

# Citizen Engagement in Technically Dynamic Environments

Angie Westover-Muñoz\*, David Landsbergen\*\*, Amanda M. Girth\*\*\*

\*John Glenn College of Public Affairs, Ohio State University. 1810 College Rd. Columbus, Ohio, 43210., westover-munoz.1@osu.edu

\*\*John Glenn College of Public Affairs, Ohio State University. 1810 College Rd. Columbus, Ohio, 43210., Landsbergen.1@osu.edu

\*\*\*John Glenn College of Public Affairs, Ohio State University. 1810 College Rd. Columbus, Ohio, 43210., Girth.1@osu.edu

*Abstract: Cities around the world are implementing technology-based solutions to make better decisions. These “smart cities” not only develop the abilities to process, analyze, and manage the high volumes of data collected but also need to design and implement strategies to engage with citizens. This study explores why and how cities engage citizens in their smart city initiatives by analyzing the results of a nationwide survey of US cities. Results show that cities view the purpose of citizen engagement as more informative or to generate support for smart city efforts. Cities appear to use a diverse combination of mechanisms to engage citizens with smart city initiatives with an emphasis on simple, one-way communications from government to citizens.*

*Keywords: citizen engagement, smart cities, participation*

## 1. Introduction

Cities around the world are implementing technology-based solutions to address a variety of challenges, including those related to transportation, clean air and water, energy consumption, and health. These technological "smart city" solutions rely on a significant volume of data, created or collected by public institutions (Janssen et al., 2012). While there is no agreed upon definition of a smart city (Chouraby et al., 2012; Gil-Garcia et al., 2015), this study takes the view that smart cities are those that use of information and information technology to make better decisions and improve quality of life (Nam & Pardo, 2011). This perspective reflects a set of related trends or currents within society. One current is the increased interest by cities in using data and new information technologies. The increased use is driven by the internal needs of cities to respond to complex problems by using 'data-driven' solutions (Abella et al., 2017). Another current is that there should be a more "open government" so that citizens have more accountability, transparency, and democratic dialogue (Pereira et al., 2018).

Citizens are engaged in smart cities in any number of ways. They are engaged to the extent that they are consumers of these services; for example, in Columbus, Ohio the public is informed about the availability of new technologies like electric vehicles and how they can use these services. Also, citizens and private, public, and non-profit organizations can passively receive the high volume of data cities collect and make publicly available (Paskaleva-Shapira, 2006). Citizens can also be involved in strategic or operational decision making of smart technologies (Thompson, 2016). For example, Portland, Oregon has developed a city charter that places citizen engagement at the center of all of its smart city efforts (The city of Portland, n.d.). This approach says that Portland is smart to the extent that its citizens are smart and can meaningfully participate in Portland's government. The role and importance of citizen engagement can vary widely from being a central goal that smart city efforts are designed to advance or it can be viewed as one of many instrumental goals towards achieving the city's other objectives.

The purpose of this study is to generally understand why and how cities engage citizens in smart city initiatives. To do this, a nationwide survey was conducted of smart city officials in the US to gather their perceptions of the purposes of citizen engagement and the mechanisms they use to engage citizens. Preliminary results show that cities view citizen engagement as a means to inform the residents, and to obtain residents' support of smart city initiatives. Cities use a diverse combination of participatory, consultative, and communicative mechanisms to engage citizens in smart initiatives.

## **2. Citizen Engagement in the Complicated Smart City Environment**

Cities face an especially difficult task of building internal capacity for data-based decision-making. While a central role of data and analysis in smart cities is to improve quality of life, technological efforts can contribute to undermining the goal of equitable civic engagement unless there are strong and explicit efforts to correct for the inequitable capacity to make use of the data.

