "absent", as in the case of Turin (Crivello, 2014), while others were focused on the use of citizens as "co-producers" of the smart city, and promoting such participation (Martin, Evans, and Karvonen, 2018). Even in case

study cities like Cologne, where the Mayor was dedicated to setting a structure for the public to participate in the smart city, activities around the smart city "remain largely unchallenged" and no ideas from their few public participation opportunities were taken and used (Leitheiser and Follmann, 2019).

Pulling together the history and definitions of the smart city, a review of the literature on how smart cities contribute to the design of the future and future cities and how residents have, in the literature, been seen as those with rights to be in these cities, and particularly to have the right to participate in the smart city, the rest of the thesis will further explore these themes in a set of American cities and their smart city strategies.

Research Design

Approach

To understand the methods of participation involved in the development of smart city strategies and plans, I conduct a close reading and analysis of relevant smart city documents (including plans, roadmaps, and strategies) and also conduct interviews with Smart City Directors and Managers from three of the most populous cities in America. To further understand the context of these plans, I will use a methodological framework inspired by Sherry Arnstein (1969), in addition to another framework that has been adapted to specifically analyze smart cities (created by Cardullo and Kitchin, 2019), which analyzes the extent of citizen participation found in each of these plans, and thus, in each city.

Table 1:Types of Smart City-related documents that were included in this analysis

- Road Maps (i.e. Dallas' 2018 Road Map)
- Related department strategies and documents (i.e. Los Angeles' Bureau of Street Lighting strategy)
- Websites with descriptions of the city's related strategy (i.e. San Antonio's website)

Methods

The research design for this project has two distinct steps: an analysis of the plans, and interviews with Smart City Managers from three case study cities.

Analysis of the Plans & Documents

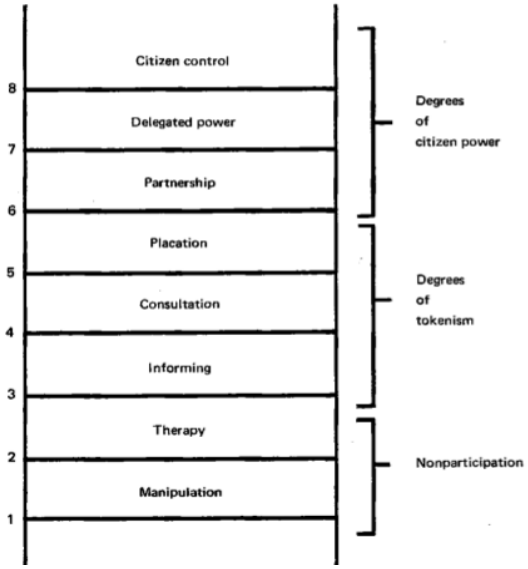


Figure 2: Sherry Arnstein's Ladder of Citizen Participation

A core objective of this thesis is to identify how cities are envisioning citizens in their smart cities, and thus my aim is to synthesize, apart from the literature and academic scholarship, the role of a city's citizens in each individual city's vision of the smart city. To do so, I use an updated typology of Sherry Arnstein's Ladder of Civic Participation, developed by Cardullo and Kitchin (2019) as a way of categorizing the nature of involvement that citizens have in individual smart city projects and initiatives. Individually categorizing these projects is effective as the composite of these individual projects make up the city's smart city vision.

Sherry Arnstein's Participatory Ladder (Figure 2) traditionally categorizes levels of citizen power in urban planning activities. The categories range from total "citizen power", where residents have total control over their own agency, to "manipulation", where agencies manipulate participants with information that they share, without taking any input from residents (Arnstein, 1969). The re-adjusted typology takes the original ladder and adds a smart city lens. While keeping many of the categories of citizen participation the same, Cardullo and Kitchin (2019) add "consumerism" as a level of participation, where residents "consume" information. In addition, they codify each rung of their "scaffold" with examples from Dublin, where they conducted their case study (2019).

<table>
<tr><th colspan="2">Form and Level of Participation</th><th>Role</th><th>Citizen Involvement</th><th>Political discourse/ framing</th><th>Modality</th><th>Dublin Examples</th></tr>
<tr><td rowspan="3">Citizen Power</td><td>Citizen Control</td><td>Leader, Member</td><td rowspan="2">Ideas, Vision, Leadership, Ownership, Create</td><td rowspan="2">Rights, Social/Political Citizenship, Commons</td><td rowspan="3">Inclusive, Bottom-up, Collective, Autonomy, Experimental</td><td>Code for Ireland, Tog</td></tr>
<tr><td>Delegated Power</td><td>Decision-maker, Maker</td><td rowspan="2">Civic Hacking, Hackathons, Living Labs, Dublin Beta</td></tr>
<tr><td>Partnership</td><td>Co-creator</td><td>Negotiate, Produce</td><td rowspan="2">Participation, Co-creation</td></tr>
<tr><td rowspan="3">Tokenism</td><td>Placation</td><td>Proposer</td><td>Suggest</td><td rowspan="6">Top-down, Civic Paternalism, Stewardship, Bound-to-succeed</td><td>Fix-Your-Street, Smart Dublin Advisory Network</td></tr>
<tr><td>Consultation</td><td>Participant, Tester, Player</td><td>Feedback</td><td rowspan="2">Civic Engagement</td><td>CIVIQ, Smart Stadium</td></tr>
<tr><td>Information</td><td>Recipient</td><td rowspan="3">Browse, Consume, Act</td><td>Dublinked, Dublin Dashboard, RTPI</td></tr>
<tr><td rowspan="2">Consumerism</td><td rowspan="2">Choice</td><td rowspan="2">Resident, Consumer</td><td rowspan="2">Capitalism, Market</td><td>Smart building/ Smart district</td></tr>
<tr><td>Smart meters, Mobile/locative media</td></tr>
<tr><td rowspan="2">Non-Participation</td><td>Therapy</td><td rowspan="2">Patient, Learner, User, Product, Data-point</td><td rowspan="2">Steered, Nudged, Controlled</td><td rowspan="2">Stewardship, Technocracy, Paternalism</td><td>Dublin Bikes, Smart Dublin</td></tr>
<tr><td>Manipulation</td><td>Traffic control</td></tr>
</table>

Figure 3: The Updated Scaffold of Smart Citizen Participation by Cardullo and Kitchin (2019)

Using this typology as a reference, I read through each city's smart city documents, and individually identified projects and initiatives, either proposed or already underway, and considered where they fit in each of the categories. Using the descriptions by Cardullo and Kitchin (2019), in addition to the examples provided on the rightmost column, I categorized every project and initiative as using one of the forms and levels of participation (everything from "Citizen Control" to "Manipulation").

