People-Centered Planning for Smart Cities

Exploring the use of smart city technologies in efforts to engage the public in planning in and around the Proctor Creek Watershed

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Summary

City planners will doubtless play a significant role in the design and implementation of smart city projects. In a 2015 report on Smart Cities and Sustainability the American Planning Association (APA) purported that smart city technologies (SCTs) will aid planners by creating more avenues for community participation in policy and planning processes (APA 2015). In reality, it is likely that these smart city technologies (SCTs) will disproportionately benefit communities that already have the resources and skills to engage in planning and policy-making processes. This study challenges the claim that smart cities will enable greater public participation by investigating the use of SCTs in efforts to engage the public in three planning efforts conducted in the Proctor Creek Watershed in West Atlanta. The findings show that use of SCTs is uneven among different stakeholder types and that perceptions about the impact of these technologies on enabling the public to engage in planning processes do not necessarily correspond with use. While use of SCTs was found to be uneven, community residents who participated in planning efforts reported that the use of certain technologies increased their understanding of the issues and their trust in the professional planners. These community participants expressed a strong desire to understand the data and technology being used in the planning process so that they could use those tools to advocate for their own community needs. As investment in smart cities grows, professional planners need to advocate for equitable development and deployment of new services and technologies to ensure that disadvantaged communities are not further disenfranchised by this new wave of automation. City and regional planners need to remain mindful of the context in which, and the audience for whom, they are planning. Further research is needed to better understand the how to plan for and develop smart cities that improve quality of life for everyone.

Introduction

The term smart city has become commonplace in city planning in recent years. While there is no universally agreed upon definition for a "smart city", descriptions typically refer to an integrated and interoperable network of infrastructure and digital information and communication technologies (ICTs) that are able to share data in real time and improve the quality of urban life (Albino, Beradi, and Dangelico 2015). While these hypothetical sketches of smart cities focus on sustainability, efficiency and equity, in reality many smart city projects are more about big business maximizing profit than anything else (Griffiths 2013). A prime example of this is Dholera, one a dozen planned "smart cities" in India, where farmers have been disposed by the developments leading to a grassroots uprising (Datta 2014).

Many of the technological enhancements propelling the smart city revolution require re-designing and in some cases re-constructing the underlying infrastructure holding cities together. City planners therefore will play a significant role in the implementation of many of these projects. In a 2015 report on Smart Cities and Sustainability the American Planning Association (APA) purported that these technologies will aid planners by creating more avenues for community participation in policy and planning processes (APA 2015). This claim, however, disregards existing social disparities related to technology and the sort of urban revitalization often associated with smart cities. In reality, it is likely that these smart city technologies (SCTs) will disproportionately benefit communities that already have the resources and skills to engage in planning and policy-making processes. Rather than benefiting marginalized communities, they may in fact exacerbate existing social and economic divides.

Advances in technology have changed the way we live and interact with one another. The Internet has been created new avenues for political engagement and collective action (Norris 2001). However not everyone has the access to the same technologies. The "digital divide" refers to the growing gap between the underprivileged members of the population who do not have access to computers or the Internet, and those with access. The divide, however, does not stop at access but also extends to peoples' knowledge of and ability to use the technology (Selwyn 2004).

This study is grounded in the belief that meaningful public participation is a vital part of city planning that leads to more effective planning efforts. While public participation has been accepted as a vital element of city planning for decades (Arnstein 1969; Booher 1975), meaningful community engagement is often still missing in modern planning efforts (Glass 1979). Examples can be found where technologies have been successfully used to enhance public participation in planning (Jankowski 2009) or enable community-led civic engagement (Warren, Sulaiman, and Jaafar 2014), however simply adding technology to the planning equation does not guarantee meaningful participation (Sylvester and McGlynn 2010). As "participation" itself becomes increasingly digitized how do we as city planners and as citizens engage differently?

For the purpose of this study, the term *planner* refers to anyone who engages in activities related to the design of a community's appearance, functionality and livability. The labeling of the different stakeholder categories with the term planner was chosen intentionally to highlight the fact that you don't have to have a degree in planning to do the work. For example, of the five primary planners interviewed in this study, only three of them have planning degrees.

This study explores the use of smart city technologies (SCTs) in efforts to engage the public in planning efforts using the Proctor Creek Watershed in West Atlanta as the case study. Three main questions were investigated:

1. Do the amount and types of SCTs used in planning efforts vary by stakeholder type?

It was hypothesized that different stakeholders would use different technologies based on their role in the planning process, professional training and access to technologies. For example, it was expected that the people leading the planning efforts would be professions whose job it is to create plans (whether they work for the public, private or nonprofit sector) and who would have knowledge of and access to more types of technology than the average citizen participating in the planning efforts. Overall, it was expected that lead planners and technical experts would use more SCTs on average compared to community participants.

2. How are SCTs used by different stakeholder types?

The way in which the technologies are being used could say a lot about their overall role in the process of planning in smart cities. In the cases where different types of stakeholders used the same SCTs, it was hypothesized that they may be using the technology for different purposes. For example, most stakeholders presumably use the Internet during the planning process, but one stakeholder type might be using it to email friends and colleagues about a public meeting and another stakeholder type might be using it to mine a data center for useful information. It was hypothesized that the people leading the planning efforts and the people providing technical assistance and expertise would use SCTs for more technical purposes, such as data mining or GIS mapping, while citizen participants were expected to use technology for less-technical purposes, such as communication via mobile phone or email.

3. What is the perceived impact of the use of SCTs on citizen participation in the planning process from the viewpoint of different stakeholders?

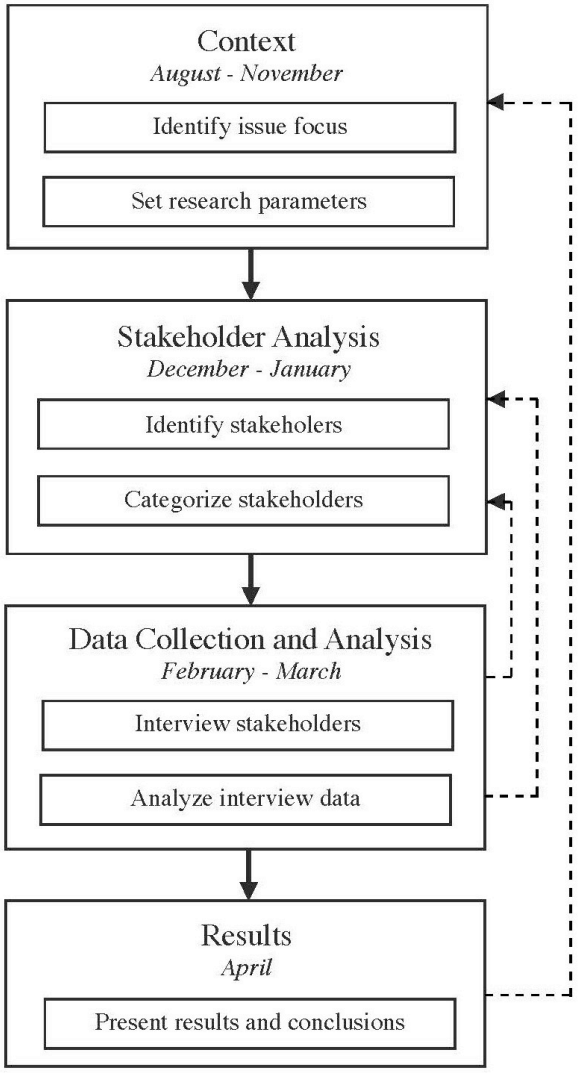
Lastly, it was hypothesized that the perceived impact of SCTs on enabling public participation in planning would differ based on a stakeholder's their relative power in a traditional planning framework. Based on the earlier hypothesis that certain types of stakeholders will use more SCTs due to their educational background and professional resources, it is expected that those stakeholders will also perceive SCTs are having a greater impact on effects to engage the public in planning processes due to the assumption that they themselves use more SCTs.

This study is divided into five sections. The first section lays out the methodology, provides an overview of the data, defines key terms, and identifies limitations. Section 2 offers a literature review of existing research on participatory planning, technology and participation, smart city technologies, and other related topics. Section 3 provides background information about the case study area and a history of the degradation of the creek itself and major efforts to clean it up. Section 4 presents the results from the interviews and section 5 lays out the key findings from the study.

1. Methodology

This case study employs a mixed-methods approach, combining an academic literature review, a review of past plans, and structured interviews. Figure 1 below provides a diagrammatic representation of the research process. The dashed lines indicate the potential for future steps to inform preliminary steps in an iterative process.

Figure 1. Research process and timeline



To begin, background research was done to understand the history of the area and context for recent planning efforts. The Proctor Creek Watershed was selected due to its relatively high profile

nature, which made it easier to find detailed information about relevant projects and planning efforts, as well as the active community efforts to engage with planning and development in this area. In the past decade there have been a number of planning efforts conducted in the Proctor Creek Watershed. Three of the most recent plans were reviewed and references to public participation and SCTs were identified and analyzed. The background research also helped produce an initial list of potential interviewees, which was expanded using the snowball effect. Next, a literature review was done to help frame the study around existing research on the role of technology in public participation in planning and decision-making processes.

