Whose open data is it anyway?
An exploratory study of open government data relevance and implications for democratic inclusion

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Abstract. Open government data (OGD) is believed to enhance democratic outcomes by empowering citizens with the information necessary to participate in meaningful ways. Nonetheless, questions remain about whether OGD is indeed empowering citizens to participate or if the data that governments publish is more reflective of the interests of non-citizen stakeholders. Using the metadata of 2607 publicly available datasets scraped from New York City's open data portal, this exploratory study employs qualitative content analysis to identify what types of data are published and what the data say about OGD's potential as a tool for advancing inclusion in democratic processes. The analysis focused particularly on the datasets' relevance to five particular stakeholder groups: citizens, private sector firms, nonprofits, researchers, and the city's internal agencies. Findings showed that non-citizen-relevant datasets not only outnumbered citizen-relevant datasets by a large margin but they were also viewed and downloaded at higher rates too. I discuss the implications for inclusion in democratic processes, including power imbalances among OGD user groups, the discretionary power data publishers possess, and, ultimately, whether the types of data cities publish is sufficient for empowering an informed citizenry, as an effective democracy demands.

Keywords: Open government data, citizen participation, democracy, usability, inclusion

Key points for practitioners:
- The data that governments publish is often reflective of imbalances in power and status among user groups. Therefore, governments should be aware of how the types of data it publishes can either help to redistribute power or exacerbate existing power imbalances.
- If governments want citizens to use OGD to participate meaningfully in democratic processes, they must provide citizens with relevant, useful, and context-sensitive data.
- Public sector agencies can promote open data use by making more informed, inclusive, and citizen-centered decisions about what types of data they publish.
- Governments can optimize investment in open data initiatives and the public value generated by them through efforts to understand how citizens use open data, including their interests, skillsets, requirements, and information preferences.

1. Introduction

Open government advocates argue that increasing access to government data will enhance transparency, accountability, and citizen participation. As open government data (OGD) initiatives have increased and evolved in recent years, digital government scholars have taken an interest in investigating such claims by

exploring OGD's potential to foster democracy (Ruijer et al., 2017; Ruijer & Martinius, 2017; Harrison et al., 2010) and provide public value (Gurin, 2014; Janssen et al., 2012). More recently, the intricacies of the portals and the datasets themselves have captured scholars' attention, including specific design principles that may help or hinder the ability of OGD portals to achieve their potential (Lnenicka & Nikiforova, 2021; Matheus et al., 2021; Janssen et al., 2017). To date, empirical studies provide important insight into the benefits that OGD provides, including the factors that influence governments' adoption of OGD initiatives, as well as the social, economic, and political factors that influence data sharing (Ruijer et al., 2020; Fan & Zhao, 2017). This stream of research is ultimately important for understanding the factors that affect open data use and, as a result, OGD's ability to achieve the values that OGD initiatives aim to promote.

Nonetheless, few studies to date adequately discuss the many different kinds of data governments publish, including the values and goals they promote, what sorts of activities the available data can be used for, and by whom. Yet, these are important components of OGD initiatives and can inform a greater understanding of not only the nuances of open data use but also implications for transparency, accountability, and more inclusive participation. While the literature provides a good overview of the diversity of stakeholder groups that use OGD (Dawes et al., 2010), it also provides evidence of many barriers preventing ordinary citizens from using open data (Zuiderwijk et al., 2012). Additionally, there is evidence that non-citizen stakeholders such as researchers, private industry, developers, and journalists are some of the most active users of open data (McGuinness & Schank, 2021; D'ignazio & Klein, 2020). Thus, questions remain about whether open government data is indeed empowering citizens to participate in decision-making processes as hoped, or if the data available are more relevant to, and potentially used more frequently by non-citizen stakeholders.

This exploratory study probes the nuances of the link between open government data and participation by exploring two main research questions. First, what types of open government data are made available? Second, what can the types of data published tell us about open government data as a tool for democratic participation; mainly, its ability to inclusively engage citizens? As the second question suggests, I am most interested in understanding whether the types of data provided are sufficient for empowering citizens. Specifically, whether the available data are inclusive of the needs, interests, and activities of the diverse citizenry that a city serves or if data is more relevant to non-citizen stakeholders. Using observable data scraped from New York City's open data portal (NYC Open Data), this exploratory study employs qualitative content analysis to investigate the extent to which the published datasets can indeed encourage more inclusive citizen participation. I evaluate the types of data available on the city's open data portal according to its category, the open government principle it promotes, and the extent to which the dataset is relevant and useful to five stakeholder groups: citizens, private sector, nonprofits, researchers, and city agencies. The descriptive analysis of the published datasets laid the foundation for a more in-depth discussion about further implications for democratic participation and inclusion. In pursuit of my second research question, the discussion focused primarily on whether the types of data published are sufficient for engaging and empowering an informed citizenry, not only as OGD initiatives aim to do but as an effective democracy demands.

This study offers two important contributions. First, this study contributes to the OGD literature by systematically analyzing the types of datasets published on one of the most established and active open data portals in the United States, NYC Open Data, and combining the qualitative analysis with objective and quantitative measures of open data use – views and downloads of the datasets. Previous studies on open data use rely heavily on citizens' perceptions of OGD initiatives and researchers' assessments of open data portals to draw conclusions about open data utilization (Machova et al., 2018; Ojo et al.,

2018) and, as Safarov et al. (2017) point out in their systematic review, the OGD literature is largely composed of assumptions about open data use. There is a dearth of research offering empirical support for the predicted links between open data, users, and the impacts of OGD. More specifically, there is little empirical work that investigates the extent to which stakeholders are actually engaging with OGD using quantitative measures of open data use (Begany & Gil-Garcia, 2021). The exploratory nature of this research design produced a rich descriptive analysis that is useful for advancing descriptive theory (Gregor, 2002) about what types of open government data are available to the public, which agencies are publishing data and how much of it, and the extent to which stakeholders actually engage with the data available.

Second, the study contributes to an underexplored area of the OGD literature concerning the impact of open data on equity and inclusion. This area remains surprisingly underdeveloped in spite of OGD's positioning as a tool for advancing democratic values (Harrison et al., 2012), of which equitable and inclusive citizen participation remains salient. The early e-government literature had high hopes for digital technologies as tools that could enhance democratic outcomes. As governments began adopting web-based applications, social media, and other information communication technologies (ICTs), governments and scholars remained focused on ways these technologies could enhance e-democracy by encouraging and empowering ordinary citizens to actively participate in government decision-making processes (Garson, 2006; Coleman & Norris, 2005; Lee et al., 2011). Decades later, increasing citizen participation remains a top priority for OGD programs as well, yet there has been ample debate on whether OGD has in fact enhanced citizen participation processes in the ways once hoped. Like many other e-participation tools, questions persist regarding the extent to which OGD is indeed empowering citizens, especially historically marginalized groups, to participate, or maintaining historic patterns of participation and exclusion. While scholars continue to discuss the technical aspects of open data portals and systemic issues with access and inclusion also i.e. the digital divide (Norris, 2001; Ferro et al., 2011), there has been very little attention paid to the potential democratic divide in this context as well. Mainly, how the information that governments are providing access to may help or hinder participation, and for whom. While a detailed discussion of these issues is ultimately beyond the scope of this paper, it is my hope that this research can provide a foundation for which future research on the topic can build.