Citizens willingness and ability to be part of the process depends on multiple factors. Some of these factors are related to the individuals' profile including educational level, digital literacy; as well as the characteristics of the smart initiative itself (Yeh, 2017). Moreover, citizens may not understand a smart city effort, how to participate, in addition to lacking minimal technical or analytical skills (Olphert & Damodaran, 2007). This may require efforts from the government to close the gap through its design of an engagement plan. The public may not fully realize the value of the data being provided and not be able to use that information to become fully involved in smart city efforts in the absence of wider civic engagement. As a result, one concern is that data-based policy recommendations may reflect the needs of technological experts and elites even more, excluding other groups of the population from the benefits of being in a smart city (Hollands, 2008) unless there is a robust citizen engagement plan.

Even as citizens are continually improving their digital literacy, this improvement is not homogeneous across the population. Moreover, the digital literacy and analytical skills of citizens can determine their ability to understand the information they are receiving, and frame their

perceptions regarding the technology that cities are trying to implement, leading to fear, rejection (Lytras & Visvizi, 2018), or self-exclusion from the process (Kvasny & Keil, 2006).

Whether it is citizens overall or particular subpopulations, citizens could develop negative attitudes towards the use of the smart technologies, determining their frequency of use, their perceived value added and their willingness to participate in and support smart city projects. Lytras & Visvizi (2018) find that most citizens support smart city initiatives but very carefully select the services they will use due to their concerns about security and reliability of the systems. Different kinds of citizen engagement may have differential effects on the degree to which citizens are apathetic, concerned, or advocates for the initiative.

There may also be a deficit of technical skills within the city that make it difficult to generate and implement innovation (Dunleavy, 2006). The introduction of robust citizen engagement mechanisms such as citizens co-creating a strategic vision, may exhaust the capacity of cities to execute projects properly. Significant citizen engagement can compound complexity and the risk of projects. As governments now move to agile management techniques that call for quick simple solutions this may also work against the longer timelines needed for robust citizen engagement. Finally, cities may not have the funds to implement engagement strategies, because resources can be allocated to alternative goals, like direct investment on technology or other operational costs.

## 2.1. Purposes of Citizen Engagement

Citizen engagement can take place in different stages of the innovation process and it can serve multiple goals. Governments can decide to implement citizen engagement to meet legal requirements, embody ideals of democratic participation and inclusion, diagnose a problem, design a solution, co-produce a policy or program, generate support for an initiative, or create and sustain social capital, among others (Bryson et al., 2012). According to Bryson et al. (2012), identifying the purposes of citizen engagement will serve as the foundation for designing a strategy and to select the criteria for its evaluation. Engagement is recognized as a “potent means to achieve democratic values as legitimacy, justice, and effective governance” (Fung, 2006). They can engage citizens in the decision-making phase, either to collect useful information for the design of a solution, or to include them directly in the decision (Bryson et al., 2012). They could also include citizens in the implementation of the program as a form of co-production, or to simply identify critical factors for the success of the initiative (Mejier & Rodriguez, 2016) **Error! Reference source not found.** Finally, citizens could also be included in the governance of a program to help make relevant decisions and be a part of the management of the initiatives (Fung, 2006).

## 2.2. Citizen Engagement Mechanisms

Citizen engagement mechanisms are “the particular ways that cities can engage citizens” (e.g., surveys, meetings, or simply providing information). The mechanisms that cities can use to engage citizens are multiple and scholars have debated the dimensions used to categorize these mechanisms. The operating assumption is that different kinds of mechanisms are useful for different purposes contingent on the ability of a city to use those mechanisms.

Rowe and Frewer (2005)**Error! Reference source not found.** developed a typology for engagement tools sorted into dimensions of communication, consultation, and participation. These three “types of public engagement” (p. 254) vary depending on the directionality of the information. In public communication, local government sends information to citizens or other representatives. In the case of public consultation, the information goes from the public to the government, but the process is initiated by the latter. Finally, for public participation there is a bidirectional exchange of information, in which dialogue and deliberation take place. The degree to which a specific mechanism can fulfill effectively the goals of each typology depends on certain attributes. To date, researchers have not used a national and diverse sample to investigate how cities engage citizens in smart initiatives, what cities are finding successful, and what lessons can be learned to improve citizen engagement.