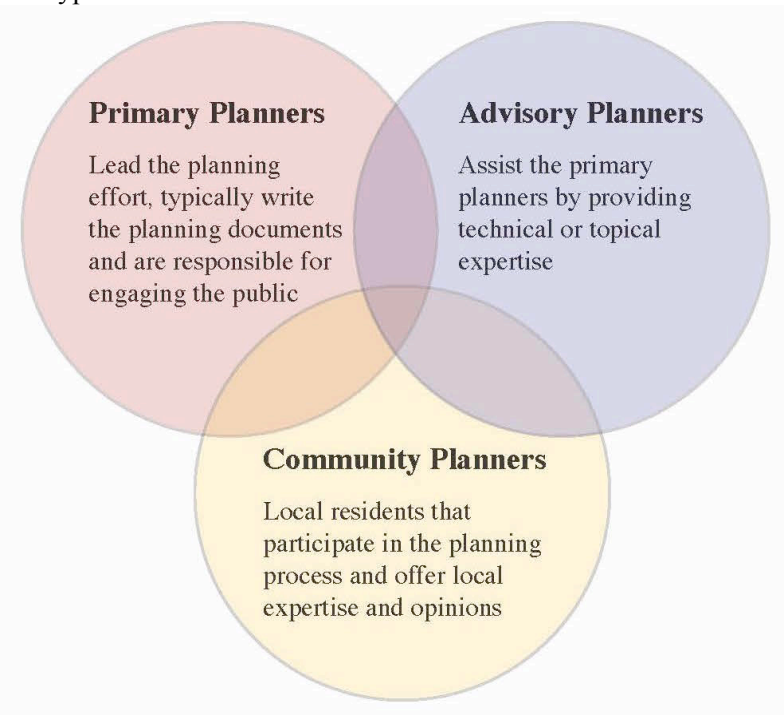
In order to explore the use of SCTs in efforts to engage the public in planning efforts in the Proctor Creek Watershed twelve key stakeholders were interviewed. Five of the interviewees were considered "primary planners" and served as the lead planners in the planning efforts. Three of the interviewees were considered "advisory planners", serving as advisors and technical experts assisting the planning processes. The four remaining interviewees were considered "community planners" and represented community members who participated in the planning efforts and provided local expertise. During the interviewees the participants' role was confirmed by asking them which category they felt best fit their capacity in the planning efforts around the Proctor Creek Watershed.

1.1 Stakeholder identification and categorization

Stakeholders are defined as 'any group or individual who can affect or is affected by the achievement of an organization's objectives (Freeman 1984, 46). The stakeholder interviewees were selected using a convenience sample. An initial list of stakeholders to interview was compiled during the background research stage. Individuals identified in the three plans were emailed and invited to participate. Snowball sampling was then used to get the names of additional stakeholders. Stakeholders were categorized using a top down analytic approach based on the researcher's knowledge of the planning process from working in the field and existing research within the discipline (Reed et al. 2009).

Drawing from Podnar and Jancic's (2006) method of categorizing company stakeholders based on stakeholder analysis and theory, stakeholders were grouped into three categories based on the author's interpretation of their role in a traditional planning process (see Figure 1.1 below). The first type, primary planners, includes individuals who led the planning efforts. These stakeholders are usually the ones writing the plans and so they are the ones that are required to engage the public during this process. The second type of stakeholders, advisory planners, typically assist the primary planners by providing technical assistance and topical or local expertise. These stakeholders can play a lot of different roles from providing expert knowledge of a community or issue to connect the first level to residents to leading citizen participation efforts or even, in some cases, writing the plans. The last type, community planners, represent local residents who will be impacted by the planning efforts. These individuals are the target of the primary planners' engagement efforts.

Figure 1.1 Stakeholder types



The Ven diagram communicates the reality that any one individual can represent multiple types of stakeholders at once or they can represent a one type stakeholder in one situation and another type in a

different situation. One of the interviewees in this study for instance, was both an advisory and a community planner because he lives in the Proctor Creek Watershed and he runs a local nonprofit that provided local expertise to the primary planners during one of the planning processes. Another interviewee reported having been a community planner during one of the planning processes and an advisory planner for another one. Each interviewee was asked which type of stakeholder they felt most accurately described their involvement in the three planning efforts included in this study.

Four to five stakeholders from each category were interviewed between January and March of 2017. Each interview lasted between 30 minutes and an hour and provided qualitative data on the perceived role of the public in planning processes, as well as the use and perceived impact of certain SCTs in enabling or inhibiting more participatory planning.

During the interviews participants were asked to answer several demographic questions including their year of birth, average annual personal income, and highest level of educational attainment.[1] Their sex and race were determined by either in person observation or an Internet search if the interview was conducted over the phone. See the Appendix for a breakdown of the interviewee profiles and demographics.

1.2 Data

This study drew from a number of primary and secondary sources. Data was pulled from historical newspaper articles and website posts in order to get an understanding of the context in which current planning efforts around the Proctor Creek Watershed are taking place. Information about specific efforts to engage the community in planning around the watershed was pulled from publicly available plans including Park Pride's Proctor/North Avenue Visioning Study, Atlanta Regional Commission's Proctor Creek Watershed Improvement Plan, and the Environmental Protection Agency's Health Impact

[1] One of the Level 3 stakeholders opted out of providing demographic data.
[2] One Level 1 interviewee was quoted, "You don't want to inflict a great plan on a community you want to help a community arrive at a great plan that meets their needs. If you're not planning for the community then why even bother."
[3] Some barriers, such as citizens' fear of displacement, likely require face-to-face interaction since they involve

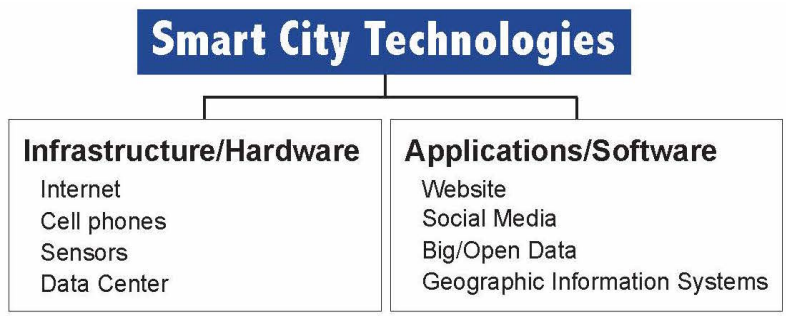
Assessment of the Proctor Creek Boone Boulevard Green Street Project. Data was also pulled from websites such as the City of Atlanta's data dashboard and ARC's interactive map of Proctor Creek.

1.3 Definitions

For this study we use the APA's definition of *smart city technologies* as information communication technologies (ICTs) including hardware infrastructure, such as wireless internet, mobile devices, sensors, and smart meters or grids, and software applications, such as websites, social media, open/Big Data, and Geographic Information Systems (GIS) modeling and mapping (APA 2015). Hardware infrastructure typically refers to physical devices (such as a computer) that are required to store and execute a software program or application. Software applications, by contrast, consist of a collection of instructions that enable a user to interact with some piece of hardware (often a computer) by performing a specific task. Smart city technologies will be abbreviated to SCTs in this paper.

This study focuses on eight specific examples of SCTs (see Figure 1.3 below). They are split up into infrastructure/hardware and applications/software. The infrastructure/hardware SCTs reviewed in this study include: the Internet, cell phones, sensors, and data centers. The applications/software reviewed include: websites, social media, big/open data, and geographic information systems (GIS).

Figure 1.3 Smart City Technologies investigated in this study



The *Internet* is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardized communication protocols. The

Internet can be used by planners to incorporate other smart city technologies—such as interactive GIS mapping, data from sensors or smart meters, etc.—into participatory planning processes. It can also be used to publish planning documents, share data and information with the public, and advertise public meetings.

A *cell phone* is any portable telephone, which uses cellular network technology to make and receive calls. People can use applications on to share data or gather community input on a project or plan. Since more people have cell phones than computers, these devices are useful for reaching a wider audience. As smartphones are becoming ubiquitous they are playing a bigger and bigger role in planning and the automation of cities.

A *sensor* is an object that collects information about the environment and sends it to a computer using ADC (Analog to Digital converter). Sensors can be used in everyday household items like lamps that brighten or dim by touching the base or some other part. More sophisticated sensors can detect and store data such as air temperature, air quality, traffic flow, and even human mobility patterns. This data is used by planners to understand current use and flow patterns in cities and then better plan for the future. It can also be shared with the public in order to spread awareness about an issue or to demonstrate progress made toward planning or other goals.

A *data center* is any physical or digital space used to house large quantities of data. An example of a physical data center might be a research institute or government agency with servers that store large amounts of data. An example of a digital data center is a city's online data portal where anyone can find and download data related to the city's performance.

A *website* is a location connected to the Internet that maintains one or more pages on the World Wide Web. Most city planning department in big cities manage their own websites and use them to share information with the public and advertise events. Social media includes websites and applications that enable uses to create and share content or to participate in social network. Planners can use social media to share information, gather input, or organize community engagement events.

Social media are computer-mediated technologies that facilitate the creation and sharing of information. Examples include Facebook, Twitter, Tumblr, Instagram, LinkedIn, YouTube and SnapChat. Social media can be used by planners to learn about the communities for which they are planning and for less formal outreach to engage citizens in the planning process.

Big data are datasets that are too large for traditional data processing applications. Big data is created in part from the increase in information-sensing mobiles devices, aerial remote sensing, campers, microphones, wireless sensor networks and more. *Open data* on the other hand is data that can be shared freely without any restrictions on sharing, use or re-use. Both big and open data can be used by planners to understand current trends, create performance and other benchmarks, and better plan for the future. Data is a vital ingredient of information sharing between the public and planners.

And lastly a *geographic information system (GIS)* is a computer system that can capture, store and display data related to positions on Earth's surface. GIS is commonly used by planners to analyze patterns and relationships and share those with the public.

1.4 Limitations

This study has several limitations. Interviews have inherent limitations such as the potential for the interviewee to respond in a way that they think the researcher wants them to respond—response bias (Menachemi et al. 2006). Secondly, due to the sample size and sampling method the results from this study are not necessarily generalizable (Baker and Edwards 2012). This study is primarily exploratory but it will hopefully fuel future research into this topic.

Thirdly, the validity of the study is threatened by the convoluted nature of the questions being asked. The aim of the study was to better understand the impact of SCTs on public participation in planning efforts. Often when this question was asked interviewees seemed unsure of how to answer. It was perhaps sometimes unclear, especially to community planners who were the target of public engagement efforts, if they were being asked how their use of the technology impacted their own ability to participate or someone else's. For example when asked whether or not they used GIS or any other

mapping or modeling program, some answered yes because they had been show maps during public meetings but they hadn't been involved in creating them. This lack of clarity is a result of the research design, but also general lack of knowledge of the complexities of this topic.

2. Literature Review

2.1. The Changing Role of Planners

The government's role is not only to provide infrastructure systems to keep cities clean, safe, and economically vibrant, but also to ensure that these systems are evenly distributed throughout the population—in other words to promote equality (Brenman 2012). As government employees, city planners help predict, analyze and make decisions about where and how infrastructure projects—such as streets, sidewalks, bridges, sewage treatment systems, police and fire departments, etc.—should be realized. According to the American Planning Association (APA), planners are key to promoting inclusive and transparent public participation, overcoming historic deficiencies in involvement of underserved populations, identifying ways to improve communities' quality of life, and responding to public input on proposed plans (APA 2015).