This paper begins with a discussion of open government data (OGD) in the broader context of e-democracy and open government reforms, including OGD's promise as a tool for promoting democratic values such as transparency, accountability, and citizen participation. Following is a discussion of OGD use, focusing on the importance of relevance and usability of open data for encouraging citizen participation, especially. Next, I present an overview of the case of NYC Open Data as an example of an active and established OGD program with over 2600 published datasets which can be analyzed to understand the types of data available and their relevance to various stakeholder groups. I then present the results of the analysis, followed by a discussion on what the findings suggest for inclusion and participation in democratic contexts, more specifically. Lastly, I conclude with recommendations for how cities can encourage more inclusive citizen participation by increasing the amount of citizen-relevant data and improving the usability of OGD.

2. Open government data as an open government tool

Since introduced by United States President Barack Obama in 2009, open government initiatives have expanded across the world. The aim of these initiatives is to promote the monitoring of government and its activities by external stakeholders through greater access to information and increased opportunities to

participate in decision-making (Grimmelikhuijsen & Feeney, 2017; Meijer et al., 2012). Broadly, the open government movement advocates not only for the openness of information but also for greater openness in public participation processes, with the understanding that the former can facilitate the latter. Additionally, in the United States, there is an emphasis on collaboration between stakeholders and promoting activities that help to facilitate data sharing and bring together multiple perspectives in the development of new types of data and information (Open Government Progress Report, 2009).

As open government reforms continued to evolve and expand, the Obama administration introduced an Executive Order in 2013 mandating all federal agencies to make their data "open" and available online. Soon, states and local governments across the U.S. began enacting their own open data policies and adopting broadscale OGD platforms. Today, a vast majority of open data is disclosed via a specialized website called an open data portal. Open data portals serve as an integrated system for governments to organize, upload and manage the data they collect across many agencies and various sources using just one platform. More generally, open data is data that is open and free to everyone to use for whatever purpose they see fit. Within that, open government data (OGD) refers specifically to the data collected, managed, and published by governmental institutions. The disclosure of government information via open data portals allows the public to obtain a glimpse into the activities of government relatively easily, providing opportunities to interact with government agencies and actors in ways that weren't previously possible.

Access to government information in this way provides greater transparency of government activities, decision-making, and performance. Internet-based platforms such as OGD portals have also provided new opportunities for citizens to hold governments and public officials accountable (Meijer, 2003; Meijer, 2006). Accountability which refers to governments' and public officials' answerability for their performance and sense of public responsibility (Dowdle, 2006; Bovens, 2007), has been the focus of recent open data research (Lourenço, 2015; Lourenço et al., 2017; Mayernik, 2017; Peixoto, 2012; Saxena & Muhammad, 2018). Yet, as with transparency, the impacts of OGD programs on accountability are mixed, with studies showing that OGD does not support ordinary citizens in public accountability processes because of a lack of useful data (Saxena & Muhammad, 2018), structural elements of the portals (Lourenço, 2015) including incomplete data (Mayernik, 2017), and even governments' reluctance to release data that could be used for accountability purposes (Shkabatur, 2012; Ruijer et al., 2019).

Though some argue that the transparency and accountability dimensions of open data make OGD programs intrinsically valuable, scholars also argue that open data is instrumental to many other important political and social functions (Dawes et al., 2016). For instance, OGD is expected to improve service delivery by encouraging cities to more efficiently and effectively manage data (Gonzalez-Zapata & Heels, 2015; Longo, 2011) and improve performance (Attard et al., 2015) through data-driven insights. Additionally, governments collect a great deal of data that has both social and commercial relevance (Attard et al., 2015). Opening such data to the public is thought to spur innovation and economic growth (Dawes et al., 2016; Attard et al., 2015; Howard, 2012). In sum, the proactive provision of information in this way is thought to create public value (Harrison et al., 2012) as open access to government information should not only increase transparency and government efficiency but also encourage and empower citizens (Kassen, 2013).

3. Open government data and democracy

3.1. E-democracy

Digital government and ICTs have long been regarded as promising tools for enhancing citizen-state

relations (Morgeson III et al., 2011; Janssen et al., 2017; Tolbert & Mossberger, 2006). Following the rise in internet use and the development of new ICTs in the early 2000s, many assumed that new technologies would transform the ways that the public participates. There was hope that governments' use of ICTs would help to strengthen democracy by increasing opportunities for those who traditionally participate and mobilizing new groups (Norris, 2001). The term e-democracy was quickly coined as a sort of umbrella term to describe the many ways that governments used ICTs to improve democratic outcomes (Garson, 2006), including using ICTs to inform, consult, and communicate with citizens (Coleman & Norris, 2005; Lee et al., 2011).

Distinct from e-government, e-democracy is aimed at empowering citizens to use new technologies to participate more meaningfully in government decision-making and policy-making processes (Hujran et al., 2020). Nonetheless, e-democracy is an intentionally broad concept in order to encompass a wide range of activities and initiatives in which digital tools are leveraged to enhance democratic participation (Coleman & Norris, 2005). This includes open government programs. With citizens "at the heart of open government" (Wirtz et al., 2019, p. 566), OGD initiatives have become obvious choices for democratic governments eager to facilitate a more deliberative and participatory democracy. In contrast to voting in periodic elections, increasing access to government data is thought to provide citizens with the information needed to actively participate in a number of ongoing governance processes (Attard et al., 2015; Harrison et al., 2012), thus, enhancing democratic systems.

Yet, scholars continue to debate whether OGD indeed empowers citizens to participate (Linders, 2012) or if OGD initiatives have failed to encourage meaningful citizen participation. To this end, scholars have argued that technology adoption is not enough to advance the kinds of democratic values in question (Yu & Robinson, 2011). Evans and Campos (2013) argue that most open government initiatives place too much emphasis on data delivery, including the technical aspects of the platforms, which distracts from the need to provide citizens with the necessary contextual information to make sense of and the data in order to use it appropriately. Similarly, Wirtz et al. (2017) contend that governments have neglected the crucial importance of accessibility and usability for ensuring equal access to OGD. For participatory democracy to materialize in the desired manner, it will take more than simply introducing new technology. Citizens must possess a degree of knowledge about the issues, the systems they are embedded in, and the nature of the policymaking process to engage productively and meaningfully in deliberative processes. Additionally, the data provided should be relevant to citizens and the decision-making processes they are encouraged, even expected at times, to participate in.

3.2. The democratic divide

The digital divide, which largely refers to disparities in access to and use of technology among marginalized groups, has been widely discussed in the digital government literature. However, the democratic divide is also salient in this discussion as it describes the "differences between those who do and do not, use the panoply of digital resources to engage, mobilize, and participate in public life" (Norris, 2001, p. 4). In other words, of those who have access to and use the internet, who uses it to participate and who does not? (Min, 2010; Nam, 2011). Thus, the democratic divide poses questions concerning increased access to information via internet-based applications such as open data portals and whether it indeed enhances democratic participation by empowering new groups of citizens, or if it remains another tool for those who would otherwise participate anyway. Like many ICTs used by governments in efforts to enhance citizen participation, there is a real possibility that OGD is not actually making participation processes more inclusive. In fact, e-democracy research provides evidence of cases in which digital tools have failed to engage individuals and groups outside of the already actively engaged (Kreiss, 2015; Jensen, 2006; Dahlberg, 2001).