### 3. Data, Method, and Measures

This study provides exploratory insights on smart city citizen engagement initiatives in cities across the US. A descriptive empirical analysis is used to report results from a nationwide survey of city officials in the US, and lays the groundwork for future additional analysis. The survey was sent to the 1,000 most populated cities within the US, according to census data (US Census, 2017). The surveys were sent to public officials working in the local governments in the positions of chief information officer, information technology managers, city managers, or similar; individuals were identified through city websites and LinkedIn. The survey was emailed to one individual in each city in late 2019. The maximum response rate for the citizen engagement questions was 10%. There is only one response per city.

The unit of analysis is the city. For all the citizen engagement questions, respondents were asked to refer to their largest smart city project. The largest smart city project was defined as the one with the biggest overall cost, including the total investment by all partners. The largest smart city project has the highest likelihood of showing the wide range of citizen engagement purposes and mechanisms that cities are implementing. The projects total cost range from a \$12,000 to \$1,000,000, with a mean of \$30,799 and a standard deviation of \$122,490. In average a 67.80% of that cost is public expenditure (sd. 59%). Most of the projects (63%) have been operating for less than 2 years, 24% from 3 to 5 years, and 13% for more than 6 years.

Nine items included as purposes were adapted from the list present in Bryson and Quick [4]. The frequency of each purpose is presented item-by-item. The survey contained a list of 10 mechanisms adapted from the inventory developed by Rowe & Frewer (2005). Respondents were asked to indicate if they use (1) or not use (0) a specific mechanism. The mechanisms were classified using the three typologies of engagement developed by Rowe & Frewer (2005): communication, consultation and participation.

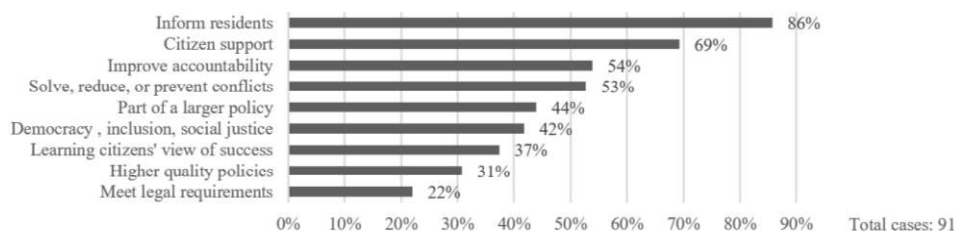
Seven combinations of mechanisms were created (communication only, consultation only, participation only, communication-consultation, communication-participation, consultation-participation, and communication-consultation-participation). Each city was included in one of these combinations where it had one mechanism in one of the basic types of mechanisms

(communication, consultation, or participation). Thus, if a city had two communication mechanisms and one consultative mechanism, it was put in the communication-consultation combination.

## 4. Results

This section reports the frequencies of the purposes of citizen engagement and the mechanisms utilized. Figure 1 contains the percentage of cities that declared having each purpose as part of their plan to engage citizens in their largest smart city project. The most common purpose is to send information to residents (86%), followed by gaining citizen support (69%). The high prevalence of these purposes is consistent with the results shown in figure 2 for engagement mechanisms. Cities commonly used communication mechanisms (one-way from city to citizen) whose aim is to send information to citizens.

Figure 6: Purposes, Percentage of Cases (As percentage of the total cases)



On the other extreme, the less frequently declared purpose is to meet legal requirements (22%). The small number of cities that declare having this as a purpose for the engagement of citizens is interesting. One potential explanation is that there are not clear or predetermined legal requirements on how and when to engage citizens in smart city initiatives since a large number of these cities are still in an early stage of implementation of these kinds of projects.