In the 1800s city planning evolved out of the need to improve public health and the livability of cities that had become dangerously polluted during the industrial revolution. While the separation of disparate uses and increased regulation of polluting facilities improved the overall health of citizens and the environment, low-income urban communities of color continue to suffer disproportionately from lack of adequate infrastructure and exposure to environmental toxins—what is now commonly known as environmental injustice. Exclusionary zoning, highway construction, urban renewal and public housing developments during the 1950s and 1960s exacerbated segregation in urban neighborhoods, further disenfranchising low-income, urban communities of color (Brenman 2012).

Widely held conceptions of planning have shifted over the last century from normative, rational models that position planners as technical experts, toward a theoretical pluralism characterized by the

political nature of planning, competing interests of stakeholders, and decisions as negotiated outcomes facilitated by planners (Lane 2005). These more contemporary models view citizen participation as a key part of the planning process. Smith (1973), for instance, argues that participatory planning increases the effectiveness and adaptability of the planning process and that citizen participation strengthens our understanding of the role of communities in the urban system.

Meaningful public participation in planning has been found to better planners' understanding of the community context (Myers 2010), improve decisions through knowledge sharing (Creighton 2005), increase community trust in political decision making (Richards, Blackstock, and Carter 2004; Faga 2010), produce long-term support of plans (Levy 2011), enhance citizenship (Day 1997; Smith 1973), build social capital (Layzer 2008), and address complex problems through collaboration and consensus (Innes 2010; Godschalk 2010).

A systematic review of literature related to the importance of citizen participation in planning found that planners concern with public participation arises in part from the fact that plans created without meaningful citizen input are often greeted with apathy or even hostility (Booher 1975). The author, however, argues that "an equally important element is a relatively recent sensitively to the need for the planning process to reflect the values of those for whom the planning is accomplished" (Booher 1975, 3).

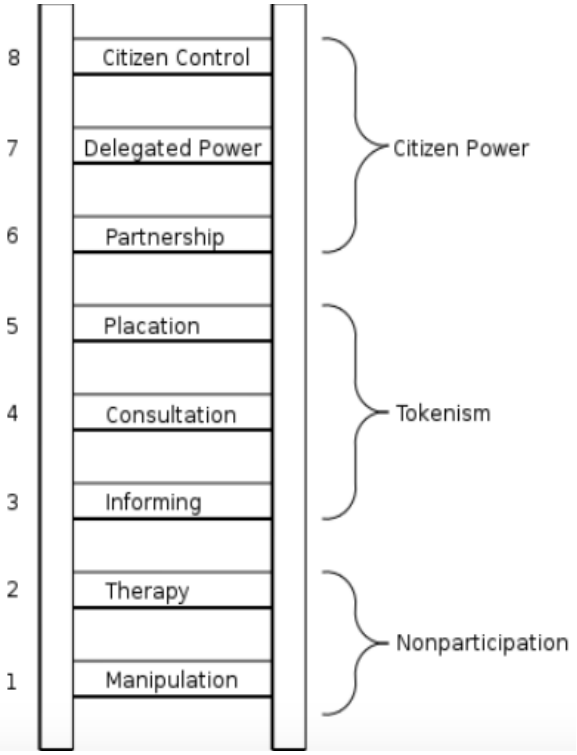
Taking a pluralistic view of planning Davidoff (1965) advocates for stakeholders themselves to act as planners rather than solely relying on public agencies to plan for them. He argues that allowing for alternative plans (plurality) results in more options for the public and requires public agencies to actively seek support for their plans from the community (Davidoff 1965).

While these more contemporary planning models emphasize the importance of citizen engagement, achieving meaningful participation has proved difficult. Challenges preventing meaningful citizen participation include funding and resource constraints (Creighton 2005), literacy and numeracy (Community Places 2014), disinterest (Cropley and Phibbs 2013), lack of access to necessary resources (Cropley and Phibbs 2013), the prescriptive role of government (Njoh 2002), power inequalities within

groups (Reed 2008), jurisdictional misalignment (Layzer 2008), and lack of respect for public opinion (Day 1997).

The 1954 Urban Renewal Program was the first federal U.S. program that required public participation (Gordon, Schirra, and Hollander 2011). Ironically, between 1948 and 1973, urban renewal efforts displaced a million people from 2,500 neighborhoods, 1,600 of which were predominantly African-American (Brenman 2012), creating concentrated low-income communities of color in urban areas.

Figure 2.1 Arnstein's Ladder of Participation



In her seminal 1969 article, A Ladder of Citizen Participation, Arnstein uses examples from federal urban renewal and anti-poverty programs to illustrate different manifestations of participation in practice (see Figure 2.1 on the left). Arnstein defines citizen participation as "the redistribution of power that enables the have-not citizens, presently excluded from the political and economic processes, to be deliberatively included in the future. It is the strategy by which the have-nots join in determining how information is shared, goals and policies are set, tax resources are allocated, programs are operated, and benefits like contracts and patronage are parceled out" (Arnstein 1969, 216). Arnstein's examples show how some efforts to include citizens in planning and decision making can perpetuate existing systems of power and actually further disenfranchise marginalized communities.

Glass (1979) attributes the dearth of meaningful citizen participation in planning and policy making processes to lack of attention to the design of participatory programs and a mismatch between objectives and techniques. Glass identifies five objectives of citizen participation—information exchange,

education, support building, supplemental decision making, and representational input—and specific techniques—such as neighborhood meetings, public hearings, citizen advisory committees, and citizen surveys—used by planners that relate to each of the objectives. Glass concludes that if the goal is just to get citizens to participate then almost any technique will be seen as sufficient. He argues that one technique alone is never enough and that meaningful citizen participation requires a continuous, multifaceted system of engagement (Glass 1979).

2.2 Technology-aided participation in planning

For decades scholars have been exploring ways that technology can enable meaningful participation in planning and policy making. Recent hype around smart cities has added to the debate about the role of technology in these processes. While the term "smart city" is being used by scholars and practitioners around the world a universal understanding of the concept has yet to be established. APA defines a smart city as one that uses "information and communication technology (ICT) to engage citizens, deliver city services and enhance urban systems (APA 2015).

An in-depth analysis of the literature led Albino et al. (2015) to point out that unlike related concepts such as the digital city, the intelligent city and the ubiquitous city, the smart city is not limited to the diffusion of ICT, but also includes people (Albino, Beradi, and Dangelico 2015). In 2015 APA released a report on smart cities and sustainability in which they argue that smart cities "allow government to better serve the population by improving the feedback loop from which the public can voice their opinions…Offering more and easier ways for these populations to participate in the public process, should provide both a greater quantity and quality of that input" (APA 2015, 15). Castelnovo et al. (2016) propose a holistic approach to assessing the smartness of cities paying particular attention governance and management of decision making processes and focusing on citizen participation and public value. The authors argue that citizen engagement is a fundamental cornerstone of smart city governance (Castelnovo, Misuraca, and Savoldelli 2016).

Technology has been found to support citizen participation in planning by increasing participants understanding of issues and proposed plans (Salter et al. 2009), supporting collaboration (Jankowski 2009), strengthening the role of low-income residents (Livengood and Kunte 2012), leading to more informed decision-making (Al-Kodmany 2002), and enabling alternative, informal manifestations of civic engagement (Asad and Le Dantec 2015).

Al-Kodmany (2002) reviewed traditional and computerized visualization tools in order to help planners navigate through the multiple options that exist for visualization in public participation planning. Al-Kodmany found that computerized tools can significantly enhance public participation in planning and enable the public to make more informed decisions.

Gordon et al. (2011) propose immersive planning as a model for employing new technologies into public participation and for evaluating the success of citizen engagement efforts. They identify three categories of immersion—challenge-based, sensory, and imaginative—and review literature and projects involving geographic information systems (GIS), computer-aided design, planning support systems (PSS), virtual environments, and digital games. The authors purport that these new tools allow for participatory processes to be evaluated not just by how much power the public wields (as Arnstein proposed), but also how immersive the actual experiences are, arguing that the more immersive a process is the more effective it will be at engaging the public in the planning decisions and in their lives more generally.

Jankowski (2009) presents two case studies of participatory GIS being used in water resources planning efforts: one involving the use of computer generated maps and the other involving the use of more sophisticated information tools. They conclude that participant input in both cases became an important driver of outcomes and contributed to collaboration and empowerment.

Livengood and Kunte (2012) describe the use of Global Positioning System (GPS) and GIS by the Participatory Settlement Mapping Project (PSMP) to map informal settlements in Cuttack, India. Their initial findings show that GPS and GIS can "strengthen and support the role of residents of low-

income settlements in developing the information based needed for development" (Livengood and Kunte 2012, 95).

Salter et al. (2009) explored the role of digital tools in a collaborative planning process on Bowen Island in British Columbia. Two 'digital workshops' were held that combined interactive landscape visualization and real-time data analysis through the CommunityViz tool with the immersive lab facilities at the Collaborative for Advanced Landscape Planning (CALP). The study found that dynamic visualizations and use of real-time data appeared to increase the participants understanding of the draft plan, however, participants verbal and written responses indicated that there wasn't sufficient time to examine and interact with the information provided.

Asad and Le Dantec (2015) conducted fieldwork with a housing justice activist group in Atlanta to examine the way ICTs support forms of community activism that operate outside formal political and institutional channels. Based on their findings they argue that ICTs are instrumental in supporting and shaping three alternative information practices: situating, a process of revealing to the public the issues at hand and the consequences of those issues; codification, acts of translation where one domain, issue, or body of knowledge was translated for different purposes within the organization; and scaffolding, operationalizing different bodies of knowledge in order to help recruit and marshal additional support from a wide range of loosely connected social justice groups, concerned community members, and neighbors (Asad and Le Dantec 2015).

The use of technology in participatory planning may address some existing barriers to participation, in particular lack of understanding of the underlying issues being addressed, but it can also exacerbate other existing barriers, such as inadequate understanding of the planning process or lack of the technical skills to engage with certain types of technologies.

Al-Kodmany (2002), for instance, found that while computerized tools enable greater understanding, in some cases they are less interactive and some participants feel uneasy about engaging with the technology. Al-Kodmany suggests that planners should employ more than one method in a

community planning process because no single visualization method can capture all the ranges of meaning and information necessary for public participation in the planning process (Al-Kodmany 2002).