3.3. Who uses open government data and for what purpose?

Zuiderwijk et al. (2015) define open data use as any activity taken by a person or organization to view, understand, analyze, or visualize a dataset provided by a governmental organization. OGD use is thought to provide a wide range of stakeholders, including individuals, firms, scientists, and journalists, with many benefits (Charalabidis et al., 2018). Dawes et al. (2016) outline three stakeholder groups who are either involved in the implementation or active users of OGD. The first group is the governments and organizational leaders who are often tasked with promoting open data initiatives and ultimately responsible for the implementation and management of OGD. The second group is direct open data users, which tend to be advocates of transparency initiatives such as OGD, as well as data analysts and developers who leverage open data to create new applications, innovations, and public interest technologies. The third group consists of those who are beneficiaries of the products and services developed out of OGD. More recently, in perhaps the most comprehensive systematic literature review on open data utilization to date, Safarov et al. (2017) reviewed these conceptualizations among others in the literature and identified six categories of OGD users: citizens, businesses, researchers, developers, 224 non-governmental organizations, and journalists.

Similarly, the researchers identified eight purposes, or uses, of OGD: innovation, data analytics, decision-making, anti-corruption, smart city, new services, research, and hackathons/competitions (Safarov et al., 2017). Further, Wijnhoven et al. (2015) found that motivations for using OGD vary based on the context and task at hand. Using insights from studies of the open source software community, they also highlight the influence of individuals' internal motivations including the desire to learn, solve their own problems, or simply have fun (Von Krogh et al., 2012). Schmidthuber et al. (2017) also found that in the context of open government tools, citizens were more likely to participate in problem-solving activities and provide input and feedback when they perceived benefits from participating.

Like other open government initiatives, OGD also aims to promote collaboration among stakeholders. An emerging means by which this occurs is through data collaboratives which help to facilitate the sharing and use of data to address social problems (Susha et al., 2018). Collaboration, in this sense, occurs between government departments and agencies (Yang et al., 2014; Gil-Garcia et al., 2009; Yang & Maxwell, 2011) and even across sectors (Susha et al. 2018). Nonprofits, non-governmental organizations, and voluntary organizations may be motivated to participate in these efforts in order to share and obtain resources that help them fulfill their mission.

Lastly, a key aspect of the Obama administration's open government directive was an emphasis on interoperability which would enable more efficient data sharing across governments and sectors increasing transparency, accountability, and opportunities for collaboration. In a comprehensive literature review on open government and democracy, Hansson et al. (2015) propose that the emphasis on interoperability in the U.S. can be explained by the prominent role that private actors and NGOs play in governing the public sector. Furthermore, rising interest in co-creation, co-design, and co-production in the context of open government and OGD has emphasized the multi-stakeholder interest in OGD (McBride et al., 2018). Specifically, co-creation projects using OGD require collaboration among local authorities, community-based groups, academics, industry, and volunteers (Khayyat & Bannister, 2017) in order to leverage data to create valuable products and services. OGD-enabled collaboration is expected to produce both social and economic benefits for stakeholders and society at large by encouraging the use of open data in ways that stimulate innovation and economic growth. Positive economic impacts can occur by way of businesses using OGD to evaluate potential investments (Janssen et al., 2012), from developers leveraging traffic and geographical data for the creation of new apps and services (Bertot et al., 2014), or

by facilitating open innovation (Linaker & Runeson, 2020) and social innovations by empowering civic hackers through organized hackathons (Young & Yan, 2017).

In any case, for OGD to be a tool for democracy and not just economic benefit, governments must think about inclusive means of encouraging citizen participation by providing data that is useful not just to the private sector, nonprofits, and government agencies, but of interest and relevance to all citizens. For citizens to meaningfully participate, simply disclosing information about government is not necessarily enough (Nikiforova & McBride, 2021; Piotrowski & Liao, 2012); the data provided should be useful for informing meaningful engagement in deliberative activities.

4. Usability of open government data

4.1. Quality data

There are many factors that impact OGD's ability to enhance democratic outcomes once adopted, but the quality of OGD is paramount. Quality is a dynamic concept but the degree to which data is indeed usable is often considered a factor because usability has such a big impact not only on whether stakeholders use open data as intended but whether the values OGD is intended to promote are realized. Usability has been discussed quite a bit in the literature but mostly from a technical aspect with ease of access and navigation (Cucciniello et al., 2012; Pina et al., 2010; Pina et al., 2007) and quality of data (Bertot et al., 2014; Arrard et al., 2015; Janssen et al., 2017; Zhu & Freeman, 2019; Ojo et al., 2018; Vetro et al., 2016) being necessary, but still overlooked, conditions of usability.

Usability can also refer to how easy it is for users to understand, interpret, and comprehend the information provided (Zhu & Freeman 2019; Karr, 2008; Caba Perez et al., 2005). A common issue with many open data portals is that they neglect to provide the necessary context and guidance on how to use the information provided (Evans & Campos 2013). As a result, users must expend valuable time and energy determining the relevance of the data and whether or not it is usable. Thus, even if OGD is error-free, timely, and complete, the availability of relevant and useful data remains particularly critical for its use (Belhiah & Bounabat, 2017; Belhiah et al., 2015; Evans & Campos 2013; Pipino et al., 2002; Wang & Strong, 1996).

4.2. Relevant and useful data

Previous studies have also emphasized the importance of providing communities with the information they actually care about like data on crime, public health, and the environment (Ojo et al., 2018). Ultimately, the information provided should provide value to its users. It is one thing to allow increased public access to government data, but it is quite another thing to publish data that is valuable to the public and that individuals are interested in using (Attard et al., 2015; Harrison et al., 2012; Lee & Kwak, 2011). Furthermore, the Open Data Barometer (2017), which develops principles for open and accessible data and ranks governments accordingly, believes that open data is a right for all and, as such, governments should provide the public with data that people need and can easily use.

Fitness for use is considered a critical factor for data to be relevant (Juran, 1974), and thus usable (Attard et al., 2015). In other words, data should be appropriate for and applicable to whatever the intended goal is. This involves acknowledging the data's context (Ruijer et al., 2017; Wang & Strong, 1996). For instance, if the goal is to encourage citizen participation, governments should provide citizens with contextually relevant information necessary for participating in a meaningful and informed manner.

If it is feedback that is desired, governments should provide sufficient guidance to the public on how to go about submitting feedback, in what form, and where to find any additional information that may be useful for helping citizens participate in this way.

5. Data and method of analysis

This exploratory study focused on two main questions. First, what type of open government data does the city make available to the public? Second, what can the types of data published tell us about OGD as a tool for democratic participation; mainly, its ability to inclusively engage citizens? To investigate these questions, this mixed methods exploratory study analyzes the metadata of each individual dataset ($N =$ 2605) published on the New York City open data portal (NYC Open Data).

New York City (NYC) was chosen because NYC was the first city to pass an open data law in 2012, making it the oldest and most established open data program at the local level in the United States. NYC Open Data is hosted by Socrata,[1] a popular data management tool developed by Tyler Technologies, one of the leading software and technology solutions providers for the public sector in the world. The open data platform provided by Socrata's software helps governments manage and share data across multiple agencies, departments, and external sources so that all data are published on one singular, comprehensive data hub. Previous studies have described Socrata as a means of streamlining open data (Nikiforova & McBride, 2020) operations by providing a framework to assist governments with managing their data ecosystems. Further, it offers users the ability to browse, search, and interact with platforms easily via the Application Programming Interface (API) (Neumaier et al., 2016).