Figure 2 presents the percentage of cities that use each one of the mechanisms. The most used mechanisms to engage citizens are information publicly available (64%) and meetings to provide information (56%). On the opposite side, the less used mechanisms are meetings to design a solution with citizens and meetings to make binding decisions (both 8%). The percentage of cities that implement each mechanism in their smart city initiatives seems to align with the level of intensity of the interaction that each one requires. The most commonly used are communication mechanisms, followed by consultation, while participation mechanisms are the less used. The most frequently used citizen engagement mechanisms are those that require less interaction. These include making information publicly available and meetings to provide information mechanisms that are intended to just send information to the community.

In contrast, the less frequently used mechanisms are those that require the most active interaction between the city and citizens. 'Designing solutions' and 'Making binding decisions', not only have bidirectional exchanges of information, but also involve expressing and forming opinions through deliberation. This intense level of interaction can slow projects down and may require particular skills or involve the expenditure of additional resources that the city does not have. One exception to this general finding of the relationship between intensity and use, are 'Meetings with experts'

which are at a higher level of intensity but frequently used. Relying on experts may be efficient in that they provide useful information including what citizens want and guide governments toward a 'solution.' Another exception are 'Hotlines or 311' with a low intensity but not used frequently. This may owe less to being low intensity and easy to use but are simply less effective for smart city engagement.

Figure 2: Percentage of Cities That Use Mechanisms (As percentage of the total cases)

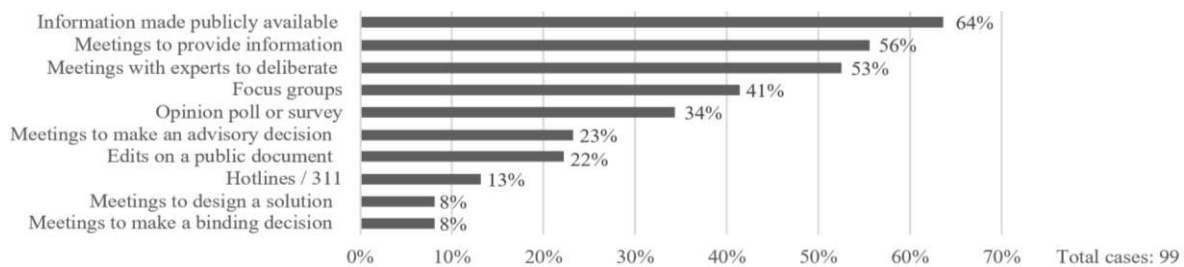
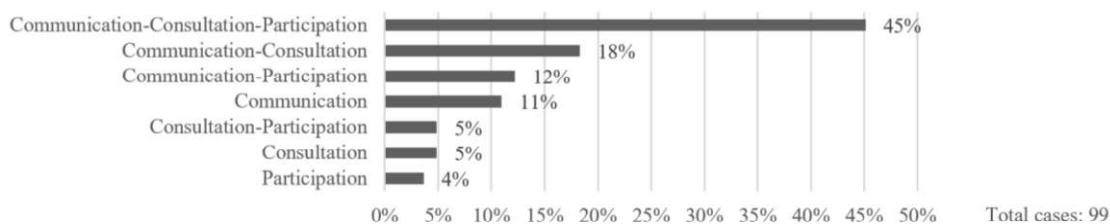


Figure 3 reports how cities combine different type of mechanisms. Most of the cities use a combination of communication, consultation and participation mechanisms (45%). Using combinations of communication with consultation, and communication with participation are the second and third most popular cases (18 and 12% respectively). Only a minor percentage of cases concentrate their portfolio purely in one of the three types of engagement. How they determine and decide what the right combination of engagement mechanisms to achieve their purposes is, could be because of a) the synergies among specific set of mechanisms, b) a response to experiences engaging citizens in the past, or c) a random combination. This question cannot be responded with this data, but could be explored in future case study research.