Holgersson and Karlsson (2014) interviewed citizens in order to explore their willingness and ability to participate in public e-service development. They found that while citizens are generally willing to participate, their ability to do so is often limited. Factors affecting citizens willingness to participate included: 1) use of public e-services, 2) satisfaction with public e-services, 3) personal incentives, 4) available time, 5) social commitment, and 6) earlier experience with systems development. Factors affecting citizens' ability to participate included 1) knowledge about public authorities, 2) knowledge about IT, and 3) knowledge about systems development (Holgersson and Karlsson 2014).

In their book, Visualizing the Data City, Ciuccarelli et al. (2014) investigate the possible perspectives for the use of time-based geo-located social media data as a source of knowledge in urban planning, design, and management. Acknowledging the growing relevance of controlled data harvesting, analysis and visualization by public agencies, Ciucciarelli et al. caution that "this technocratic vision of a digitally controlled city can be problematic, especially if matters such as the active engagement of all stakeholders involved in designing, operating, and controlling these dashboards are not properly addressed" (Ciuccarelli, Lupi, and Simeone 2014, 2). They posit that social media conversations could represent a component of more informed (albeit less formal) urban planning, design, and management, but acknowledge that these techniques will still not include everyone's thoughts due to the digital divide.

Epstein et al. (2014) conducted an in-depth analysis of what it takes to address barriers to online civic engagement using a federal public engagement initiative, Regulation Room, as the case study. They draw a multidimensional picture of barriers to participation including motivation, skill, and general political participation divides. They argue that producing a successful mechanism for online public participation in government decision-making "requires adjusting the process and allocating resources to non-technological activities that contextualize online political deliberation" (Epstein, Newhart, and Vernon 2014, 342). They also point out that while much of the mainstream debate about online citizen

participation focuses on technological solutions, there are many non-technical aspects of non-participation that need to be considered.

2.3 Equity, planning and smart cities

While the purpose of city planning is to improve communities and quality of life, social equity is often neglected in planning (Brenman 2012). Despite the emphasis of citizen participation in planning, urban communities of color often still suffer from poor infrastructure, environmental degradation, exposure to toxic substances, and potential displacement due to rapid gentrification. A concern voiced by many critics of smart cities is that, like previous attempts to use technology to increase participation, the existing digital divide will limit participation to certain groups of people with certain resources and skills.

Using 2007 Pew survey data, Sylvester and McGlynn (2010) conducted four logistical regression models that try to explain the factors leading to individuals having "low access" to the Internet and how internet usage and physical location influence civic participation. They find that living in a rural area and being African American or Hispanic increase the probability that you will have low access to the Internet. Age was found to have a significant, positive effect on Internet access, meaning that the younger you are the more likely you are to have access to the Internet. The results also show that people living in urban areas were more likely to contact the government by phone (Sylvester and McGlynn 2010).

In part the recent growth of smart cities is due to the fact that more and more people are moving to cities each year. In 2014, 54 percent of the world's population lived in urban areas in 2014 and the World Health Organization estimates that by 2030, 80 percent of the world's population will live in cities (WHO 2017). In many cities increased demand for housing in causing land values to shoot up, pricing in out many native residents. Atlanta, for example, is expected to grow by around 2.5 million people in the next 25 years, however income inequality in the city is growing and poor urban residents are being displaced by millennials and baby boomers (Coleon 2016).

Memory and attachment to place have been found to be an important factor contributing to citizens engagement in local planning efforts (Fenster and Misgav 2014). Due to the fact that attachment

to place is needed for citizens to feel a desire and drive to participate in planning efforts and decision-making processes, some wonder whether displacement of long-time native residents will result in less participation in future "smart cities" (Coleon 2016).

This brings up a major concern regarding smart cities. Who are we making cities smart for? If our efforts to make cities more efficient, safe and clean result in the displacement of marginalized communities, are these cities really smarter than the ones we live in now? Agyeman and McLaren (2016) argue that no app can substitute public engagement and responsive leadership. They advise against the creation of tech hubs without a simultaneous strategy to protect and invest in affordable housing, basic services and infrastructure.

> "More important to city success than smart street lights and digital surveillance is the need to use smart technology to enable skill sharing, citizen participation, management of shared services—in short, the general well-being of citizens." (Agyeman and McLaren 2016)

Adam Greenfield presents a similar, albeit more in-depth, critique in *Against the Smart City* where he investigates three major international smart city urban developments and argues that the marketing materials and promises of the sponsors highlight their interest in this top-down, data-rich urban management system (Griffiths 2013).

In the APA's 2015 Smart City and Sustainability Task Force survey planners ranked socio-economic disparity as the second most important topic for planners working in smart cities, after green building and site design, suggesting that planners are aware of the importance of socio-economic stratification. But what are planners doing to ensure that investments in smart city technologies are benefiting everyone equally? And how are they using these technologies to support more meaningful community engagement? Perhaps ICTs can play a role in supporting alternate, illegitimate forms of civic action that have a greater impact, especially where institutionally-mediated participation falls within the first five rungs of Arnstein's ladder.

The existing literature suggests that even where technologies enable greater understanding of the planning issues or more meaningful engagement, they must be used in tandem with non-technical planning methods such as in-person meetings and design charrettes. Scholars also emphasize the need for ongoing participatory mechanisms (Gordon, Schirra, and Hollander 2011; Al-Kodmany 2002). In a widely cited article Batty et al. (2012) urges smart cities researchers and engineers to "develop technologies that ensure informed participation and create shared knowledge for democratic city governance" (Batty et al. 2012).

Many of the studies on technology-aided participatory planning included in this literature review focused on the use of digital visualization tools like participatory GIS and took place in wealthier communities. This study seeks to expand the definition of smart city technologies and to explore the use of these technologies in an environmental justice community that has been historically disenfranchised and excluded from planning and policy-making processes.

3. Case Study: Planning for Proctor Creek

3.1 Race and Place in Atlanta

Atlanta is referred to by some as the "capital city of Black America" due to its growing Black middle class population and concentration of Black-owned business, Black political leaders and Black cultural production (Pooley 2015). West Atlanta is home to some of the oldest historically black communities in the city, including the Atlanta University Consortium, which houses four historically black colleges and universities: Spelman College, Morehouse College, Morehouse School of Medicine and Clark Atlanta University. Robert Bullard, who is widely accepted as the father of the environmental justice movement, earned his master's degree in 1972 at Clark Atlanta University where he later went on to teach.

Despite being one of the most diverse cities in the country, Atlanta remains largely segregated with most of the wealth and other capital concentrated in the north and east, which are predominantly

white. Like most cities in America, city planning in Atlanta has a dark history of supporting and perpetuating racial segregation through the use of racial covenants, redlining, and other planning and policy tools, many of which are still used today under new, subtler names. During the Civil Rights Movement in the 1950s and 60s Atlanta tried to stay out of the limelight, proclaiming itself "the city too busy to hate." Incidents, however, like the Peyton Road Affair, when Atlanta Mayor Ivan Allen instructed city staff to erect barricades across Cascade Heights Avenue in Southeast Atlanta to prevent black families from blockbusting the neighborhood, revealed city officials' true values and objectives. Between 1960 and 1970 the city's black population rose from 38 to 51 percent, while the white population dropped by 20 percent (Harmon 1996) as people fled to the suburbs.

As suburbanization swept the nation in the 80s and 90s, wealthy whites continued to moved out of metro Atlanta, leaving behind those who could not afford to build a house in the suburbs. Property values went down especially in southwest Atlanta, decreasing the amount of money going to the public schools in the area and further disincentivizing new businesses from locating in the area. The Westside of Atlanta, home to the Proctor Creek Watershed, was increasingly disenfranchised, politically and economically, and even cut off physically from the rest of the city through discriminatory transportation policies that disproportionately affected—if not targeted—low-income communities and communities of color.

Table 3.1a below provides a comparison of key statistics in the study area and the City of Atlanta as a whole, using data from the city's Data Visualization Dashboard. The study area includes twenty-seven neighborhoods in West Atlanta that fall partially or entirely within the Proctor Creek Watershed. As Table 3.1a shows, the study area's black population is significantly higher as a percent (88 percent) than that of the city overall (53 percent), and the proportion of White, Hispanic, Asian and other populations is much smaller in the study area. Housing vacancy in the study area (23 percent) is more than three times higher than in the city overall (6.8 percent). Even Atlanta's shockingly high individual poverty rate (25 percent) is surpassed in the study area, where nearly 40 percent of the population is living in poverty (City of Atlanta-b).

Table 3.1a Comparison of key statistics in the study area versus the City of Atlanta

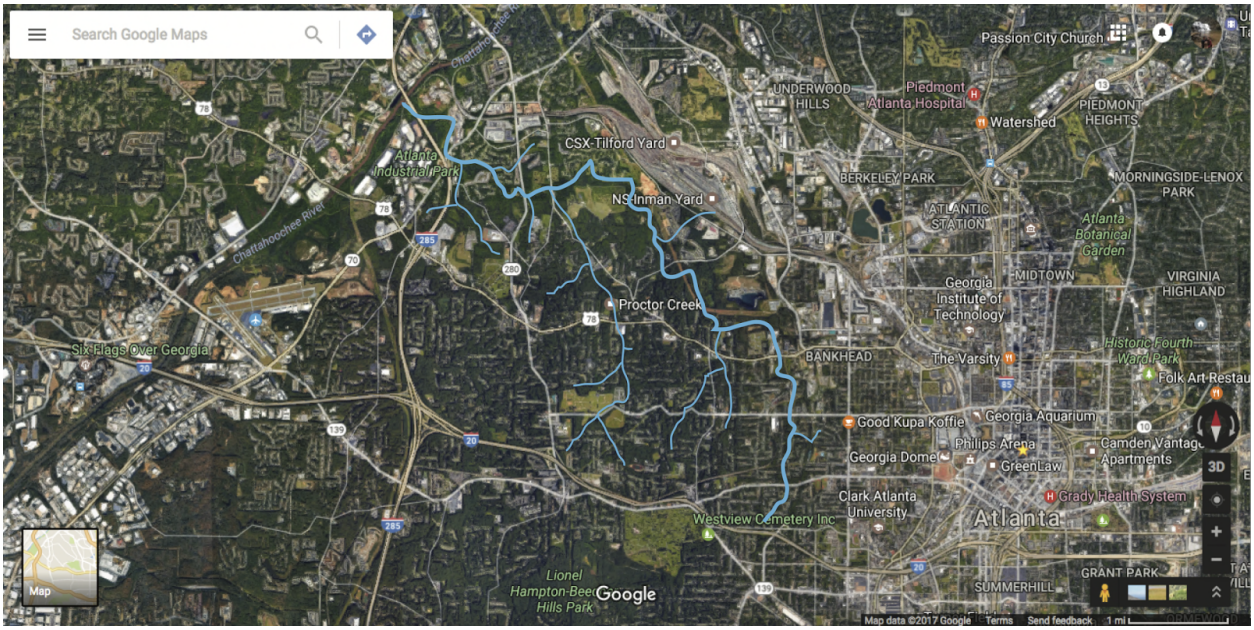
	Study Area[1] Average	City of Atlanta
Change in Population 2000-2010 (%)	-17.04	0.8
Percent Black	89.18	53.4
Percent White	6.08	36.3
Percent Hispanic, Asian, or Other	4.74	10.3
Housing Vacancy (%)	23.26	6.8
Population without a High School Diploma (%)	19.62	12.6
Population (25+) with Bachelors or Higher (%)	39.57	46.4
Individuals in Poverty (%)	39.57	25.5
Per Capita Income ($)	13,974	35,058