5.1. Data

In addition to providing streamlined access to all published datasets, the Socrata platform allows governments to publish detailed and comprehensive metadata with each dataset including a description of the dataset, the category it belongs to, the agency that published it, when the dataset and its metadata were last updated, and how frequently the data are updated. Data owners and publishers (cities, agencies, departments, etc.) can also create custom fields for any additional details it chooses to disclose. For this study, the metadata for each publicly available dataset was collected using a web scraping package in Python. The Python code was programmed to crawl through the pages of NYC Open Data in order to collect the information on the landing page of each individual dataset. This resulted in an original dataset containing the metadata for all 2605 datasets published on the portal.

To answer the research questions, I conducted a content analysis of the 2605 datasets. Since this was an exploratory study, the aim was to note patterns and themes in the metadata that could help with first understanding the categories of data published and which agencies and their functions were publishing the data. Then I used the themes and patterns to qualitatively analyze the datasets in order to determine the most prevalent types of information and their relevance to five main stakeholder groups, as well as the open government principle (*transparency*, *accountability*, *or participation*) that the dataset promoted. As illustrated in Table 1, the analysis focused on specific fields of the metadata: the name of the dataset, the description provided of the data, the name of the agency that published the data, the category the agency assigned it to, and the tags used by the agency. Below, I expand on how I conducted the analysis.

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[1]There are alternatives to Socrata when it comes to third-party data portal providers. However, Socrata is the only platform that provides publicly available metadata that includes a count of the number of views and downloads of each dataset updated in real time, which is critical for the research design.

Table 1
Metadata fields analysed in the content analysis of NYC open data

Metadata field	Description of metadata field	Example from NYC open data
Dataset Title	Title helps users discover, select, and differentiate between similar datasets.	HHS Invoice Cycle Time
Dataset Description	Description helps users discover, select, and differentiate between similar datasets.	Human Health Services Accelerator annual invoice cycle times across the 10 agencies that are managing contracts in HHS Accelerator Financials.
Data Publisher	Responsible Agency/Department is helpful for navigation and to ensure a single responsible party.	Mayor's Office of Contract Services (MOCS)
Data Category	Category groups similar datasets together regardless of source and can be used to locate similar datasets.	City Government
Tags/Keywords	Tags link technical language, secondary categories, and acronyms to your dataset, aiding in user-executed searches.	#hhs #invoicecycletime

Table 2
Metadata fields coded

Data category	Agency function	Open government principles	User group	Type of information
Business	Finance & Economy	Transparency	Citizens	Performance Information
City Government	Energy & Environment	Participation	Private Sector	Budgets/Expenditures
Education	Health & Human Services	Accountability	Nonprofit Sector	Contracts/Procurement
Environment	Education		Researchers	Crime Data
Health	Transportation		City Agencies (Internal)	Elections/Campaigns
Housing & Development	Infrastructure			Demographic Data
Public Safety	City Administration			
Recreation	Recreation & Culture			
Social Services	Public Safety			
Transportation				

5.2. Data category

For the most part, the data owners (agency, department, etc.) categorized the datasets according to the ten categories listed in Table 2. However, 68 datasets (2.6%) were not categorized by the data owner, and 41 datasets (1.5%) were miscategorized. In the latter, a dataset was considered incorrectly categorized if the category was in conflict with what the name and description suggested, if it appeared to be a subcategory of another category (e.g. NYC Big Apps as a sub-category of "Business"), or if it was generally more appropriate for a different category. For example, a dataset titled "Businesses Receiving Training Fund Awards" was categorized as "City Government" but the agency that published the data was the "Department of Small Business Services" and the description provided noted that it was a list of businesses that received the award. The agency's focus, the name given to the dataset, and its description suggested that "Business" was a better fit for the data than "City Government."

5.3. Agency function

There were 85 total unique data owners listed. These included large agencies such as the "Department of Parks and Recreation" or "Human Resources Administration" as well as commissions and advisory boards (e.g. Commission on Women's Issues), public development authorities (e.g. New York City Housing Authority), and various offices and divisions within city agencies. The 85 unique data owners

were then sorted into 9 broad agency functions (see Table 2) according to the types of tasks and duties it typically performs or is generally responsible for overseeing. "Other" was listed for eight datasets. A closer look at the metadata showed that these eight datasets were owned by organizations outside of the city including community associations and collaboratives.

5.4. Type of information

Scholars argue that governments should use OGD as an opportunity to provide the public with data related to the core activities of government including the processes, procedures, and decisions made (Janssen et al., 2017). Since understanding the degree to which governments are indeed leveraging open data portals to provide this type of information was one of the motivations of this research, it was important to go beyond the categories self-selected by the data owners. The data categories provided were often very broad and did not offer much insight into what kind of information was actually provided in the data. Likewise, the names and categories given could be vague, ambiguous, and misleading, even if unintentional.

Understanding the type of information provided on open data portals is important for a few reasons. First, transparency research would suggest that it is not just access to information about education, in and of itself, that is valuable, but it is perhaps access to performance information about local schools, more specifically, that enhances transparency. Similarly, citizens may not be interested in information about "city government," generally speaking, but may desire to know more about the city's plan for broadband adoption, including opportunities to participate in decision-making processes concerning the plan. Lastly, different groups of stakeholders have different interests and information needs so understanding what type of information is actually provided on open data portals can help with understanding its relevancy to the many potential user groups.

Therefore, a more detailed content analysis of the dataset names, descriptions, and tags provided by the data owners was necessary for identifying the types of information the datasets contained in an effort to determine what the data could potentially be used for, and by whom.

5.5. User groups

Dawes et al. (2016) argued that the success of open government initiatives rests on the ability of governments to account for the many competing demands of a diverse group of stakeholders including users, providers, and broad communities. However, understanding the many nuances of the data itself and the various ways that data can be used and by whom can be a challenge. Nonetheless, the literature provides insight into some of the main user groups of OGD. Using this literature as a framework, the results of the content analysis helped to determine potential users of the information provided. The user group analysis focused on analyzing the available datasets according to the relevance of the information provided to five main groups of OGD users identified in the literature: citizens, private sector, nonprofit sector, researchers, and internal city agencies.

For example, data that included information about public services, participation processes, and decision-making were coded as relevant to *citizens*. There is a dearth of research on which types of data citizens actually find relevant and most likely to use,[2] so the data were coded according to a few specific criteria; mainly, whether the datasets provided information that could help citizens find out about city services,

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[2]The hope is that this exploratory study will help to inform more empirical research on this question.

programs, performance, and policies. Any dataset that was of interest, involved, or advanced the mission of actors and organizations in the private sector was coded as *private sector* and, likewise, *nonprofit sector*, for those that concerned nonprofits. For example, information about contracts and bids are typically of interest to private companies that routinely submit bids to win contracts or find out who won a particular contract. Similarly, the city contracts out many human and social services to nonprofits, so data about service contracts, clients served, and information about social services are likely of interest to nonprofits and civil society organizations.

Many of the dataset descriptions mentioned specific research studies and partnerships between the city and external researchers. These data were either provided by or ostensibly, of interest to, *researchers*, and were coded as such. Lastly, since administrative agencies are not just data producers but data users as well (Dawes et al., 2016), datasets that agencies could use internally for agency-related tasks and in decision-making processes were coded as *city agencies*.

Appendix A provides more details on this process, including examples of datasets that were coded as relevant to each user group.

It is important to note that these categories are not mutually exclusive. Many of the datasets that were relevant to the private sector, for instance, were also relevant to nonprofits. Similarly, there was a great deal of overlap between datasets that were relevant to city agencies and the four other stakeholder groups.