	Type of Smart City Plan/Websites/Documents
New York	Smart City Plan (2015) & Strategy (2019)
Los Angeles	Bureau of Streetlighting Smart City Plan
Chicago	"Tech Plan" (2013)
Dallas	Road Map from Dallas City Hall (2018)
Houston	Houston's Smart City Vision website
Philadelphia	Smart City Plan (2017) & Road Map (2019)

San Diego	Smart City San Diego (public-private collaboration) and Smart City Streetlight Plan
San Antonio	SmartSA website
San Jose	Smart City Vision website

Table 2: List of Smart Cities analyzed

The nine most populous cities with existing smart city plans, websites, and related formal documents are listed above in Table 2. These documents were identified by investigating each city's individual website and searching for a variety of keywords, including "smart city", "innovation", and "smart". These strategies and documents are varied: some focus on specific departments, while others are websites and focus on Road Maps. Recognizing the diversity of interpretations of what a smart city could be, an analysis of these plans was later supplemented by interviews with city staff.

Semi-structured Interviews

The other core objective of this thesis is to understand how cities are envisioning public engagement in their smart city strategies. To gain information on this aspect, I conducted interviews with Chief Information/Chief Innovation Officers, Smart City Managers, etc. from 3 case study cities: San Antonio, Dallas, and Philadelphia.

Figure 4: Motivations for each city's smart city initiatives

These three cities were chosen because their motivations behind starting smart city roadmaps or smart city offices are distinct (as per Figure 4).

Each city is reflective of a subset of cities with similar motivations for wanting to be a "smart city".

For Dallas, this is a desire “to be a vibrant metropolis and one of the United States’ most attractive cities by 2030”, with smart technologies and cities playing an important role in how they are become such. This group of cities focus on the use of smart devices and technologies as a marketing strategy, and so as to develop their brand in a globalized world, following a history of cities that partner with private sector partners like IBM as a signal to outsiders of their own economic competitiveness, often following economic downturns (Wiig, 2015).

San Antonio’s goal is to be “connected, inclusive, and a resilient community supporting a high quality of life”, which follows the trend of smart city that wants to use smart technologies to improve the quality of life for its residents. Albino, Berardi and Dangelico (2015), compile different definitions of the smart city found in the literature and find that a large number of them center on quality of life as an objective for the smart city (Figure 5, “Smart City Objectives”).

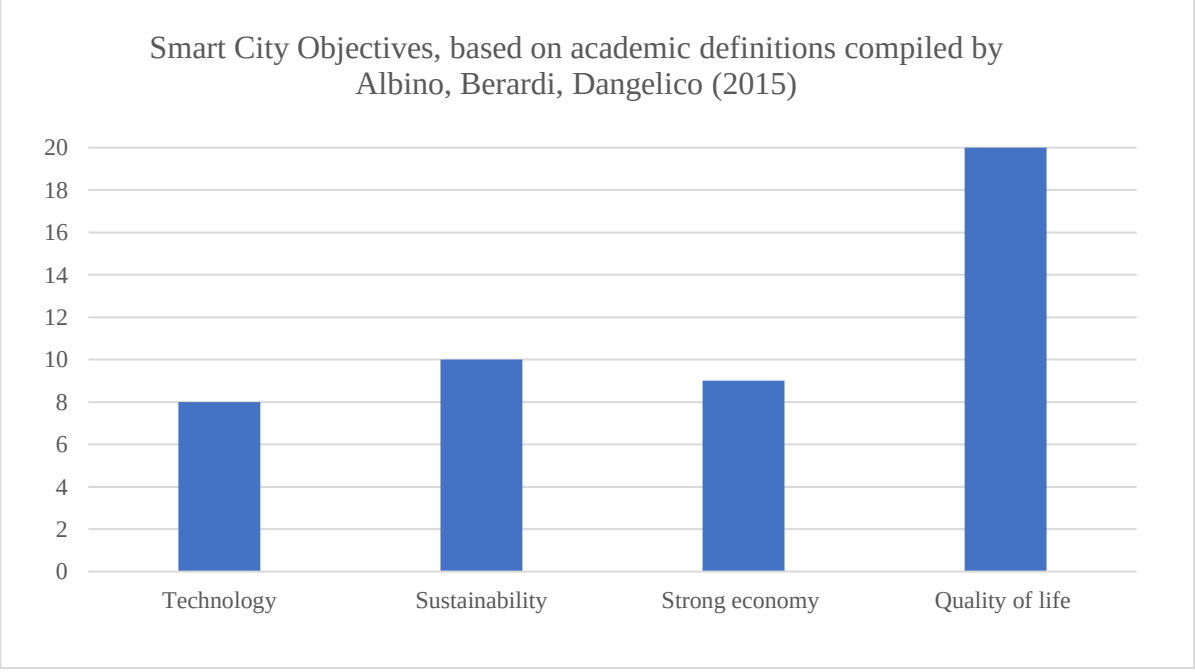


Figure 5: Smart City Objectives, based on academic definitions by Albino, Berardi, Dangelico

And finally, Philadelphia's Roadmap clearly states that their smart city initiatives were a result of wanting to improve service delivery. These cities view the role of smart technologies as tools to help with service delivery, following a six-city survey in the UK by Cowley, Joss and Dayot (2017), which finds four types of smart city activities and initiatives in these cities: service user, entrepreneurial (where residents are prompted to co-create and innovate through activities like hackathons), political (which has to do with voting, being involved in decision-making processes), and civic (oriented around civic activities not related to political engagement). Philadelphia's perception of the government as service implicitly orients citizens and residents as users, and follows the trend that Cowley, Joss and Dayot identify, which is that the most commonly deployed "smart" activities perceive the public as the users of services (2017).

Data

The data for this thesis includes various documents related to the plans of 9 American cities, in addition to interviews with relevant bureaucrats at each of these individual cities.

The nine most populous cities with existing smart city plans, websites, and related formal documents was previously listed in Table 2. These documents were identified by investigating each city's individual website and searching for a variety of keywords, including "smart city", "innovation", and "smart". These strategies and documents are varied: some focus on specific departments, while others are websites and focus on "RoadMaps", defined as a document that details a city's approach to "smartness", and the processes that it will undertake to meet these objectives (as per Dallas' definition of a RoadMap from their "Smart Dallas Roadmap").