Figure 3: Combination of Types of Engagement (As percentage of the total cases)



## 5. Discussion

Overall, the results indicate that cities perceive the purpose of citizen engagement as a way to generate support for smart city initiatives or to inform citizens. There is less emphasis on legal compliance or interactive design of projects. The low emphasis on legal compliance might mean that legal requirements are a floor for citizen engagement. Earlier it was suggested that one potential explanation for the low emphasis on legal requirements is that there are not clear or predetermined legal requirements on how and when to engage citizens in smart city initiatives since a large number of these cities are still in an early stage of implementation of these kinds of projects (reported in table 1). Alternatively, cities could have specific requirements to engage citizens in general, but since this

represents a minimum requirement, it becomes a routine rather than fully capturing why they are doing citizen engagement. Put another way, there are much more important reasons for doing citizen engagement than simply meeting legal requirements.

The different purposes for doing citizen engagement, in some cases, might compete with each other; for example, cities' use of more efficient processes can crowd out democratic participation. Yet the variety of purposes reported by cities might also mean that purposes can be harmonized. In any case, cities might consider giving citizens the opportunity to be heard early in the process as it might lead to better designed solutions. These tradeoffs or congruencies need to be explored creatively by smart city managers.

There may be many reasons why cities seem more reticent to use participation mechanisms. The implementation of more participative mechanisms can require a bigger investment in time and resources from the city, especially in the context of smart city projects, where other survey results indicated that the financial resources seem to be unstable and unpredictable. Moreover, processes that include deliberation increase challenges like lack of interest or capacity to understand and process information, which could make them less likely to participate. Finally, since these processes involve deliberation, planning and implementing them effectively could be more difficult than with simpler mechanisms without so many interests at stake.

While the results of this survey show that cities use a variety of mechanisms to engage citizens in smart city projects – which is a good thing – the most commonly used tools are the simpler one-way communication mechanisms. The more intense forms of engagement, such as participatory or consultative are less commonly employed. The presumption is that cities should be matching mechanisms to the kinds of purposes that they are seeking to realize. If smart city purposes are complex, while the mechanisms chosen are simple and easier, there could actually be a mismatch between the goals and the means used to achieve them.. The use of simple mechanisms could be a result of a lack of skills, resources, or understanding of the benefits of robust citizen engagement. Given that a variety of different kinds of mechanisms is preferable, it may be important to identify best practices and understand what experience among many cities has actually shown. This would include knowing what the real costs and risks are, followed by training.

This study is the first step in a larger research project on smart city initiatives. Next steps include comparing administrator and citizen perceptions of barriers to citizen engagement and what constitutes successful citizen engagement. There are interesting dynamics and relationships that should be explored in more detail. Most important for practice is to understand how administrators create pragmatic solutions given the competing purposes and constraints. In depth case studies are another next logical step to build upon the results described here.

## References

- Abella, A., Ortiz-De-Urbina-Criado, M., & De-Pablos-Heredero, C. (2017) A model for the analysis of data-driven innovation and value generation in smart cities' ecosystems. *Cities*, 64(April), 47-53.
- Bryson, J. M., Quick, K. S., & Crosby, B. C. (2012) Designing Public Participation Processes. *Public Administration Review*, 73(1), 23-34. <https://doi.org/10.1111/j.1540-6210.2012.02678.x>. Designing