5.6. Open government principles

Lastly, using the open government principles of *transparency*, *participation*, and *accountability* to guide the analysis and coding, the datasets' names, descriptions, and tags were also used to understand how the available data promoted or contributed to transparency and accountability, as well as citizens' participation in democratic activities. Here, the focus was on identifying information that could increase transparency by providing insight into the inner workings of the city (Matheus & Janssen, 2020; Meijer et al., 2012) as well as data that provided citizens with relevant information for monitoring the activities of the city for purposes of holding the city and its agencies accountable for outcomes such as performance, progress toward stated goals, and generating public value (Gains & Stoker, 2009; Bovens, 2007; Shktabur, 2007; Meijer, 2006). Datasets coded as "participation" explicitly referenced city-led engagement activities, information concerning formal venues of participation, and any information that would ostensibly assist citizens in participation in decision-making and other democratic activities. As with the user group analysis, it is important to note that there was often overlap. Many datasets were compatible with more than one of the principles.

5.7. Measuring open data use

Open data use was measured using the number of *views* and *downloads* of each dataset. These data points were included in the metadata provided for each dataset and are updated routinely or as needed. The count of *views* refers to the number of times a user visits a dataset's landing page through the portal. A view is counted any time a user visits the page, views the data table embedded on the web interface, or engages with the visualization tools (if available). Socrata, Inc. provides a number of visualization tools within the platform to allow users to build their own graphs, charts, and visualizations with the data as well. Any time a user visits a dataset's page and interacts with any of the visualization components, it is counted as a view. Thus, views are a more passive form of use, as users are only observing and interacting with the data within the platform's web interface. On the other hand, *downloads* represented the number of times a dataset had been downloaded for offline use by a user. Datasets can be downloaded

Table 3
Datasets by category

	N	*%*
Business	79	3.03
City Government	638	24.49
Education	1014	38.93
Environment	123	4.72
Health	73	2.8
Housing & Development	167	6.41
Public Safety	86	3.3
Recreation	63	2.42
Social Services	200	7.68
Transportation	162	6.22

in machine-readable file formats (CSV, XML, shape file, etc.) made available by the data owner. The extra step of downloading a dataset to one's device for offline use suggests an intent to use the dataset for some purpose. Thus, downloads could be considered a more active form of open data use.

6. Findings

6.1. What were the main types of data published?

At a broad level, Table 3 shows the breakdown of the number of datasets per category (provided by the data owner). Education was the most prominent category with over 1000 datasets (38.93%). These datasets mainly concerned school performance information including standardized test scores, disciplinary reports, and graduation rates. The next most prevalent category was City Government with 638 total datasets (24.49%). This data mainly consisted of budget documents, bids and contracts, agency reports, and strategic plans. Social Services data made up almost 8% of the datasets, followed by Transportation (6.22%), Environment (4.72%), Housing & Development (6.41%), Public Safety (3.3%), Business (3.03%), Health (2.8%), and Recreation (2.42%).

Table 3 shows the breakdown of the number of datasets by the agency and its function. As shown in Tables 3 and 4, there was quite a bit of overlap between the category of data and the data owner's (i.e. agency, department, etc.) function. In other words, unsurprisingly, data categorized as "Transportation" was often published by transportation-related bodies. Likewise, data categorized as "Social Services" were published mostly by health and human services agencies. Therefore, since the focus of this research was mainly on understanding the type of data that was published, the remainder of the analysis focused less on the data owner (agency function) and more so on how the data were categorized by the data owner.

The content analysis of dataset descriptions highlighted six prominent topics represented among the datasets: *performance information*, *budgets and financial reports*, *contracting and procurement*, *crime and public safety*, *elections and campaigns*, and *demographic data*. The results of the content analysis revealed that an overwhelming majority of the datasets published to NYC Open Data were performance reports and other types of performance information (860 datasets). Second to performance information was demographic data (353 datasets) which also included U.S. census data and reports. Third, were budgets, including revenue and expenditure reports from agencies. These documents accounted for 166 total datasets. Table 5 shows the number of datasets for each of the topics identified. As shown, topics were not mutually exclusive with several datasets compatible with more than one type of information (e.g. "performance information" and "crime and public safety data").

Table 4
Datasets published by agency function

Listed Category	Finance & Economy	Energy & Environment	Health & Human Services	Education	Transportation	Infrastructure	City Admin.	Recreation & Culture	Public Safety	Other
Listed Category										
Business	49	0	2	0	0	10	13	0	0	5
City Government	217	5	13	0	1	113	215	31	42	1
Education	1	1	19	954	0	34	3	2	0	0
Environment	0	71	1	1	0	18	3	29	0	0
Health	0	0	66	0	1	1	1	4	0	0
Housing & Development	58	0	2	0	0	97	2	8	0	0
Public Safety	0	1	18	1	0	0	6	1	60	0
Recreation	0	0	1	0	0	1	1	59	0	0
Social Services	11	0	118	3	0	9	54	1	2	2
Transportation	1	0	0	9	149	2	1	0	0	0

Table 5
Summary statistics for datasets by principles, type, and user group

	N	Mean Views	Std. Deviation	Min.	Max.	Mean Downloads	Std. Deviation	Min.	Max.
Open Government Principles									
Transparency	2535	6830.96	79083.71	16	2264449	2827.98	25644.91	8	1017553
Participation	189	4768.34	32771.17	50	441908	3884.39	29104.04	16	398678
Accountability	1115	2893.02	20909.21	16	441908	1764.98	12633.3	8	398678
Type of Information									
Performance Information	860	1568.12	7088.08	24	93414	1215.37	3342.85	8	50645
Budgets & Financial Reports	166	2492.89	10825.5	19	107285	1448.63	3626.33	11	42590
Contracting & Procurement	100	721.59	1662.09	31	14393	813.13	1362.01	13	11455
Crime & Public Safety	53	6628.25	18590.68	58	108217	3041.04	8316.02	16	57249
Elections & Campaigns	26	1146.31	2887.33	50	14906	1567.85	1653.41	16	6940
Demographics & Census Data	353	1054.26	3256.49	26	30602	1079.99	2087.53	8	31059
Relevance to User Group(s)									
Citizens	722	4666.54	22291.53	22	441908	3113.53	17088.65	8	398678
Private Sector	734	10685.34	95066.54	26	1699601	3706.52	18967.35	10	288920
Nonprofit Sector	421	2541.98	11000.18	26	196863	2355.49	10488.62	13	184179
Researchers	239	12960.47	121291.5	25	1863398	6886.68	66309.66	12	1017553
City Agencies	1472	10708.16	103415.7	16	2264449	3395.41	20590.24	9	429429
Citizens (Only)	82	2443.95	5876.34	22	36884	1519.11	3989.43	8	35467
Private Sector (Only)	31	5373.19	9820.69	46	38082	1703.71	2829.285	13	14133
Nonprofit Sector (Only)	16	556.13	463.82	116	1969	1170.25	972.51	31	2818
Researchers (Only)	66	6561.24	24420.28	25	178845	19163.55	125716.8	12	1017553
City Agencies (Only)	465	9090.43	107642.3	16	2264449	2583.116	20395.41	9	429429

The dataset names, descriptions, and tags were analyzed further to identify datasets that promoted and/or contributed to the open government principles of transparency, accountability, and participation. This analysis identified 2535 (97.31%) datasets that promoted transparency and 1115 (42.8%) datasets that either promoted accountability measures or could otherwise be used to hold the city accountable for its performance, decision-making, or other policy-related outcomes. Whereas, only 189 (7.26%) datasets concerned citizen participation activities. The types of participation-related information provided was mostly geared toward formal city-led processes such as participatory budgeting, public meetings, and community advisory boards. However, information about general civic engagement activities such as lists of volunteering opportunities and activities and events that were more community-focused events (e.g. community-gardens) were also present.