These nine cities were selected because they have developed distinct "smart city" elements, whether on websites or in documents. While some of these cities do not actually have distinct smart city plans written up as documents, various articles and write-ups on their webpages

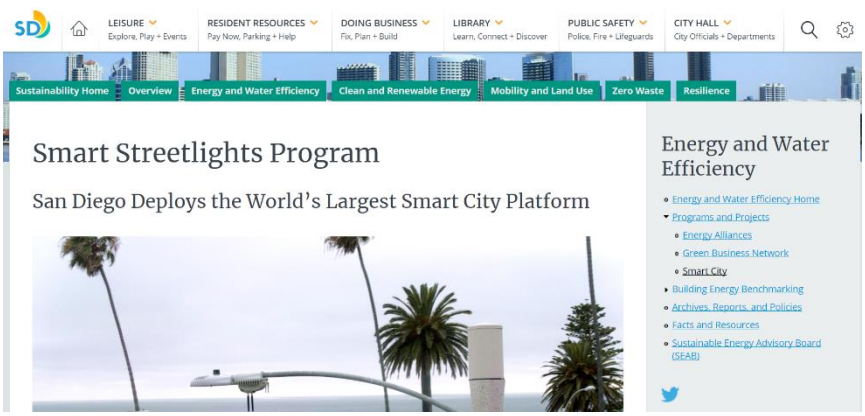
demonstrate they have a variety of smart city initiatives and "smart city elements." For this reason, these cities were also included as they provided evidence that they were still adopting smart city elements.

The analysis of smart city documents has been used successfully in the literature to identify trends in smart city deployments and initiatives, and to indicate contextual details about the smart city implementation strategies (Lee and Lee., 2014; Neirotti et al, 2014). Moreover, the use of these plans, websites and strategies is useful because of their content: these documents and pages typically outline technology rollouts, statement of the values and the mission of the smart city initiative, and could be considered indicative of an individual city's pull to implement smart city strategies (Angelidou, 2015). Thus, analyzing smart city plans is useful as it allows us to see a city's intention regarding the implementation of such technologies.

A brief outline of each individual city's documents follows.

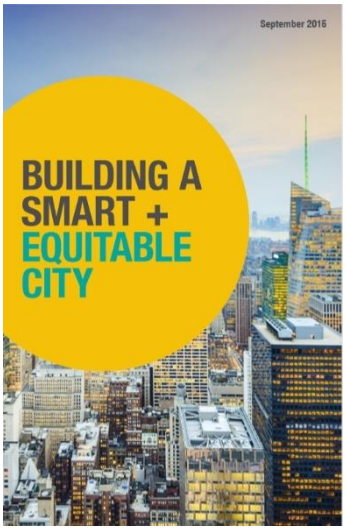
San Diego

The city provides a webpage on the "smart streetlights" and "smart sensors" programs taking place in San Diego. In addition, minutes from a critical meeting on the Smart Streetlights from September 10, 2019, are located on the page, as well as a San Diego Police Department Procedure and ordinances outlining how data might be collected.



The “Smart Streetlights” page shown above, features instructions on accessing the metadata for residents, and an explanation of how one might do so. A video at the bottom of the page from General Electric entitled “San Diego: Data Powered Cities – DRONEWEEK” accompanies the page.

New York



The City of New York first implemented the OneNYC 2015 plan and posts subsequent updates yearly. The document “Building a Smart + Equitable City” reported on 10 case studies of relevant initiatives from OneNYC agencies. The plan itself did not include an explicit smart city plan for New York City.

Chicago

The City of Chicago does *not* have an explicit smart city plan, rather a “Technology Plan” that considers 28 specific initiatives within five broad strategies, with two strategies being foundational and the third being growth-related. The foundational strategies were infrastructure and “smart community” (building literacy), while the ones on growth were focused on “efficient, effective and open government”, civic innovation, and “technology sector growth”. Specific themes are used to tie together initiatives across different strategies (i.e. “#savings”, “#services”, etc.)

This report was specific to the city's collaborations with post-secondary institutions and research centers. Additionally, the report includes measurements for engagement, which they define as "clicks" on a page or "engagements".

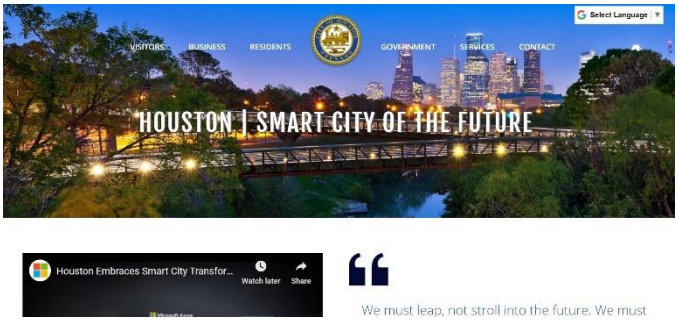
While the report is thorough, the City of Chicago makes it very clear that this is a "Tech Report", rather than a smart city report. It does not make any specific reference to "smart" strategies or cities, instead choosing to focus on how technology would enable "opportunity, inclusion, engagement and innovation" (City of Chicago, 2013). However, many of the themes in the Chicago report overlap with other initiatives found in different cities: their focus on policing and safety, literacy, and infrastructure is also found in the smart city report for Dallas.

Los Angeles

While the city is in the process of developing a smart city plan, there is currently no overarching plan or report in existence. Instead, there is a website on the Bureau of Streetlighting page that is dedicated to various smart city technologies that the City is engaging in, including "smart poles", which includes USB phone chargers, public wi-fi, and CCTV cameras, EV charging stations, and solar panel installations.

Houston

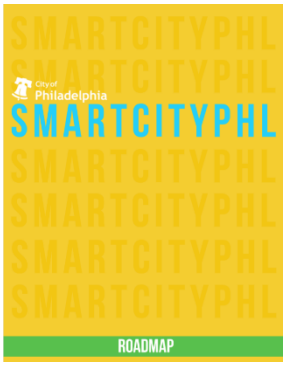
Houston's Smart City website comprises of listings of the initiatives that the city has active, including those relating to public safety, transportation, resiliency and sustainability—but the city does not have a distinct plan. Most notably, a video from Microsoft on a joint initiative is featured heavily on the front page. The video features an interview with Mayor Sylvester Turner, which indicates a level of cooperation between the two parties.



San Jose

San Jose features a "Smart City Vision" website that outlines three initiatives: "Safe City", which uses data to analyze and measure safety; "Inclusive City", which considers increasing digital infrastructure, access, and addressing affordable housing problems; and "User-friendliness", which builds a neighborhood dashboard that expands civic engagement, uses open data and visualizations, and various demonstrations.

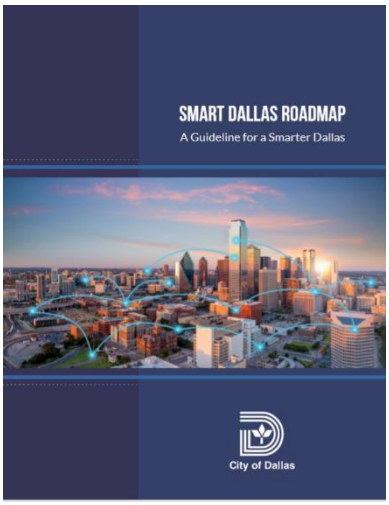
Philadelphia



The City of Philadelphia has a #SMARTCITYPHL roadmap (a document that is 25 pages long) that is intended to be "an initial guide to spur innovation and collaboration in City government around smart city and the policies and technology surrounding it" (City of

Philadelphia, n.d.). The document includes guiding principles, a methodology, and assets, in addition to three core strategies for the implementation of the smart city.