[1] The study area encompasses neighborhoods that are entirely or partially within the Proctor Creek Watershed. The following neighborhoods were included: Atlanta Industrial Park, Bolton Hills, Brookview Heights, Almond Park, Carey Park, Carver Hills, Rockdale, Scotts Crossing, West Highlands, Dixie Hills, Penelope Neighbors, West Lake, Center Hill, Harvel Homes Community, Grove Park, Knight Park/ Howell Station, Hunter Hill/ Mozley Park, Bankhead/ Washington Park, Vine City, English Avenue, Castleberry Hill, Ashview Heights, Harris Chiles, Just Us, Atlanta University Center, the Villages at Castleberry Hill and West End.
Data Source: The City of Atlanta's Data Visualization Dashboard http://neighborhoodnexus.org/case-studies/coa/

Since the mid 2000s wealthy white and black families have reversed their flight pattern and begun moving back into the city. The Westside in particular has been identified as a potential place for redevelopment and revitalization, however there is concern within the community that rapid economic development will lead to forced displacement due to rising rents.

One of the natural features attracting developers to this area is Proctor Creek, which surfaces near the old Georgia Dome west of downtown and runs northeast through mostly residential neighborhoods until it reaches the Chattahoochee River just under nine miles away. As the only tributary of the Chattahoochee that falls completely within the boundaries of the city, the creek's watershed covers approximately 16 square miles of land and is home to around 60,000 Atlantans (City of Atlanta-a).

Figure 3.1 Proctor Creek Watershed in West Atlanta (Source: Google Earth)



Once a sacred place where residents would go to swim, fish and even perform baptisms, Proctor Creek has become polluted over the years. As the area around the creek was developed the increase in impervious surfaces, now 33 percent of the watershed, led to increased stormwater runoff, polluting the creek with trash, motor oil, and other toxic substances. Another major contributor to the degradation of Proctor Creek is Atlanta's antiquated combined sewer overflow (CSO) system. The CSO system combines the city's stormwater and sewage systems into one pipe which, when there are heavy rains, overflowed debris and human feces into Proctor Creek.

Due to its continued degradation, in 1998 Proctor Creek was placed on the federal list of impaired waters and the U.S. Environmental Protection Agency (EPA) issued two federal consent decrees requiring that Atlanta clean up the creek and fix its sewer system (Clean Water Atlanta, n.d.). The first decree involved separating three major basins and constructing a 27-foot-diameter tunnel to transfer flows that would previously have supercharged the city's seven CSO treatment facilities to a new treatment plant, which the city completed in December 2008. According to the City of Atlanta, these projects have reduced sewer spills by about 70 percent since 2000 (City of Atlanta-a). In addition to these major

infrastructure projects, local agencies, non-profits, community groups and businesses have been working hard to clean up Proctor Creek and the surrounding watershed (see Table 3.1b below).

Table 3.1b Organizations involved in the cleanup and redevelopment of the Proctor Creek watershed

Federal Government	Local Government	Private	Nonprofit	Academia
Environmental Protection Agency (EPA)	City of Atlanta, Dept. of Watershed Management	Arthur Blank Foundation	Proctor Creek Stewardship Council (PCSC)	Georgia State University
U.S. Geological Survey (USGS)	City of Atlanta, Dept. of Parks and Recreation	Coca Cola	West Atlanta Watershed Alliance (WAWA)	Clark Atlanta University
Federal Emergency Management Agency (FEMA)	City of Atlanta, Dept. of Public Works	Turner Foundation	Eco-Action	Spelman College
Centers for Disease Control and Prevention (CDC)	City of Atlanta, Office of Sustainability	Georgia Power	HELPinc	Morehouse College
Housing and Urban Development (HUD	City of Atlanta, Office of Planning and Community Development	Atlanta Beltline	Park Pride	Energy University (and Emory Hercules Program)
U.S. Army Corps of Engineers (ACOE)	Invest Atlanta	Atlanta Botanical Gardens	Atlanta Community Food Bank (ACFB)	Georgia Tech
Health and Human Services (HHS)	Atlanta Regional Commission (ARC)	Emerald Corridor Foundation	Community Improvement Association (CIA)	
U.S. Department of Agriculture (USDA)	Fulton County Public Health Department		Georgia STAND-UP	
Department of Interior (DOI)			Trust for Public Land (TPL)	
			Chattahoochee River Keepers	

These groups have been involved in a number of plans and projects in the Proctor Creek Watershed over the last two decades. Table 3.1c below provides a list and description of the three plans included in this study. The City of Atlanta's Greenway Acquisition Project, completed in 2008, involved a $25 million program to acquire and permanently protect properties adjacent to selected rivers and creeks within the Metro Atlanta Area, including 74 acres of streamside greenspace is the Proctor Creek Watershed (USI, Inc. 2001). In 2011 Atlanta's Department of Watershed Management (DWM) Office of Watershed Protection joined forced with the Atlanta Regional Commission (ARC) and community

stakeholders to compile the Proctor Creek Watershed Improvement Plan, which identified non-point sources of pollution in Proctor Creek and recommended solutions (ARC 2011).

Over 18 months in 2010 and 2011, Park Pride worked with a coalition of organizations and individuals within the English Avenue, Vine City, and Atlanta University Center (AUC) neighborhoods in a visioning process to identify greenspace improvements that would provide capacity relief for the combined sewer system and create a series of interconnected greenspaces. The Proctor-North Avenue (PNA) Vising Study, which was published as a result of the coalition work, proposed the creation of a variety of types of greenspaces including parks, greenways, community gardens, rain gardens, and green streets (Park Pride 2010a). In 2014 the City of Atlanta was one of 17 cities to be awarded a Technical Assistance Grant from the U.S. EPA. The grant funded Tetra Tech, in collaboration with the City and EPA, to evaluate demonstration projects in Park Pride's PNA study and to develop a conceptual plan for creating a 'green street' along Boone Boulevard (U.S. EPA 2014a).

Table 3.1c Key planning efforts involving Proctor Creek

Plan/Project	Organizations Involved	Description	Results	Time Frame
Proctor Creek Watershed Improvement Plan	DWM; ARC; Upper Chattahoochee Riverkeepers; WAWA; CIA	Plan produced by the ARC detailing specific issue points throughout Proctor Creek, stakeholder organizations, and potential solutions	Identified non-point sources of pollution in Proctor Creek and recommended solutions	2011
Proctor-North Avenue Visioning Study	Park Pride; Perkins + Will, Inc.; WAWA; Eberly and Associates, Inc.; Metropolitan Atlanta Urban Watershed Institute (MAUWI); CIA; Conservation Fund; American Rivers	Vising plan produced by Park Pride and a coalition of community members proposing greenspace improvements to reduce flooding and improve health around the PNA study area	Proposed green infrastructure and greenspace improvements in the PNA study area	2010-11
Proctor Creek's Boone Boulevard Green Street Project Health Impact Assessment	U.S. EPA; Centers for Disease Control; Georgia State University; Fulton County Department of Health and Wellness; WAWA; DWM	This HIA evaluated the potential health impacts of the proposed Boone Boulevard Green Street Project	Found that the project would have mostly positive effects on the community's health	April 2015

In April of 2015 the EPA published Proctor Creek's Boone Boulevard Green Street Project Healthy Impact Assessment (HIA), which evaluated the proposed green street's potential impact on the surrounding community's health. While the EPA produced the plan, the process of creating it involved a large number of local government agencies, nonprofits and community organizations.

Proctor Creek was selected as the case study for this research project in part due to the vibrant culture of public participation on the Westside and around Proctor Creek in particular. The PNA visioning plan in particular put a strong emphasis on community engagement, and community considers the study to be the official planning document for any development around Proctor Creek. In the final report, they wrote, "Moving forward, the team wants to building upon its prior [outreach] work, striving for even greater community engagement" (Park Pride 2010b, 14). The Boone Boulevard Green Street Project final report also provided a detailed account of community engagement efforts and stakeholder feedback (U.S. EPA 2014a, 131–139).

In 2013 Proctor Creek was added to the Urban Waters Federal Partnership, an innovative initiative by 15 federal agencies to collaborate with community-led efforts to stimulate local economies, create local jobs, provide job training and skill acquisition, improve quality of life, and protect Americans' health by revitalizing urban waterways in under-served communities across the country (U.S. EPA 2011). In July of 2014 the EPA announced that it would be awarding over $179,000 to organizations working to restore and protect Proctor Creek (U.S. EPA 2014b). The organizations, each receiving around $60,000, included the Center for Watershed Protection, Inc., Chattahoochee Riverkeepers, Inc., and Environmental Community Action, Inc.

Atlanta Mayor Kasim Reed and newly hired Director of Planning, Tim Keane, have both vocalized the importance of involving the public in efforts to redevelop and revitalize the Westside. Shortly after moving to Atlanta to Keane attended an NPU meeting in Bankhead, a neighborhood within the Proctor Creek Watershed, during which he called on the community to help determine how the neighborhood would grow (Lee 2015). Keane and Councilmember Ivory Lee Young, who represents the

area and was also at the meeting, emphasized the importance of including the community in the planning and development process.