Overall, the analysis revealed that an overwhelming majority of the data published on NYC Open Data was aimed at promoting transparency. Specifically, transparency of government performance, budget and financial information, and strategic planning. However, less than 10% of all of the datasets published directly informed or involved citizen participation activities. At the same time, as the transparency literature suggests, the amount of data available on the city's performance, decision-making, planning, and policy outcomes can still enable citizens to monitor and evaluate how the city is performing. In doing so, citizens can use this information to monitor the activities of the city and hold the city accountable, if necessary. This suggests a potentially powerful indirect effect of the data available.

6.2. What can this tell us about open government data as a tool for democratic participation?

Scholars posit that the success of OGD rests on government's ability to account for the many competing demands of a diverse group of stakeholders including users, providers, and communities (Dawes et al., 2016). The benefits of OGD are expected to generate social benefits, including a more informed

and engaged citizenry. However, OGD is also promoted as an innovative tool for generating economic benefits. This then begs the question of which outcomes and groups of stakeholders are most reflected in the types of data that governments choose to publish. As discussed earlier, for OGD to promote democratic participation, governments must publish data that is inclusive of the interests of diverse groups of stakeholders. Further, available data should be sufficient for informing meaningful participation. Therefore, the availability of data that is relevant and useful to citizens is especially important if OGD is to empower and enable citizen participation in democratic activities.

The analysis found that 722 (27.72%) of the datasets provided information that was of relevance to citizens. Note that this is different from information that directly informs or involves participation activities (discussed above) and that some datasets were relevant to two or more user groups. An overwhelming majority of the information coded as relevant to citizens was about government programs and services, including contact and directory information for agencies and/or public officials, information about and for community advisory boards, participatory budgeting processes and outcomes, and 311-related information. In contrast, 734 (28.18%) of the datasets were of relevance to private sector actors and firms as evidenced by datasets that concerned real estate transactions and development projects, information for and about business improvement districts, construction projects including bids, requests for proposals, and permits, and transportation-related information, especially for taxi companies and For-Hire-Vehicles. Additionally, 421 (16.16%) of the datasets were of relevance to nonprofits. The data mostly involved social services-related information, including information about and for nonprofit providers of public programs and services, grants, site locations, directories, as well as data about community demographics and public health, which is often used by nonprofits to assess community needs. Similarly, 239 (9.17%) datasets contained data collected by the city for research purposes, by external researchers, or relevant to those conducting research. For example, data from surveys, environmental studies, and city collected data about water and air quality were included in this group. Lastly, 1472 (56.51%) of the data published to the portal was of relevance to the city agencies, themselves. These were datasets that contained information that helps city agencies and officials advance the public interest, provide public services, and, otherwise, do their job. For example, there were a number of "trackers" that agencies used for project management purposes including capital projects, managing work orders, responding to citizen complaints, and even overseeing the city's open data projects. Additionally, much of this data was relevant to internal human resources matters as evidenced by employment codes, salary schedules, pension benefits, as well as information related to agency-specific tasks, and key performance indicators in adherence with the mayor's performance plan.

6.3. What can the number of dataset views and downloads tell us?

To gain a better understanding of the data's relevance and usefulness to the five user groups, it was beneficial to look at the number of views and downloads of the datasets to determine the extent to which users were engaging with the data. When it comes to engagement with the data, datasets relevant to the private sector, researchers, and city agencies were viewed the most, overall. Whereas, the highest number of downloads were of datasets relevant to the private sector and researchers. This suggests that these groups were frequently downloading datasets to use for specific purposes offline; perhaps to analyze for research projects or use for software development projects.

Since there was a lot of overlap in terms of user-group relevance for many of the datasets, it was helpful to look closer at the number of datasets in which each of the user groups was the sole audience. In other words, the datasets that appeared relevant to only one group, rather than to multiple groups. Table 5

includes the breakdown of the number of datasets and mean views and downloads for those datasets that were coded as relevant to only one user group. Here, we see that the number of datasets specific to internal city agency business (465 datasets) was much higher than the others and these datasets also had the highest mean views. This suggests that agencies may be using the open data portal to routinely look up information they need (i.e. for internal decision-making, service provision, etc.) or reference one of the many performance trackers present. Whereas, the datasets specific to researchers had the highest mean downloads suggesting that researchers are indeed using the portal to access datasets for research purposes.

The results of this descriptive analysis suggest that not only was the supply of citizen-relevant datasets lower than for other user groups such as private sector firms and internal administrative agencies, but it seems that the demand was too. This was evident by the relatively low amount of views and downloads for datasets compared to researchers, private firms, and internal administrative agencies, as well.

While it is not possible to see exactly who is downloading the datasets due to the proprietary nature of the software, these descriptive results suggest that users, regardless of affiliation with any particular stakeholder group, are using specific datasets that fulfill particular functions more than others. In all, the datasets published disproportionately advantaged private interests and the agencies themselves. When it comes to engagement with the data, the mean views and downloads, especially, suggested that researchers are some of the most active users of OGD. Of course, it is still likely that these data are being used for research purposes that generate public value for citizens. Nonetheless, these findings highlight potential barriers to inclusion when it comes to OGD-enabled citizen participation if the information citizens need to participate meaningfully is not available or accessible.

7. Discussion of results and implications for democracy and inclusion

Inclusion in the context of digital government, and OGD especially, is not well defined. Therefore, we might think of inclusion in broader terms as a concept that describes both the inclusion of some groups and the exclusion of other groups. From a sociological perspective, social groups are typically organized according to factors such as power, wealth, education, and even cognitive and physical abilities (Fortunati, 2008). In heterogenous societies, this question of which social groups are granted equal opportunity to participate in society dominates. Collins (1975) argued that inclusion is fundamentally about status in society with status being the mechanism by which some groups are granted access to the interaction sphere, while others are not. Dependent on a variety of social, cultural, and economic conditions, some groups are granted higher or lower status than others. Thus, exclusionary practices in which the weak, exploited, and marginalized are not granted access (Fortunati, 2008) to civil society or come to gain access to communities they were previously excluded from (Parsons, 1965) are just as relevant to discussions of inclusion as who is. These perspectives frame inclusion largely in terms of which groups are granted opportunities to participate socially, culturally, economically, and civically. On the other hand, democratic theory, poses these and similar questions more specifically in terms of who is included as members of the polity (Zilla, 2022).

We might think about the findings of this study as they relate to both the democratic divide, as discussed earlier, in addition to inclusion (and exclusion) as products of social and economic status. The former helps to frame questions of OGD-enabled inclusion in terms of who is using the data to engage and participate in civic discourse and public life (Norris, 2001). Whereas, the latter goes one step further in asking which groups are even provided access to the data and information they need to engage and meaningfully participate. Regardless of whether an individual or group's intention is to use OGD to

participate in democratic processes, the point is whether citizens have access to information that is sufficient for such activities. If, indeed, the available data is not sufficient, what and whose interests does the data support? In other words, what stakeholder groups benefit most from the data that cities publish?