Dallas



Dallas has a 45-page document outlining the Smart Dallas Roadmap. It encapsulates the five citywide strategies (smart mobility, smart infrastructure, smart environment, smart public safety, and smart government) and outlines current and future challenges, in addition to areas for the strategy to expand.

Importantly, the document also reveals a definition about what the smart city is.

San Antonio

San Antonio presents a number of different documents that demonstrate different reports, presentations, and media used by the office in broader smart city strategies.

While there is no explicit roadmap yet, their website currently details a variety of city projects, including:

- Digital Community Kiosks
- Drones
- Cameras
- Streetlights
- Parks mobile apps
- SA Trip (to “improve pedestrian safety and reduce congestion)
- Wi-fi in parks
- 311 Mobile App

  Innovation Zones, which are specific communities within San Antonio that are “proving grounds that allow us to test intelligent processes and emerging technologies”

Analysis of Findings

Analysis of the Documents

For each of the nine cities identified previously, I identified sections of their plans or websites where residents or "citizens" are mentioned in an initiative. I coded each project and initiative in their pans as a specific form of participation aligned to Cardullo and Kitchin's scaffold, using the examples provided in the scaffold as reference. The following section lays out some of the technologies, strategies and initiatives that mention citizen involvement.

In their typology, Cardullo and Kitchin categorize Dublin's smart city projects as a way to understand how citizens are "conceived and positioned" within these initiatives (Cardullo and Kitchin, 2019). This allows them to assess how citizen-focused these initiatives are. Within their typology, they have four general categories of participation (non-participation, consumerism, tokenism, and citizen power) that are then broken down into nine subcategories, providing greater detail.

They describe Non-Participation (with Therapy and Manipulation as subcategories) when citizens are "nudged and steered toward specific sets of behaviour, practice and conduct". Examples that the authors use are systems that mediate how citizens maneuver around the city, such as the SCATS (Sydney Coordinated Adapted Traffic System), which regulates traffic flow. Non-participation is also described as when personal views and opinions are influenced by education, as seen in advocacy coalitions involving private industry and politicians, that sponsor challenges and workshops educating city staff on the merits and potential of smart city systems. Most notable about this level of participation, the authors write, is how it is "underpinned by strong technocratic impulse" (2019, p. 6) along with paternalistic systems that frequently overlook the citizens in inviting such participation.

Consumerism (with a subcategory of Choice) is identified as citizens having the ability to choose between largely urban pre-determined services and/or products. As an example, the authors point to a "smart meter" that allows for consumption monitoring, which they write only allows for limited involvement as citizens (i.e. they do not have significant choices in the way they are provided these services). Just like Non-Participation, Consumerism is also heavily influenced by this "technocratic impulse" and reframes citizens, who have rights and entitlements, into consumers, who are able to pick from a variety of services and offerings often from the private-sector (2019, p. 7).

According to Cardullo and Kitchin, Tokenism (with subcategories of "Placation", "Consultation", and "Information") allows for some level of engagement and voice: it varies from "informing" citizens, where they are aware of what is happening in the city (such as "Dublinked", an open data store with products like datasets run by local authorities), to "consultation", where citizens can provide feedback through methods like social media and "placation", where citizens are able to provide more substantive feedback including alternatives to what has been proposed. However, Cardullo and Kitchin note in their analysis that many of their examples that fall under the "consultation" moniker were those that provided citizens with the opportunity to give input *after* objectives for individual project objectives were decided and approved—the authors also note that crowdsourcing also involves the use of free labor by their citizens that is rarely compensated.

Finally, the last level of engagement is Citizen Power (with subcategories of "Partnership", "Delegated Power", and "Citizen Control"), which Cardullo and Kitchin view as something akin to citizens gaining decision-making authority and are overall "fully in charge of the policy and managerial aspects of a program or institution" (2019, p.9). The authors note that it was difficult

to find such an example in Dublin, and cited examples like Code for Ireland, a civic organization where citizens take on the responsibility of creating civic apps for a variety of uses.

Participation in the Context of American Smart Cities

Using the methods listed above to categorize each of the smart city projects and initiatives proposed, I was able to aggregate the types of projects that appeared most frequently across the nine cities.

Cardullo and Kitchin conclude in their Smart Dublin assessment that the majority of Smart Dublin's projects are concentrated in lower levels of participation. As they write on page 10:

> *"Instead, most citizens are "empowered" in the smart city by technologies that treat them as consumers or testers, or people to be steered, controlled, and nudged to act in certain ways, or as sources of data which can be turned into products. In other words, smart cities perform within the bounds of expected and acceptable behaviour, rather than transgressing or resisting social and political norms."*

An analysis of these projects demonstrate that these American case study cities display a similar trend: many of the projects and initiatives in the nine case study cities have lower levels of participation, particularly "Manipulation", and "Choice". Below, in Figure 6, is an aggregation of the number of specific type of projects in each of the cities. In total, there were 145 projects identified from the plans.

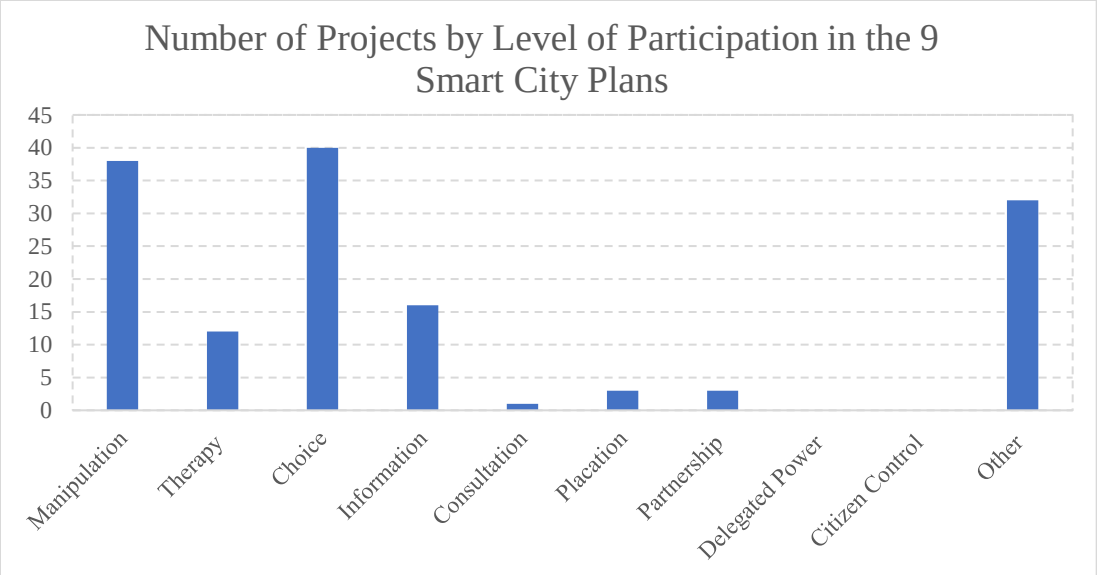


Figure 6: Participation & Mention of the Residents within the Smart City Plans

In the following section, I will summarize findings from each level of participation before concluding with some overarching themes.