- Chourabi, H., Nam, T., Walker, S., Gil-Garcia, J. R., Mellouli, S., Nahon, K., & Scholl, H. J. (2012) Understanding smart cities: An integrative framework. In 2012 45th Hawaii international conference on system sciences (pp. 2289-2297). IEEE
- Dunleavy, P. (2006) *Digital era governance: IT corporations, the state, and e-government* / Patrick Dunleavy [et al.]. Oxford :: Oxford University Press.
- Fung, A. (2006) Varieties of Participation in Complex Governance. *Public Administration Review*, 66, 66–75.
- Gil-García, J. R., Pardo, T. A., & Nam, T. (2015) What makes a city smart? Identifying core components and proposing an integrative and comprehensive conceptualization. *Information Polity*, 20(1), 61-87.
- Hollands, R. G. (2008) Will the real smart city please stand up? Intelligent, progressive or entrepreneurial? *City*, 12(3): 303-320.
- Janssen, M., Charalabidis, Y., & Zuiderwijk, A. (2012) Benefits, Adoption Barriers and Myths of Open Data and Open Government. *Information Systems Management*, 29(4), 258-268.
- Kvasny, L., & Keil, M. (2006) The challenges of redressing the digital divide: A tale of two US cities. *Information systems journal*, 16(1), 23-53.
- Lytras, M. D., & Visvizi, A. (2018) Who Uses Smart City Services and What to Make of It : Toward Interdisciplinary Smart Cities Research. *Sustainability*, 10(1998): 1–16.  
<https://doi.org/10.3390/su10061998>
- Meijer, A., & Rodriguez, M.(2016) Governing the smart city : a review of the literature on smart urban governance. *International Review of Administrative Sciences*, 82(2), 392–408.
- Nam, T., & Pardo, T. A. (2011) Conceptualizing smart city with dimensions of technology, people, and institutions. In *Proceedings of the 12th annual international digital government research conference: digital government innovation in challenging times* (pp. 282-291).
- Olphert, W., & Damodaran, L. (2007) Citizen participation and engagement in the design of e-government services: The missing link in effective ICT design and delivery. *Journal of the Association for Information Systems*, 8(9), 27.
- Paskaleva-Shapira, K. (2006) Transitioning from e-Government to e-Governance in the Knowledge Society: The Role of the Legal Framework for Enabling the Process in the European Union's Countries. Paper presented at the 7th Annual International Conference on Digital Government Research, San Diego.
- Pereira, G. V., Eibl, G., Stylianou, C., Martínez, G., Neophytou, H., & Parycek, P. (2018) The Role of Smart Technologies to Support Citizen Engagement and Decision Making: The SmartGov Case. *International Journal of Electronic Government Research (IJEGR)*, 14(4): 1-17 . doi:10.4018/IJEGR.2018100101
- Rowe, G., & Frewer, L. J. (2005) A Typology of Public Engagement Mechanisms. *Science, Technology & Human Values*, 30(2), 251–290. <https://doi.org/10.1177/0162243904271724>
- The city of Portland, Oregon. - Civic Engagement Partners. Retrieved from Civic Engagement Partners, <https://www.portlandoregon.gov/civic/60436>, last acceded 2020/02/14.
- Thompson, E. M. (2016) What makes a city ‘smart’? *International Journal of Architectural Computing*, 14(4), 358-371.



U.S. Census Bureau. (2017), American Community Survey, 2017 American Community Survey 1-Year Estimates, using data.census.gov, available at: <https://data.census.gov/cedsci/>

Yeh, H. (2017) The effects of successful ICT-based smart city services: From citizens' perspectives. *Government Information Quarterly*, 34(3): 556-565.

## **About the Authors**

### *Angie Westover-Muñoz*

Angie Westover-Muñoz is a Ph.D. Student in Public Policy and Management at John Glenn College of Public Affairs, The Ohio State University. Her research interests include technology and data-driven policies, and citizen engagement.

### *David Landsbergen*

David Landsbergen is an associate professor at the John Glenn College of Public Affairs at The Ohio State University. He has written about modernizing information systems, interoperability, privacy, developing technical standards, public records, and open data in *Government Information Quarterly*, *IEEE Transactions*, the *Journal of Public Administration Research and Theory*, *Public Administration Review*, and the *Journal of Policy Analysis and Management*.

### *Amanda M. Girth*

Amanda M. Girth is an associate professor at the John Glenn College of Public Affairs at The Ohio State University. Her research on government contracting, public-private partnerships, and accountability challenges in third-party governance is published in the *Journal of Public Administration Research and Theory*, *Journal of Supply Chain Management*, *Public Administration Review*, and *International Public Management Journal*, among other outlets.