Overall, these findings suggest that lay citizens may be at a disadvantage when it comes to the information they need to meaningfully participate in democratic activities. The results of this exploratory study suggest that an overwhelming majority of the datasets available were primarily relevant to non-citizen stakeholders. Datasets were most aligned with the interests and activities of industry, researchers, and the city agencies, themselves. Additionally, there was not only a disproportionate supply of data supporting the interests and activities of private firms and internal agencies but patterns of use point to low engagement from citizens compared to researchers and agencies which is concerning for OGD's potential to encourage democratic participation.

This raises important questions about the power dynamics involved in the supply and demand of open data. For instance, private sector firms and those working for them, especially those with in-demand technical skills, are typically regarded as "high status" in a country like the U.S. where economic power translates to social status. These users can use their status, and the access to resources their status awards them, to lobby for the information they need or want. Whereas, the lay citizen lacks the relative status and power that more formal groups like private firms, researchers affiliated with well-resourced institutions, and established nonprofits often possess. Private firms, developers, and journalists are increasingly the top users of OGD but the ways that these stakeholders use OGD to further their interests will likely be different from the ways that typical citizens would. Likewise, the advantages of using OGD will also be different. Thus, it is unclear whether these user groups are simply more interested in OGD than lay citizens are, or if it is because the datasets provided on open data portals are more relevant to their goals and objectives. Ultimately, data owners function as the gatekeepers of open data. This awards agencies and departments with a substantial amount of power and status (Open Data Monitor, 2016; Ruijer et al., 2019) in the open data ecosystem. Agencies obviously have the power to supply data but these power dynamics might also introduce opportunities to influence demand by supplying certain types of data that supports the interests of a select group of stakeholders. In short, these power dynamics can influence both the demand for particular types of data as well as the supply if data owners are keen on meeting or otherwise influencing that demand.

Until now, this discussion has focused primarily on issues around inclusion that largely involve the datasets themselves. But, what about what happens with the data? The intention of this research is not in any way to argue that open data is only valuable if it is relevant to citizens or when it empowers participation in democratic processes. In fact, there are several examples of initiatives aimed at promoting equity, inclusion, and social good using open data. For instance, there has been steady growth in civic technology projects in recent years. These are projects that are technology-oriented and are often aimed at promoting data access, transparency, and good governance. The projects range from relatively simple data visualization and mapping tools using government data to much more complex mobile-based applications that mediate the relationship between citizens and government by e.g allowing citizens to report service issues vis-á-vis mobile apps. These projects represent efforts to improve communities and advance democratic outcomes that may or may not directly involve citizens.

Nonetheless, they still highlight the importance of designing with inclusion in mind. Most projects are well-intentioned, and can certainly produce innovative solutions to public problems (McGuinness & Schank, 2021). However, they are often led and funded by highly skilled and well-resourced individuals and groups who may or may not be representative of local residents or have any close ties to the community. Technical skills and resources translate to forms of human and technological capital that can

be influential in terms of not only accessing certain kinds of data but also in using data for whatever their intended purpose is. The public interest technology movement is making inclusion part of its mission in using technology for social good, but it is still the case that certain individuals, groups, and organizations have more power than others to shape what data is made available and, ultimately, what is done with it.

Ultimately, awareness of these dynamics can help data owners and publishers better understand the dynamics of often competing stakeholder groups as well as the information needs of the community open data is intended to provide value for. This understanding can then be used to inform decisions about what data to publish, how much of it, and the best ways to more effectively align open data with democratic goals.

8. Conclusion and recommendations

Research on OGD provides mixed evidence on whether initiatives have realized their full potential (Ruijer & Meijer, 2019; Shao & Saxena, 2018; Dawes et al., 2016; Attard et al., 2015; Conradie & Coenni, 2014; Janssen et al., 2012). As it stands, governments face many obstacles when implementing and managing open data initiatives in ways that generate public value. One such obstacle is the complexity of open data initiatives and governments' tendency to ignore the inherent social and technological complexity of programs in their design (Dawes et al., 2010), including the diverging roles of the individuals and groups expected to use open data and the types of data that stakeholders need in order to actively contribute to democracy in the ways open data is intended to (Ruijer et al., 2017). For OGD to truly enhance democratic values, such as citizen participation, governments should take care to ensure that they are inclusive of the diverse interests and information needs of not just the range of potential user groups, but of citizens, especially.

Findings from this exploratory study suggest that the type of data provided to the public disproportionately advantages stakeholders in the private and public sectors. This disparity extends to the rate at which the data were viewed and downloaded as well. At first glance, it may not look like there was much of a difference between the total number of citizen-relevant datasets (722 datasets) and the total number of datasets relevant to private sector interests (734 datasets). However, when looking at the mean views and downloads of the datasets as measures of open data use, we see that private sector-relevant datasets were over viewed and downloaded over twice as frequently (see Table 5). This trend of much higher levels of engagement remained consistent for the datasets deemed most useful for researchers and the city's internal administrative agencies. In all, relative to the other user groups such as private firms, researchers, and the city's own administrative agencies, the datasets published were less relevant to citizens, which was reflected in lower levels of engagement.

Nonetheless, there are steps that cities can take. Here, I outline three recommendations for cities that are invested in engaging citizens inclusively through OGD. For one, agencies can make more informed and targeted decisions about what data they publish, ensuring that the datasets they publish are usable, useful, and relevant, first and foremost to citizens. However, publishing relevant data is only one part of usable and useful data in this context. The excessive use of technical jargon and acronyms in the title and descriptions of datasets can make it difficult for citizens to find what they are looking for and understand the nuances of the data. Data publishers must take care to make relevant data searchable and easy for citizens to discover when browsing. Similarly, relevant data is context-dependent (Ruijer et al., 2017) and publishing data without providing the necessary context for citizens to make sense of the information creates unnecessary barriers to open data use. Whereas, easy-to-understand explanations can help to frame citizens' understanding of the data and its potential uses. Additionally, including the information

citizens need to participate as well as setting clear expectations regarding the role that citizens and their feedback will play in the policy-making process may help citizens feel empowered to participate. Linaker and Runeson (2021), urge governments to take a more demand-driven approach to OGD in addition to implementing effective feedback loops to keep abreast of the demand by understanding what data users want. In practice, this might look like engaging not just users, broadly defined, but diverse groups of citizens, specifically, through surveys, focus groups, and interviews in order to understand what kinds of data they find most relevant and useful.

Second, understanding the myriad ways citizens wish to participate is necessary for designing OGD programs that successfully engage citizens. A major critique of the e-democracy and e-participation literature is that there tends to be very little understanding of citizens and how their participation differs not only from other stakeholder groups but from one another (Sæbø et al., 2008; Flak et al., 2003). Likewise, scholars have also criticized the open government literature for failing to account for the complexity of citizens (Hansson et al., 2015). For instance, Kreiss (2015) refutes the assumption throughout the literature that citizens are rational, general-interest, and non-partisan, and makes a case for more research on e-democracy applications that acknowledges the realities of a heterogeneous citizenry with diverse social identities, perspectives, and values. Today, this can manifest in many different motivations for using OGD across and within user groups. Therefore, cities must take into account the diverse needs and requirements of potential users (Zuiderwijk & Janssen, 2013), but also citizens' interests and goals for using OGD, in order to realize the value of programs such as OGD. Investing in initiatives that can help with better understanding of participants' motivations can improve implementation (Leimester et al., 2009), attract new users (Hilgers, 2012), and enhance the overall public value of OGD initiatives.