Manipulation

Among the cities, the City of Dallas had the greatest number of projects that fell under the category of "Manipulation". These projects ranged from congestion reduction systems (like an advanced traffic management system and multimodal transit navigation) to camera surveillance and crowd analytics. This is unsurprising considering the common narrative used in private sector marketing around smart cities: the city is meant to be informational, and one that generates "insights" (Harrison and Donnelly, 2011). In order to generate these insights, these cities must be effective in collecting the data needed.

In Houston, which also had a high number of "Manipulation"-oriented projects, projects focused on intelligent transportation systems (a real-time data collection for traffic), in addition to community sentiment analysis and even a lead elimination research project, a risk model that

would help prioritize where environmental investigations would be conducted to protect from lead hazards. While the latter would not be a project that directly took citizens as datapoints, it captures data from environments directly in the vicinity of such citizens, and uses it to "keep the public safe from lead hazards", leading directly to outcomes that would impact the citizens.

Therapy

Arnstein's original description of Therapy describes insidious actions by planners or organizers of engagement events that would use them to "cure" the participants of their "pathologies". To illustrate, Arnstein used the example of a father whose child died from a misdiagnosis, and how he attended a Community Action Agency meeting with some hope of change in the local hospital; instead the hospital board implored the father to attend parental child-care sessions and gave him a weak promise to "telephone the hospital director to see that it never happens again" (Arnstein, 1969).

While less common than "Manipulation", Cardullo and Kitchin give the example of a smart city office located within the city that influenced narratives around the smart city in Dublin through a variety of means, like campaigns, educational materials, and workshops (2019). In a smart city, therapy would be seen in a similar light, where projects and initiatives would orient around "soothing" the users rather than validating their concerns.

One example in particular is able to illustrate this level of participation: San Antonio's Innovation Zones. The Zones are designated areas in the city with the objectives of identifying challenges in each zone, and "test new processes and technologies in a real-world setting" ("Smart SA: Innovation Zones", n.d.). Three zones were specifically chosen in San Antonio

(Brooks, Downtown and Medical Center), and they are to be used as spaces to literally implement the smart city projects and initiatives before they are made permanent.

In February, an event called "SmartSA Sandbox", described as a "family-friendly pop-up event that is a hands-on opportunity for residents to experience and imagine the future of San Antonio" ("SmartSA Sandbox at Brooks", 2020) was held in Brooks (a community located close to downtown San Antonio), in the community's Innovation Zone. The event provided participants with the opportunity to demo multiple technologies including autonomous vehicles, smart sensors, and electric cars, but the city also partnered with organizations that provided coding and robotics workshops, information from the city, and demonstrations.

With Innovation Zones and spaces like this, residents are given the opportunity to test drive and see the innovations that would be implemented—but offered less opportunity to protest or re-orient the technologies that are being implemented in the space. An interview with the San Antonio smart city manager revealed that the feedback received wouldn't be used necessarily to "compile or put in a report", but would be used to inform strategies that they would deploy in the innovation zone (E. Royall, personal communication, February 3, 2020).

However, a representative from CityFlag, an organization that was present at the event, described the SmartSA Sandbox event as "effective", and that "residents were enthusiastic and willing to receive information" (interview, 2020), underscoring that residents were not present to provide information or feedback, rather to *receive.* Cardullo and Kitchin give a similar example of a "therapy"-oriented initiative (Smart Dublin, a coalition of high-level stakeholders) contributing to the reshaping of personal views, and educating both workers and citizens "to the logic of a smart city (Cardullo and Kitchin, 2018). San Antonio's Innovation Zone provides a similar example of an event in a location that seeks to orient and educate residents to such a logic.

Choice

Choice was a new addition to the Arnstein ladder, intended to capture the smart city projects and initiatives that reframed citizens as "consumers" who often are given the choice between a preselected group of options. In Dublin, this is exemplified through smart buildings and homes, where citizens have an increasing opportunity to live in a "smart neighborhood" (similar to Sidewalk Labs' failed Toronto project), and from there, have a selection of choices of "smart" consumer goods that they can afford. In the smart city, the civic responsibilities of citizens have been shifted away and citizens have been classified more as consumers who simply buy these government services from providers. In the UK, where there are many such smart city projects, the role of citizens have been analyzed through such a lens where their responsibilities have been traded instead based on *exchange,* particularly on data (Cowley, Joss and Dayot, 2017).

Both Dallas and Houston have a large number of projects focused on Choice (7 each), such as the installation of Public Wifi, Mobile 311 and Next Generation 911 from Dallas, and 311 Chatbots and Smart Water Meters from Houston. However, there is a difference between products like Dallas' Mobile 311, replaces an existing customer relationship management (CRM solution), and Digital Services-ePlan, which allows for the "seamless process for document submission, permit application, plan review and approval, and permit issuance" ("Smart Dallas Roadmap", 2018).

While both are intended to address "the objective of on-demand access", the former replaces an existing management system that already frames residents as consumers, which does not reflect a change in the way a smart city conceptualizes residents. However, with the Digital Services-ePlan, this represents a change in the way the planning process is envisioned: it is one that speeds the process up, specifically reducing the time needed for the permitting process by replacing

paper-based processes. With greater efficiency and speed in permitting processes like these, citizens are likely to have their own opportunities for engagement shifted to fit a more streamlined process.

Information

Both Arnstein's ladder and Cardullo and Kitchin's scaffold position "Information" as a subcategory under "Tokenism", where citizens are allowed more than simply being manipulated or choices—they have some level of information, which allows them to make more informed decisions or have a better understanding of some elements of how their cities work (Cardullo and Kitchin, 2018).