3.2 References to public engagement in past plans

Watershed Improvement Plan

In 2011 the Atlanta Regional Commission published the Proctor Creek Watershed Management Plan, which outlined the City's strategy for cleaning up this impaired waterway. This plan was orchestrated and put together by the ARC. Technical assistance was provided by the City of Atlanta and Upper Chattahoochee Riverkeepers. Outreach activities were coordinated by Upper Chattahoochee Riverkeepers, West Atlanta Land Trust, and Community Improvement Association. The final planning document includes a section on public involvement that lists the goals for engagement in the development and implementation of the plan:

> "Build capacity for watershed monitoring and other watershed activities such as stream cleanup days, achieve awareness of water quality issues existing in the watershed in order to build public support for plan implementation, produce a change in behaviors that can lead to long-term benefits in water quality and provide for support of long-term plan implementation efforts" (ARC 2011, 38).

Stakeholders were invited to comment on several products and processes that were produced as a result of the watershed improvement planning process, including: a report detailing findings from a visual field survey of the area, an initial and then revised watershed monitoring plan, an educational booklet and tri-fold brochure developed for watershed residents, a website (Cleaner Streams) created to house all relevant products, and a final report.

Comments were collected during public meetings—though public comment periods and paper comment forms—, email communication, the Cleaner Streams website, and telephone communication with planning staff. Public involvement events were advertised in local newspapers, on the City's website

and on partner websites including a local community nonprofit (West Atlanta Watershed Alliance), a regional nonprofit (Upper Chattahoochee Riverkeeper), and a regional planning commission (Atlanta Regional Commission). Stream clean ups were organized by a local community nonprofit (Community Improvement Association) and the City hosted bacterial monitoring trainings through their Adopt-A-Stream program. Presentations were given by neighborhood associations and other stakeholder groups throughout the planning process. Stakeholders were invited to review a draft of the plan before it was submitted to the Georgia Environmental Protection Division (EPD) and according to the plan, input was to be welcomed regarding actual implementation of the plan once it was approved by Georgia EPD and funding was secured.

Examples of the public meeting notices and mass emails used to engage the public between 2009 and 2011 are provided in the plan's appendices. The email communications were all sent by a senior planner at the ARC to between 25 and 80 stakeholders. Email was used to schedule in person meetings to discuss plans and to schedule creek monitoring events. Sign in sheets and summaries for two stakeholder meetings help in 2011 are also included in the plan's appendices. According to the sign in sheets attendance at these meetings was limited to representatives from key stakeholder organizations rather than being open to the general public. Discussion at the stakeholder meetings revolved around the design and execution of creek monitoring activities. No minutes or sign in sheets were included for public comment meetings that were held earlier in the planning process.

PNA Visioning Study

The Proctor/North Avenue Visioning Study was commissioned in 2009 by Atlanta City Councilmember Able Mable Thomas and was produced by Park Pride, a local environmental nonprofit, in 2011 after eighteen months of working with local organizations, neighborhood associations and residents in English Avenue, Vine City and the Atlanta University Center (AUC) neighborhoods. The goal of the plan was to propose greenspace improvements that could provide capacity relief for the city's overwhelmed CSO system, while creating connected green spaces that benefit the community (Park Pride

2010). In the end the study came up with the four 'Demonstration Projects' that the participants believed were realistic and would have the most positive impact on the community. In the executive summary it is suggested that interested community members form an Implementation Committee that would work with Park Pride and technical professionals to select one or two projects for which to seek funding to develop.

The PNA Coalition included twenty-four local and national nonprofits, professional consultants, government agencies and development groups. Several community groups including Community Improvement Association (CIA), West Atlanta Watershed Alliance (WAWA), and Metro Atlanta Urban Watershed Institute (MAUWI) supported the visioning process and helped host cleanup and remediation workshops in the area. The plan referenced the importance of community engagement in not only producing this study but also implementing the proposals:

> "Park Pride firmly believes that communities must steer their own greenspace planning efforts. As such, it is imperative to the Visioning process that community members develop their wish list and plans for their communities." (Park Pride 2010, 16)

Between January and December of 2010 thirty-three public meetings, design workshops and reviews, and educational events were organized by Park Pride and partner organizations. Eight creek cleanups were organized by CIA, WAWA, UCR, Fulton County, Georgia Tech, Hands On Atlanta, and CDC. Six public meetings were held to gather input from the three neighborhoods in the study area. A seven person Steering Committee was formed and thirteen steering committee meetings were held to come up with a wish list and overarching goals to help guide the Design Team in coming up with specific proposals. Throughout the process the meeting notes and sketches were electronically shared with the Steering Committee, the Design Team and members of the community that had attended a public meeting or other event. The Design Team worked with neighborhood associations and community groups to advertise public meetings and events. Residents and Park Pride staff went door-to-door distributing fliers

highlighting the Visioning process, the public process, and advertising the various ways available for public involvement.

Boone Boulevard Green Street HIA

The Proctor Creek Boone Boulevard Green Street Project Health Impact Assessment (HIA) was published by the U.S. Environmental Protection Agency (EPA) in April 2015. It was co-authored by representatives from the EPA, CDC, Fulton County Department of Health and Wellness, Georgia State University, and WAWA. An HIA is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program or project on the health of a population, as well as the distribution of impacts throughout the population. Among other things, the HIA process typically involves using pre-existing, publicly available (open) data, rigorous analysis, modeling and mapping with GIS and other software.

The purpose of the Boone Boulevard Green Street HIA was to evaluate the potential environmental and broader impacts of the project, which was based on one of the PNA demonstration projects and submitted for EPA funding by the City of Atlanta's Department of Watershed Management as a way to improve the health of the creek by reducing flooding and CSOs.

Stakeholders invited to participate in the HIA included residents from the study area, representatives from community-based organizations, local universities, local businesses, the City of Atlanta, land and homeowners, and future businesses and investors. The HIA project managers laid out different roles that stakeholders could fill based on their availability and interest. Stakeholders who wanted to actively participate in data collection and analysis made up the HIA Core Project Team. Stakeholders with slightly less availability but useful expertise and knowledge were invited to participate in the HIA Advisory Group. Stakeholders who wanted to provide input but did not want to serve in a formal role were encouraged to participate in the public meetings as Community Informants.

Stakeholders were recruited to participate in the HIA process via email, phone, and public flyers. The primary mode of communication between the Core Project Team and the other stakeholders was

email and/or phone. The Core Project Team developed communication materials including meeting invitations, post-meeting summaries, PowerPoint presentations, and factsheets to assist in the goals of the HIA. Between March 2013 and March 2015 there were five Core Project Team meetings, two Advisory Group meetings, two public community meetings, and two stakeholder engagement meetings that included everyone involved.

Based on recommendations gathered in the public engagement meetings the team noted several differences in the priorities between stakeholders who were residents of the study area and those who were not residents. For example some residents had observed a foul, sewage-like smell coming from the Proctor Creek/North Avenue combined sewer outflow and they asked that the smell be addressed as part of the Boone Boulevard Green Street project. Several stakeholders also pointed out that the HIA lacked any community asset mapping, as well as context that would have been used by the community to advocate for more efforts to address issues in the watershed. This prompted a question for the planners: What can we do to build capacity for self-determination for communities and organizations?

In order to maximize the potential positive benefits and minimize the negative impacts of this project, the HIA Core Team and stakeholders recommended that the Department of Watershed Management: 1) keep the community engaged in the planning, implementation, and monitoring phases of the project; and 2) help support community advocacy groups address the community's needs.

4. Results

4.1 The role of public participation in planning

In order to frame the questions about specific technologies used to engage the public, interviewees were asked their opinion about the purpose of public participation in planning in general—essentially whether or not, and if so why, they believe it is important to include citizens in the process. Table 4.1 below shows the answers broken down by the different stakeholder levels.

Table 4.1 Importance/purpose of public participation in planning

Primary Planner	Advisory Planners	Community Planners
Federal/state requirement	Citizens should lead plans in their own community	Ensure that the community's interests are included
Public can help planners identify issues/needs/ community priorities	Community has local knowledge and expertise that planners lack	Participation is a democratic civic duty
Public can help collecting data	Give community a voice at the table	Stay informed about what's happening
Inform community about planning efforts	Monitor use of data in planning efforts to ensure integrity	Help inform their friends and families
Give community a voice at the table	Community members can help get other local residents engaged	Provide local knowledge of issues being addressed through planning
Provide community with knowledge to advocate for themselves	Citizens want to know what's happening and stay informed	Understand what's happening and how so that they can benefit from the changes
Improve planning analysis and assessment by incorporating local knowledge		Become involved not just in planning, but in the things that the plans create (i.e. economic growth and development)
Help planners engage more effectively with the community		

Some primary planners cited the ability of citizens to contribute local knowledge to the traditional planning process, while others referred to federal and state laws that require them to hold public meetings. These stakeholders generally felt that public participation is a fundamental part of planning,[2] however one primary planner said that public participation is not a part of their process because they are a technically a utility.

Advisory planners focused more on the importance of citizens having a voice in the political process and being able to influence planning and development efforts in their own community. Like the primary planners, advisory planners felt that participation is vital, but they noted that planners often forget for whom they are planning. One advisory planner expressed the need for the community to be at the table in order to ensure that the best decisions are made for the community since, he warned, "data can be manipulated."

[2] One Level 1 interviewee was quoted, "You don't want to inflict a great plan on a community you want to help a community arrive at a great plan that meets their needs. If you're not planning for the community then why even bother."

Community planners mentioned the need for themselves, as local residents, to be kept informed about developments that will affect their lives so that they can benefit from those changes. These stakeholders felt that the community needed to be involved in the process in order to ensure that their interests were included in the final plans, so that they could offer local knowledge and expertise, and so that they could benefit in the long-term from development and growth in their community that result from planning efforts.

> "If you're at the table you can make the best decision for your community, rather than an outsider coming in and saying, well based on the data this is how we're going to reconstruct your community." - English Avenue resident and founder of a community organization who acted as an advisory planner for all three of the planning efforts.

In many cases this question led participants to mention data. The primary planners talked about the need to work with the community to gather local data, however they seem to be the ones using the data and they often referred to themselves as the data analysts. The community planners seemed to mistrust the primary planners and many of them expressed a desire to understand the data and technologies more so that they could learn how to use them.