The city with the greatest number of projects and initiatives oriented around Information is San Jose, with multiple projects focused on presenting information in "innovative ways". The City of San Jose divides their smart city initiatives into eight individual sections, and many of their projects focused on Information fall under the "User Friendly City" category. Their proposals include a "Neighborhood Dashboard" which includes information on developments projects, while also providing the functionality for reporting broken streetlights and potholes, and utilizing "open data and visualization to inform public dialog, policy-making and management decisions" ("Smart City Vision", n.d.).

Just like many of the projects in the "Choice" section, many of the projects outlined in the Information section use technology to present some kind of information. That many of them are in San Jose is not unusual, due to the city's proximity to Silicon Valley. Noting that "the City of San Jose is the Capital of Silicon Valley", the City writes that they "aspire to be as innovative as the community we serve" ("Smart City Vision", n.d.). In doing so, they adjusted their tools and

the ways in which they deliver information to ones that they believe will align with the technological inclinations of people in Silicon Valley.

The City of San Jose also wrote that they intended to use data tools to demonstrate indicators such as the "purchasing power of neighborhood foot traffic by location" in an effort to generate economic development in struggling business districts. In this instance, while not directed exactly at residents, these indicators served as information that allowed stakeholders to make informed decisions, on where they might choose to locate.

Minimal Consultation, Placation, and Partnership & Lack of Citizen Control and Delegated Power

In climbing up the ladder and the scaffold, it becomes evident that there are very few projects and initiatives that encourage consultation and placation (both subcategories for "Tokenism"), very little Partnership and a total lack of Citizen Control and Delegated Power (all three considered to be subcategories of "Citizen Power").

This is not illogical when one considers the roots of smart cities and how they began. These initiatives are often sold to cities as tools to help analyze the data that these cities are creating. Private companies like Cisco and IBM have sold cities various technological solutions that help "make the invisible visible" (Harrison and Donnelly, 2011), and recent literature has investigated how smart cities are inherently centered around systematic data capture (Sadowski and Pasquale, 2015). A significant reason why these systems exist is because they collect and interpret data, justifying the large number of Manipulation-style projects.

In addition to the reasons why there are more projects and initiatives involving less citizen power, the presence of fewer projects that involve *more* citizen power and engagement is

consistent with what some have found to be less willingness from city staff and officials to engage residents, particularly in the plan and policy development phases.

In an Atlanta, Georgia case study of a smart city engagement event, in addition to an analysis of ongoing initiatives, a heuristic of the "general citizen" and the "absent citizen" is developed for thinking through the physical absence of citizens in policy and initiative development events. While citizens were frequently mentioned in the development process of the smart city and referred to as "a user" and "receptacle" for the policies developed, citizens were frequently "absent," ands there were very few attendees who were citizens off the street and *not* invited because of their association to high-tech or municipal organizations. Indeed, lay citizens were largely absent from the smart city engagements (Shelton and Lodato, 2019).

"Other"

Among all of the projects and initiatives that were listed in the Cardullo and Kitchin scaffold, there were multiple that simply did not have any public-facing orientation. These were projects like the sanitary sewer outflow monitor in Houston, water and air quality monitoring in New York, and smart irrigation in Dallas.

An additional section is added for "Other" to capture projects and initiatives that do not directly involve citizens, and are focused on infrastructural projects directly related to how governments and services function. It is notable that there is a significant amount of projects and initiatives that fall into this category: it captures the roots of the "smart city" movement, which was initially focused on the sensors and data analytics, similar to what was mentioned in the first section. Companies like IBM and Cisco originally used the term "smart city" in the early 2000s to develop products that would provide cities with new opportunities for the development of "urban

systems" and "instrumentation" (Harrison and Donnelly, 2011). While the definitions of smart cities and the ways in which the term is used has expanded beyond this initial term, it's clear that there are remnants of this history in the types of products that are proposed and embedded in each individual city.

One element of consideration with large infrastructure projects like these are whether they could ever involve a level of citizen engagement, even though they do not directly interact with residents. Large urban planning infrastructure projects may certainly differ from smart infrastructure projects, where many of the latter can be invisible to the naked eye and may entail detailed understanding of technology.

It may indeed be possible, as the literature does notes that new rungs like education might be necessary in order to reach greater citizen power. In circumstances of large, complicated infrastructure projects, residents may benefit from additional "rung" of education on an Arnstein ladder where they can improve on their understanding of context of history of the products (Connor, 1988), and this could be just as applicable to large, complicated *digital* infrastructure projects. In the context of a smart city, Cowley, Joss and Dayot (2017) note that for more "fully public smart city assemblages", there may need to be catering toward these service users, and if not siloed to "participatory events" that serve more as lip service than actual participation, could provide assistance and greater engagement in the development of these large infrastructure projects, and are particularly crucial for projects that become increasingly controversial, like the implementation of facial recognition software, and Wifi infrastructure.

Conclusion

Consistent with the literature, a significant number of the projects and initiatives found in the smart city plans are those that engage their citizens less: out of the 145 projects listed in total, 38 were projects identified as Manipulation, 12 were projects listed as Therapy, 40 as Choice, and 16 as Information.

The volume of these projects is particularly stark when compared to the number of projects and initiatives that either provide minimal "tokenism" representation, and especially not any that give citizen power. Much of this may be due to a decreased involvement of citizens in the development of these plans and processes, and that is what the next section will investigate.

Three Case Study Cities & Their Smart Citizens

The second question that this thesis intends to investigate is how individual cities envision public engagement and the role of their citizens in their smart city initiatives.

The previous section ends with a particular observation that when all of the projects from different cities are aggregated together, there are fewer participatory projects and initiatives in the three case study cities. However, between each individual city, there are often clear distinctions in the types of projects that appear most frequently. As an example, the City of San Jose had 7 projects categorized as "Information", while many cities like Los Angeles, New York City, and San Antonio had none.

As smart city plans begin to proliferate more around the world, they have become paired with greater discourse around the impacts of these technologies to residents.

In May 2020, in the middle of the COVID-19 pandemic, Google's sister company Sidewalk Labs chose to walk away from their proposed Quayside Toronto project (Doctoroff, 2020), but not after months and years of controversy and pushback from the local community (Bliss, 2018),

oftentimes around governance and engagement (Wylie, 2018). While the Sidewalk project was led by a private company, it involved many of the same technologies that are found in proposed smart cities. While few smart city projects have been so widely panned as Toronto's Sidewalk Labs (just googling the project reveals many hits on the controversy behind the topic), many smart city plans have historically involved partnerships between private and public sector (Wiig, 2015; Harrison et al, 2010) and cities may one day find themselves in similar positions.

In the literature, citizens have sometimes been seen as "absent" in the smart city, whether in the imaginary future vision of a smart cities, or directly in meetings on the smart city, where they are referred to, but are largely absent from such convenings (Shelton and Lodato, 2019; Vanolo, 2016). The next section reports on interviews with smart city staff about their opinions of situating their residents in the smart city.

Is the low participation in the projects and initiatives an outcome of the process that the city went through to create the plans? The following section begins first with an overview of the case study cities before analyzing qualitative interviews from staff at each of these cities to understand the way cities envision public engagement of their citizens in smart city initiatives. Rather than going in depth, these overviews are meant to provide some context on the ways their smart city contexts have evolved.

San Antonio

San Antonio is a city located in Bexar County, Texas. The San Antonio Digital Inclusion Alliance notes that 1 in 4 households do not have internet access ("San Antonio Digital Inclusion Alliance", n.d.), and this is a fact that according to the Smart City Coordinator at the City of San Antonio, Emily Royall, influences some of the outreach that her office conducts.

In 2015, the Office of Innovation and Reform pushed for the creation of a smart city initiative, and the City Manager began the smart city team at the Office of Innovation. In 2016, when San Antonio held their City Council Budget Goal Setting Session, they defined "smart city" as one that "uses information and communications technology (ICT)" to enhance its livability, workability, and sustainability ("Smart City: City Council Budget Goal Setting Session", 2016).

In April 2017, a "Smart City Readiness Workshop" was held to gather various agents from different sectors to create a "shared vision for how San Antonio should deploy Smart City technology to address community issues." (Gomez, 2017). The event specifically focused on the following areas with six individual break-out sessions: transportation, e-government and data, water, energy, workforce development and digital inclusion, and sustainability, and called for the creation of a working group to investigate further opportunities and challenges (Gomez, 2017).

Dallas

The Dallas Smart City Roadmap outlines five priorities: smart mobility, smart infrastructure, smart environment, smart public safety, and smart government. The Roadmap for the city is supposed to have connections to various other City Plans within the city, including the Dallas Zoning Map, the Dallas Bikeway Plan, and the Dallas Cultural Plan. Laila Alequresh, the Chief Innovation Officer, described their relationship in an interview as "overlays", where the smart city roadmap is intended to overlay existing plans and draw upon them for solutions.

The first Smart City deployment occurred in June 2014 as a partnership between the City and Business ("Smart Dallas Roadmap: A Guideline for a Smarter Dallas", n.d.). The project, located in the Dallas Arts District, combined infrastructure like information kiosks, wi-fi services, and citizen connectivity that allowed for residents to make use of them. In an interview, the Chief

Innovation Officer for Dallas noted that the smart city initiative was created before the creation of the Office of Innovation—it was only after the department was established that the Initiative moved into the office.

Philadelphia

For the City of Philadelphia, the necessity for a smart city plan came about because the city had rooftop assets that were underutilized. In 2016, the city issued Requests For Ideas (RFIs) to address broadband access challenges (Hayling II, 2016) and to solicit "technology to create a smart city" (Buss, 2016). Over 100 applications were received (Bressler Group, 2017). The City received a grant from the Smart Cities Council Readiness Challenge Grant in 2017 that allowed them to host a Smart Cities Readiness Workshop to "develop a roadmap for applying smart technologies to further innovation, inclusion and investment within their cities", in addition to receiving guidance from the Council and recommended products and services from the Council's member organizations (Dunn, 2017). The City also received some funding from the Knight Foundation (which funds and focuses on journalism, the arts, technology, and cities) to help develop their Smart City Roadmap (Descant, 2019). The foundation currently has a national initiative focused on smart cities, which they define as "harnessing the growth of digital technology to improve how communities respond, connect to and engage with residents" ("Communities", n.d.).

In February 2019, the City of Philadelphia established their "SMARTCITYPHL" initiative under the executive order of Mayor Kenney (Dunn, 2019). The order itself primarily involved establishing a leadership structure "to drive governance and collaboration" through an advisory committee that includes the Mayor, and up to 15 other appointed members. The established

committee includes members from colleges, technology companies, and organizations focused on digital literacy (Torres, 2019).

Their Roadmap is subsequently divided into three distinct sections:

- Building a strong foundation with policy and infrastructure, which includes the further development of initiatives such as a data warehouse, integrated data system, address system for geospatial data, vacancy modelling, and automatic vehicle location;
- Creating a process for engagement and partnership, which involves developing a model for problem identification, and a pipeline for partnership; and
- Supporting and sustaining implementation of projects and programs with funding.

Engagement

While there is a distinct variety in the types of engagement that cities have conducted over the course of development of their roadmaps and plans, the consistent thread is that overall there is little citizen or resident engagement, echoing the findings from the participatory nature of the smart city projects and initiatives in the previous section.

Philadelphia worked with private sectors firms to create their plan, and consulted with existing groups, including private sector organizations, NGOs, and incubator spaces.

The Smart City Director explained that doing this allowed the office to create a framework and a strategy that the residents could engage with after its creation, lest the process be slowed if residents were to engage and create their own ideas from scratch:

"How do you go into the neighborhood and talk to them and build an understanding and ownership in the technology that we're using? If we were to do that in the process of the strategy where so much is left unclear or unknown, it would have delayed the process."

The Director was also clear in categorizing this process as urban planning, and that the process was slow as a result of added human emotions of fear and the future. In providing residents with a structure in which to engage, rather than allowing them to create their own ideas of the smart city from scratch, the City of Philadelphia preferred to provide them with their own predefined proposals as a method of removing particularly emotional elements that could slow the process. The Director was also explicit that they believed there was a clear demarcation in the types of projects that required community engagement and those that did not, saying that for technologies like streetlights, for example, there did not need to be significant community engagement-- but for politically-charged technologies like sensors, there would need to be engagement, and in those circumstances, they would partner with departments who had strong and existing relationships with the community to develop those engagement strategies.

One of their areas of focus is "'Smart Cities' as Responsive Cities", which the foundation describes in the following way ("Communities", n.d.):

As digital technology reshapes our lives, we invest in technology-enabled efforts that help residents connect to each other and become more informed, and that help cities be more responsive to residents.

In an interview, the Director emphasized that she found the Knight Foundation to be much more "human-centric". However, there were little opportunities for residents to be involved in the projects mentioned in the city's plan. Section 2 of the plan, which focuses on the creation of a

process for engagement and partnership, provides an outline for how to determine problem statements and solutions, a Pitch & Pilot program, and a workshop and education series to provide better "engagement and informed decision making". The Pitch & Pilot is a model for partnership between the City of Philadelphia and organizations looking to either respond to proposals or to pitch pilots. Thus, there is an opportunity during the process for a working group to review the proposals, but no other opportunities do residents at large have to provide feedback on projects.

As there is little interaction from people in the Pitch & Pilot process, the "human-centric" nature of the Knight Foundation mentioned by the Smart City Director is not necessarily reflected in engagement or actual participation. Thus, from the perspective of bureaucrats and staff, a smart city plan can be considerate or sensitive to humans without involving them in the planning process.