> "I think planners are more data based and we have our professional opinions about things that we picked up in college or wherever, and we can look at a place and kind of picture what we think it should look like, but if it doesn't have the communities needs in it why bother." - Primary planner for the Park Pride Visioning Plan.

4.2 Challenges and barriers

Interviewees were asked about challenges and barriers that made public engagement more difficult in these planning efforts or in their experience more generally. Table 4.2 below shows the barriers and challenges grouped by stakeholder level.

While primary planners did point out their lack of local knowledge and reliance on the community to produce useful plans, they often framed barriers to engagement around the community's lack of resources or technical knowledge. They also noted regulatory and political barriers that they face in their efforts to enable meaningful participation. Advisory planners mentioned primary planner' use of jargon and technical language as a major barrier to meaningful citizen participation. They also acknowledged that the location of the meetings affects citizens' ability to get show up. Community planners saw the barriers as being centered around the primary planners' ability to effectively communicate to the community in a language that they understand. One community planner commented that most primary planners with whom they had interacted are very effective at project management but not at community engagement. Both primary and community planners mentioned citizens' lack of access to technology as a barrier, however most of the barriers and challenges mentioned had little to do with technology and could arguably be remedied without use of technology.[3]

[3] Some barriers, such as citizens' fear of displacement, likely require face-to-face interaction since they involve complex social systems. These sorts of challenges cannot be addressed with technology alone.

Table 4.2 Barriers and challenges related to citizen participation in planning

Primary Planners	Advisory Planners	Community Planners
Planners' lack of funding or other resources	Citizens' lack of access to transportation to get to meetings	Planners' ability to effectively communicate data
Planners' efforts to balance local desires with the greater good	Planner's use of jargon and technical language	Planners' use of jargon and technical language
Citizens' lack of technical understanding of the planning issue	Location of the meetings (inaccessible with public transportation)	Planners' not always knowing the right questions to ask or discussions to have
Political apathy or corruption	Citizens not having enough time	Citizens' misinformation
Technocratic values held by planners or politicians	Citizens' having other more pressing issues that take priority	Citizens' lack of education; Illiteracy
Mismatch between community concerns and planning goals		Citizens' lack of access to technology
Planners' false assumptions about community priority		Citizens' fear that development will lead to displacement
Citizens' lack of awareness of/interest in the planning topic		Citizens' lack of technical understanding of the planning issue
Citizens' lack of knowledge about how to use the technology		Lack of incentives to attend meetings (i.e. food)
Citizens' lack of time due to other priorities/needs		Citizens' inflexible work schedules
Citizens' research fatigue		Time of meetings
Regulatory restrictions		
Citizens' lack of access to technology		

4.3 Engagement efforts

Table 4.3a below provides a list of the methods used to engage the public that were mentioned in the interviews. It also identifies the general purpose of each tool and assigns the appropriate rung on Arnstein's Ladder of Participation. The three major tools used in the planning efforts were public meetings, presentations, paper surveys, and water sampling training. Public meetings and presentations were held to educate the local residents about issues and disseminate information about the planning process underway to address the issues. This tactic aligns most closely with Arnstein's Informing ladder rung, which she categorizing as a form of Tokenism. The paper surveys were intended to gather information from local residents and are best categorized as Consulting, also a form of Tokenism. The water sample collection training was intended to train local residents so that they could continue sampling the water and collecting data on water quality. This engagement tool resembles Partnership, which

Arnstein categorizes as a form of Citizen Power, although unlike the planners leading the trainings the residents were not paid for their time so labeling it partnership may be a stretch.

Table 4.3a Methods of public engagement

Engagement Tool	Purpose	Ladder of Participation
Public meetings/presentations	Information dissemination; Education	Informing (Tokenism)
Paper surveys	Information gathering	Consulting (Tokenism)
Water sample collection training	Skills training; Data collection	Partnership (Citizen Power)

Table 4.3b below shows the various ways that primary and advisory planners advertised the public engagement efforts described above in order to engage with community planners. The table also shows which of the methods required use of technology. Only two of the eight methods—email and text alerts between community members and radio announcements—involved technology.

Table 4.3b Use of technology to advertise public engagement efforts

Method	Involved technology?
Fliers distributed at local libraries	No
Fliers left on people's doors	No
Announcements by planners or community members at NPU or other neighborhood meetings	No
Announcements by planners or community members at local festivals or other events	No
Word of mouth	No
Email and text alerts between community members	Yes
Yard signs	No
Radio announcements	Yes

4.4 SCTs used in Proctor Creek planning efforts

The interviewees were asked whether or not they had used any of eight different SCTs—the Internet, cell phones, sensors, data centers, websites, social media, big/open data, and GIS—during their involvement in planning in the Proctor Creek Watershed. Figure 4.4 below shows the total reported number of SCTs used by each stakeholder interviewed. Primary planners reported using between four and seven SCTs (average=6). Advisory planners reported using between one and four SCTs (average=3). And

community planners reported using between two and five SCTs (average=4) during the planning processes in Proctor Creek.

Figure 4.4 Total reported number of SCTs used by each stakeholder

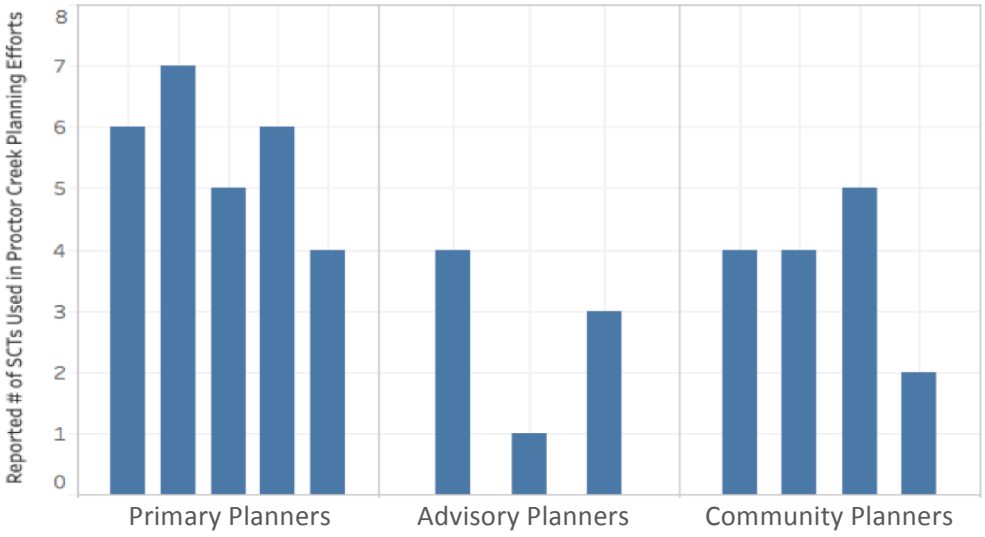


Table 4.4a below shows the average number of technologies used by each stakeholder group in each of the three planning cases included in this study. Despite the HIA being more recent, all three have similar results for each stakeholder level.

Table 4.4a Average number of technologies used by each stakeholder group separated by plan

Plan	**Average number of technologies reportedly used by:**		
	Primary	Advisory	Community
Overall	6	3	4
Watershed Improvement Plan (2011)	6	1	4
Proctor-North Ave (2011)	5	2	3
Health Impact Assessment (2015)	5	3	4

Table 4.4b below shows the specific SCTs reportedly used by each participant. All of the interviewees reported having used the Internet in some way. All but three reported having used cell phones. Only one interviewee (a primary planner) reported having used a sensor. Four interviewees (all

primary planners) reported using a data center. Seven interviewees reported having used a website—four primary planners, one advisory planner, and two community planners. Only two interviewees (both community planners) reported having used social media. Five reported having used big or open data (all primary planners). Seven reported having used GIS—five primary planners and two advisory planners.

Table 4.4b Reported SCTs used during Proctor Creek planning efforts

	Individual Interviewees											
GIS	+	+	+	+	+	o		o				
Big/open data	+	+	+	+								
Social media										★	★	
Website	+	+		+	+	o			★	★		
Data center	+	+	+	+								
Sensor		+										
Cell phone	+	+	+	+		o		o		★	★	★
Internet	+	+	+	+	+	o	o	o	★	★	★	★

Key: Primary Planner (+), Advisory Planner (o), Community Planner (★).

Tables 4.4c, 4.4d, and 4.4e below show the specific SCTs reportedly used by each participant for each of the three planning processes explored in this study.[4] Stakeholders from all three planning processes reported having used all eight of the SCTs, however, like in Table 4.4b above, these tables highlight the same clustering of use by different stakeholder type. For instance, all of the primary planners reported having used GIS, big or open data, most of the community planners reported having used cell phones and social media, and everyone reported having used the Internet.

[4] Many of the interviewees claimed to have participated in more than one of the plans so they are counted more than once. Level 3 stakeholders in particular reported having participated in multiple planning efforts, possibly because they are residents of the community and so they are committed to being engaged in this issue.

Table 4.4c Technologies reportedly used for ARC's Watershed Improvement Plan

	Individual Interviewees						
GIS	+	+					
Big/open data	+	+					
Social media					★	★	
Website	+	+				★	
Data center		+					
Sensor		+					
Cell phone		+		★	★	★	
Internet	+	+	○	★	★	★	

Key: Primary (+), Advisory (○), Community (★).

Table 4.4d Technologies reportedly used for Park Pride's PNA Visioning Study

	Individual Interviewees							
GIS	+	+	○					
Big/open data	+	+						
Social media						★		
Website	+					★	★	
Data center		+						
Sensor								
Cell phone		+	○		★	★		
Internet	+	+	○	○	★	★	★	

Key: Primary (+), Advisory (○), Community (★).

Table 4.4e Technologies reportedly used for EPA's Health Impact Assessment

	Individual Interviewees								
GIS	+	+	+		○				
Big/open data	+	+	+						
Social media							★	★	
Website	+	+	+		○			★	
Data center		+	+						
Sensor									
Cell phone		+	+		○	★	★	★	
Internet	+	+	+	○	○	★	★	★	

Key: Primary (+), Advisory (○), Community (★).

Table 4.4f below provides a detailed list of SCTs reportedly used by the interviewees in planning efforts in Proctor Creek. It includes which stakeholder type used each technology, what it was used for, and any other specifics about datasets or programs that were used. This level of detail reveals that in these

planning cases SCTs are being used to support research, to communicate internally amongst planning teams, and to communicate externally with the community.