The creation of Dallas' Smart City Roadmap did not involve any citizen involvement, rather City Council members who represented residents. However, in the new version of their Smart City Roadmap, the Chief Innovation Officer, in an interview, described wanting to have more meetings in the Council District, and to ask residents what might be important about specific neighborhoods, corridors and streets, and what sort of opportunities they might see (i.e. residents might identify a public safety problem, and then identify opportunities or solutions that might solve those problems).

In San Antonio, there is not yet a smart city roadmap, but there was a distinct awareness of a large digital divide between residents that would hamper any engagement between the city and residents: 25% of residents did not have access to the internet. With such a large gap, the interviewee (the San Antonio Smart City Coordinator) acknowledged the necessity of learning

more and bridging the gap between them and conducted a survey that closed on February 8, 2020 with the intention of creating “Digital Divide Report Cards” for 10 Council Districts; the purpose of the survey was to determine the exact levels of access to internet, devices and literacy skills; before deciding on potential strategies for moving forward.

On February 5, 2020, the City also partnered with various partners to implement “SmartSA Sandbox”, labelled as a “family-friendly pop-up event that provides residents with hands-on opportunities for residents to test smart city technologies” (Valenzuela, 2020). The event included various technology-related activities, including testing autonomous vehicle technologies, artificial intelligence and robotics, and smart sensor technologies. This was an opportunity, as the Smart City Coordinator phrased it in an interview, to “put the technology that they’re exploring and experimenting with into the hands of the residents”. This was a strategy to make the smart city more legible for residents, even if they were unable to make use of opportunities to directly contribute to how the smart city was being designed.

It was important for the administrators in these three cities to create some prior design of the smart city before presenting them conceptually and directly to the residents. In the two case study cities with completed smart city roadmaps, there were stand-in representatives that served as stakeholder parties: for Philadelphia, these parties were previously engaged organizations, such as non-profits, NGOs, and others. For Dallas, these were elected representatives, who were brought in to consult and give feedback for their residents. In Philadelphia, allowing the residents to construct their own ideas of the smart city, and directly contributing to the actual decisions on which tools would be constructed was actually perceived to slow down the planning process of the smart city because of the emotions that residents would bring forth.

The use of such streamlined processes to consult with existing organizations is reflective of a move toward more efficient administrative processes, and of a trend in smart cities to bypass the residents. Overall, it is reflective of an overarching move toward making government process less contentious for residents. This has led to the creation of a "shadow citizen" in many smart city processes, as seen in an Atlanta case study (Shelton and Lodato, 2019): city officials and non-profits, similar to the ones presented in the Philadelphia' case study, organized around the creation of a new smart city plan, but failed to include actual residents in their engagement process, creating an image of a citizen for whom these technologies would benefit, but were seen primarily as ghosts, and non-functioning in actual smart city development process.

Conclusion

From the previous analysis of the plans, and interviews with representatives from each of the three case studies, an important observation should be made: the presence of the residents and citizens in both the projects and initiatives being developed in the smart city, and in the engagement processes of these smart city plans, remains largely absent.

Using Arnstein's Ladder and subsequently Cardullo and Kitchin's typology of smart city engagement reveals that the level of true citizen power remains throughout the projects cited in the smart city documents and roadmaps was limited: engagement strategies ranged from being non-participatory to simply offering choices to residents who had no real agency or actual options. The interviews revealed the non-participatory aspects of these smart city initiatives: in Philadelphia, for instance, asking residents about something "simple" like smart streetlights does not necessitate engagement. However, for the city, the decision not to engage with citizens was strategic. Bringing the technology to the forefront may have brought attention to an initiative that could have evoked fear in the residents, which then could have provoked some backlash.

This lack of engagement in the development of these smart cities is particularly timely at the writing of this conclusion in summer 2020. In this moment, America is at a crossroads: many commercial businesses are beginning to re-open after the initial COVID-19 shutdown, and uprisings in support of Black life and to protest police brutality and violence against Black Americans are occurring in major cities across the nation.

In the context of the former issue, smart city technologies like temperature monitoring and heatmaps are being lauded as potential solutions for monitoring the spread of COVID-19 (Hasija, 2020). In the context of the latter, the surveillance of protesters and Black protesters and communities has been well-documented (Thomas, 2020), and algorithmic technologies like the

Los Angeles Police Department's predictive policing programs frequently targeted Black and Brown people with over-patrolling and methods of social control (Stop LAPD Spying, 2018). Smart city technologies, as noted by Sadowski and Pasquale (2015), "could make the control of protests less physically violent, but ever more precise and effective as a deterrent against collective action". If these technologies are implemented, they could fundamentally change how a city interacts with and monitors its citizens. Understanding how residents are situated in these development and implementation processes of these technologies, and how meaningfully and deeply they are situated in these processes, will be crucial in assessing how this relationship evolves: will these cities perpetuate existing frameworks that simply extract data from their citizens instead of meaningfully involving them in a city that incorporates smart technologies? Or will they deviate from these existing patterns?

These are questions that remain relevant in the present, but more questions exist: in both the literature and in this thesis, there has been little exploration on what the actual citizens themselves think of the smart city, and what they perceive *their* places to be within the smart city. A more systemic understanding of these perceptions may be restricted by the deeply personalized nature of each individual smart city (i.e. Dallas' smart city technologies look different than Philadelphia's). However, a future area of research lies in parsing these individual understandings of the smart city, or even in gathering or understanding collective understandings of a smart city. This thesis concludes from the data that there were no smart city projects, nor engagements, that firmly placed the agency and direction of a smart city project directly in the hands of the citizens—however, as these technologies become deeply intertwined with our workplaces, homes, and urban spaces in this time of upheaval and revolution, understanding how both municipal governments and citizens visualize these future cities—the smart city—and place

themselves will hopefully help guide the development of these smart cities in ways that reflect these current movements of justice and equity.

Appendices

Appendix A

Semi-structured interview instrument:

1. What were the factors pushing for the development of your city's smart city strategy?
2. What were the objectives for the strategy?
3. How did you engage residents in the development of your smart city strategy?
4. What were methods that you used to engage residents from marginalized communities?
5. What do you think is the role of your residents in the smart city?
6. Are there formal programs or opportunities through which residents can be involved in the smart city? How do you incorporate feedback or participation from these residents?
7. From your perspective, how does your smart city strategy impact the ways in which your residents interact with or experience the city?
8. How visible is the "smartness" of the city to your residents (i.e. do you think that your residents are aware of their impact)? Do you believe that it impacts the way in which they interact with the city?
9. Who benefits from your smart city initiative (all citizens? Some groups of citizens?)

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