Table 4.4f Reported SCT use by different stakeholders

Technology	Used by	Used for	Specifics
Internet	● Primary ● Advisory ● Community	Researching site Email communication between planners Email communication between advisors and planners Sending newsletters/emails to community Publishing planning documents Sharing information amongst planning team Learning about the planning effort	● Email ● Web-conferencing ● Drop box ● Website browsing
Cell phones	● Primary ● Advisory ● Community	Emailing/texting/calling for internal communications Calling community members to remind them about meetings/set up new meetings Robocalls to community members	
Sensors	● Primary	Water quality probes to identify water contamination	
Data center	● Primary	Researching site Creation of maps	● USGS ● ARC ● EPA ● EDP ● Fulton County Health Dept.
Website	● Primary ● Advisory ● Community	Disseminating information including data findings, meeting notices, planning documents, etc.	● ARC ● Community organization ● Nonprofits
Social media	● Community	Post meeting notices Post information about planning effort	● Facebook (personal account) ● Instagram (personal account)
Big/open data	● Primary	Researching site Creation of maps and graphics to educate the public/include in the plan Determining safe water sampling locations	● Land use ● Active/closed landfills ● Septic locations ● RICRA locations ● Topography ● Precipitation
GIS	● Primary ● Advisory	Creation of maps for scientific and educational purposes	

4.5 Perceived impact of SCT use on public participation

Interviewees were asked about the perceived impact of SCTs on the public's ability to participation in the planning processes. Overall, the primary planners reported that the use of certain

SCTs (especially big data) helped inform the planners and that the maps created using data helped explain the issues to the community. Overall, however, most of the interviewees reported SCTs playing a very limited role in their efforts to engage with the public in Proctor Creek planning efforts. One interviewee commented that in other planning efforts they had used social media and online resources much more, but that in this case the community wasn't interested in those tools. Several of the primary planners predicted that SCTs would become more relevant in future planning efforts.

Advisory planners similarly reported that SCTs played little to no role in enabling public participation in the planning efforts in Proctor Creek. One interviewee pointed out that at the time that the plan was being created it was considered exclusionary to communicate over email.

Interestingly, community planners actually felt that technology played a significant role in their ability to engage in the planning efforts in Proctor Creek. Use of technology was reported to have increased the community's trust in the planners because they felt that they could verify information being shown in maps and other documents. The Internet in particular was identified as a game changer because it enabled the residents to see their community in new ways (for instance with Google Earth) and hence to understand the issues in a new way. The use of PowerPoint presentations and large laminated maps was said to have increased the planner's legitimacy in the eyes of the community, and made the residents feel like the planners cared. Community planners acknowledged that they need easier access to resources and skills trainings to maximally benefit from the spread of new technologies.

5. Key Findings

The results of this exploratory study show that use of SCTs is uneven among different stakeholder types and that perceptions about the impact of these technologies on enabling the public to engage in planning processes do not necessarily correspond with use. The key findings are summarized below with their corresponding hypotheses.

H_1: The amount and types of SCTs used in planning processes will vary by stakeholder type.

It was hypothesized that both the amount and type of SCTs used would vary based on the stakeholder type. As expected, primary planners reported the highest use of SCTs. Community planners surprisingly reported the second highest use, followed by advisory planners. This finding may be a result of biased responses due to the researcher's affiliation with a technology school or simply due to inconsistent interpretations of what counts as use of technology. For example, some community planners reported using GIS mapping or modeling programs during the planning process, however later in the interview it became clear that they had simply used the map products that had been created by primary and advisory planners.

Type of SCT used also appeared to vary by stakeholder type as hypothesized. All of the interviewees everyone reported having used the Internet, all of the primary planners reported having used GIS, big or open data, and most of the community planners reported having used cell phones and social media. The use of data and GIS exclusively by primary and advisory planners is presumably due to their technical training and professional resources (e.g. company ArcGIS license). Whereas the use of social media exclusively by community planners is most likely due to restrictions limiting public agencies from using social media accounts.

H_2: SCTs will be used for unique purposes by different stakeholder types.

As expected, SCTs were reportedly used differently by different stakeholder types. For example, primary planners reported using the Internet to research to site, to communicate and share information with other primary planners, and to publish planning documents. Advisory planners reported using it to communicate with primary planners. And community planners reported using the Internet to send newsletters and email blasts to their networks and to learn more about the planning efforts. Again, this is presumably due to the primary advisory planners' technical training and professional resources (e.g. access to online academic journals).

H_3: Perceptions about the impact of SCTs on enabling public engagement in planning efforts will vary by stakeholder type.

The results of this study support the hypothesis that the perceived impact of SCTs differs by stakeholder level. However, it was expected that primary and advisory planners would have felt that technology played an important role because they are the stakeholders that were expected to be using the most technology. In reality these stakeholders felt that SCTs played little to no role in enabling public participation in the planning process and they reported that many of the community planners which whom they had engaged during these planning processes actively refused to engage via technology. Community planners, however, reported that technology played a significant role in the public's ability to participate in planning efforts around the Proctor Creek Watershed, revealing that reported use of technologies does not determine perceived impact of that technology.

These results may be due in part to differing interpretations of the term "technology". For example, when asked at the end of the interview what impact they felt technology had on enabling public participation in planning efforts around Proctor Creek, some community planners reported that it had had a very significant impact and then went on to describe the impactful technologies, which included post-it notes, PPT presentations, and cameras put up by the city to reduce crime. Perhaps a broader—or at least clearer—understanding of technology needs to be used when thinking about a smart city.

Community planners reported that use of maps (online and print) increased residents understanding of the issues and of their own community, and that access to the Internet increased their trust in the planners because they were able to verify information presented at meetings on their own at home. The use of visually appealing PowerPoint presentations and large laminated maps was also said to have increased the planner's legitimacy in the eyes of the community because it made the residents feel like the planners cared.

Conclusions

This study challenges the claim that smart cities will enable greater public participation by investigating the use of SCTs in efforts to engage the public in three planning efforts conducted in the Proctor Creek Watershed in West Atlanta. The findings show that use of SCTs is uneven among different stakeholder types and that perceptions about the impact of these technologies on enabling the public to engage in planning processes do not necessarily correspond with use. While use of SCTs was found to be uneven, community planners reported that the use of certain technology increased their understanding of the issues and their trust in the planners. Community planners expressed a strong desire to understand the data and technology being used in the planning process so that they could use those tools to advocate for their own community needs.

While this study did not explicitly seek to evaluate the effectiveness of technology-supported planning, the findings highlight the fact that even where technologies enable greater understanding of the planning issues or more meaningful engagement, they must be used in tandem with non-technical planning methods, such as in-person meetings and design charrettes. Many community planners mentioned the need for more face-to-face interaction with the planners earlier on in the planning process.

Public participation is vital for effective city planning because residents often know the strengths and weaknesses of their community better than anyone else. By meaningfully engaging the public in the planning process continually and multifaceted ways, planners are ensuring that the plans they create are grounded in real community needs. If meaningful public engagement is to be achieved, steps need to be taken to reduce existing inequalities that prevent citizens from being able to participation in the process.

Simple measures, such as changing the time and location of public meetings and providing incentives like on-site childcare or food at evening meetings might enable more citizens to attend meetings and stay involved. All three of the stakeholder groups interviewed in this study cited citizens' lack of time due to other more pressing priorities as a barrier to engagement in the planning process. Advisory planners also mentioned lack citizens' lack of access to transportation to get to meetings. And

community planners cited the time of the meetings, inflexible work schedules and lack of incentives as additional barriers to participation.

As investment in smart cities grows, planners need to advocate for equitable development and deployment of new services and technologies to ensure that disadvantaged communities are not further disenfranchised by this new wave of technological innovation. We, planners, need to remain mindful of the context in which and the audience for whom they are planning. Further research is needed to better understand the how to plan for and develop smart cities that improve quality of life for everyone.

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APPENDIX: Interviewee Profiles and Demographics

The age of the participants ranged from 25 to 70 years old with a median of 45 years old. On average the Level 3 stakeholders were slightly older than the Level 2 stakeholders and the Level 2 stakeholders were slightly older than the Level 1 stakeholders.

Fifty-eight percent (n=7) of the interviewees were white, thirty-three percent (n=4) were black, and eight percent (n=1) were Hispanic. All five of the Level 1 stakeholders were white. Of the three Level 2 stakeholders two were white and one was black. Three of the Level 3 stakeholders were black and one was Hispanic.

Fifty-eight percent (n=7) of the interviewees were men and forty-two percent (n=5) were women. Of the five Level 1 stakeholders interviewed, three were men and two were women. Two of the Level 2 stakeholders were women and one was a man. Of the four Level 3 stakeholders interviewed, three were men and one was a woman.

Forty-five percent (n=5) of the interviewees had master's degrees, twenty-seven percent (n=3) had college degrees, eighteen percent (n=2) had high school diplomas, and nine percent (n=1) had a Ph.D. The educational attainment of the participants varied widely within each stakeholder level. Of the Level 1 stakeholders interviewed three had master's degrees, one had a high school diploma, and one had a Ph.D. Of the Level 2 stakeholders one had a master's degree, one had a college degree, and one had a high school diploma. And of the Level 3 stakeholders one had a master's degree, one had a college degree, and one had a high school diploma.

Fifty-five percent (n=6) of the interviewees reported having an average annual personal income of between seventy-five and one hundred thousand. Eighteen percent (n=2) reported having an average annual personal income of less than twenty-five thousand. Nine percent (n=1) reported having an average annual personal income of between twenty-five and fifty thousand. Nine percent (n=1) reported having an average annual personal income of between fifty and seventy-five thousand. And nine percent (n=1) reported having an average annual personal income of more than one hundred and fifty thousand. Average annual personal income as reported by the interviewees was more stratified by stakeholder level

than educational attainment. Three of the Level 1 stakeholders reported making between seventy-five and one hundred thousand and one reported making over one hundred and fifty thousand. Of the Level 2 stakeholders one reported making between seventy-five and one hundred thousand, another between fifty and seventy-five thousand, and the last reported making less than twenty-five thousand. Of the Level 2 stakeholders one reported making between seventy-five and one hundred thousand, another between twenty-five and fifty thousand, and the last reported making less than twenty-five thousand.