Lastly, as the broader public administration literature argues, administrators possess a significant amount of discretion; decision-making that is informed by values. Thus, decisions about what data to collect and publish are often value judgments. Agencies that are cognizant of this can be more intentional in the decisions they make by ensuring that the data they publish is more citizen-centered. Such decisions can better support the inclusion of citizens in participatory and deliberative processes in which access to relevant and useful data is critical. Effective actions in this regard do not just involve an increase in citizen-relevant datasets but also making efforts to ensure user-friendliness, more generally. For instance, data owners should ensure data are regularly updated, if applicable, and include comprehensive and informative data descriptions and tags to ease understandability, searchability, and, ultimately, usability. Without centering users, and particularly citizens, cities risk further perpetuating disparities in access to information and opportunities for citizens to exercise voice and participate in decision-making processes.

While this exploratory study aimed to inform recommendations such as these and contribute to an ongoing discussion of OGD, democracy, and inclusion, it is not without its limitations. First, the study is entirely descriptive and relies on one specific case. However, the case provided a great deal of data appropriate for the research questions driving the study. The descriptive data presented is ultimately necessary for future studies to build on. In the future, studies should analyze additional cases and further explore the impact of different types of data on user engagement. Additionally, this exploratory study could be considered a launching point to conduct a stakeholder analysis (Crosby, 1992) concerning the role of the different user groups, what their expectations for OGD might be, and how cities can leverage OGD to better meet those expectations (Bryson, 2004). Further, more advanced stakeholder analyses using tools such as the 'power versus interest' grid (Eden & Ackerman, 1998) or influence diagrams (Bryson et al., 2002) are potential methods for further exploring the role of power dynamics, as discussed.

With that said, the quantitative measure of engagement used in this study is novel in that it illustrates real-time views and downloads of each dataset at the time of data collection. However, it does not allow

for parsing out who is viewing or downloading the data, so it is not possible to know whether or not the user groups of note in this study are actually driving the number of views and downloads. Future research might address these limitations by replicating the analysis across several cities or perhaps by combining a similar type of analysis with interviews with citizens. It would be especially useful to interview or survey the data owners to understand their justifications for the data they release. This would be an effective way to understand the degree to which data owners and publishers target citizens and empower their participation along with potential barriers to citizen-centered initiatives.

Citizen participation is not just a normative ideal. When effectively implemented and facilitated, citizen participation can lead to greater inclusion of diverse voices, perspectives, and experiences in democratic processes. This input can help to design and implement public policies, services, and programs that reflect the needs and lived experiences of a diverse citizenry; input that is often extremely valuable but often excluded in more traditional forums. Ultimately, if data is not available or citizens cannot, or simply will not, use the available data, then there is a higher risk that the public value that OGD seeks to provide will be unmet. A greater understanding of users, user requirements, and information preferences can, and arguably should inform governments' decisions about how to design open data technologies. This is especially the case for administrators' discretion regarding which data to make available to the public (Davies, 2010). This greater understanding can, in turn, optimize governments' investment in open data initiatives as well as the public value generated by OGD. Most importantly, a citizen-informed approach to OGD can promote inclusion in citizen participation processes, thereby enhancing the democratic goals of OGD programs.

Acknowledgments

References

Attard, J., Orlandi, F., Scerri, S., & Auer, S. (2015). A systematic review of open government data initiatives. *Government Information Quarterly*, *32*(4), 399-418.

Begany, G.M., & Gil-Garcia, J.R. (2021). Understanding the actual use of open data: Levels of engagement and how they are related. *Telematics and Informatics*, *63*, 101673. doi: 10.1016/j.tele.2021.101673.

Belhiah, M., & Bounabat, B. (2017, October). A User-Centered Model for Assessing and Improving Open Government Data Quality. In *ICIQ*.

Belhiah, M., Benqatla, M.S., Bounabat, B., & Achchab, S. (2015). Towards a context-aware framework for assessing and optimizing data quality projects. *DATA*, *10*, 0005557001890194.

Bovens, M., Schillemans, T., & Hart, P.T. (2008). Does public accountability work? An assessment tool. *Public Administration*, *86*(1), 225-242.

Bovens, M. (2007). Analysing and assessing accountability: A conceptual framework 1. *European Law Journal*, *13*(4), 447-468.

Bryson, J.M. (2004). What to do when stakeholders matter: Stakeholder identification and analysis techniques. *Public Management Review*, *6*(1), 21-53.

Bryson, J.M., Cunningham, G.L., & Lokkesmoe, K.J. (2002). What to do when stakeholders matter: The case of problem formulation for the African American Men Project of Hennepin County, Minnesota. *Public Administration Review*, *62*(5), 568-584.

Charalabidis, Y., Zuiderwijk, A., Alexopoulos, C., Janssen, M., Lampoltshammer, T., Ferro, E. (2018). Open Government Data: Areas and Directions for Research. In: The World of Open Data. Public Administration and Information Technology, vol 28. Springer, Cham. doi: 10.1007/978-3-319-90850-2_9.

Charalabidis, Y., Zuiderwijk, A., Alexopoulos, C., Janssen, M., Höchtl, J., & Ferro, E. (2018). The world of open data. *Public Administration and Information Technology. Cham: Springer International Publishing. doi*, 978-3.

Collins, H.M. (1975). The seven sexes: A study in the sociology of a phenomenon, or the replication of experiments in physics. *Sociology*, *9*(2), 205-224.

Crosby, B. (1992). *Stakeholder analysis: a vital tool for strategic managers*. USAID's Implementing Policy Change Project.

Cucciniello, M., Nasi, G., & Valotti, G. (2012, January). Assessing transparency in government: rhetoric, reality and desire. In *2012 45th Hawaii International Conference on System Sciences*, IEEE, pp. 2451-2461.

Dahlberg, L. (2001). The Internet and democratic discourse: Exploring the prospects of online deliberative forums extending the public sphere. *Information, Communication & Society*, *4*(4), 615-633.

Dawes, S.S., Vidiasova, L., & Parkhimovich, O. (2016). Planning and designing open government data programs: An ecosystem approach. *Government Information Quarterly*, *33*(1), 15-27.

Dawes, S.S. (2010). Stewardship and usefulness: Policy principles for information-based transparency. *Government Information Quarterly*, *27*(4), 377-383.

Dowdle, M.W. (2017). Public accountability: Conceptual, historical and epistemic mappings. *Regulatory theory: Foundations and applications*, 197-215.

D'ignazio, C., & Klein, L.F. (2020). *Data feminism*. MIT press.

Eden, C., & Ackermann, F. (1998). *Making strategy: The journey of strategic management*. Sage.

Evans, A.M., & Campos, A. (2013). Open government initiatives: Challenges of citizen participation. *Journal of policy analysis and management*, 172-185.

Fan, B., & Zhao, Y. (2017). The moderating effect of external pressure on the relationship between internal organizational factors and the quality of open government data. *Government Information Quarterly*, *34*(3), 396-405.

Ferro, E., Helbig, N.C., & Gil-Garcia, J.R. (2011). The role of IT literacy in defining digital divide policy needs. *Government Information Quarterly*, *28*(1), 3-10.

Fortunati, L. (2008, July). Rethinking e-inclusion. In *5th Prato Community Informatics & Development Informatics Conference*.

Garson, G.D. (2006). *Public information technology and e-governance: Managing the virtual state*. Jones & Bartlett Learning.

Gil-Garcia, J.R., Pardo, T.A., & Sutherland, M.K. (2016). Information sharing in the regulatory context: Revisiting the concepts of cross-boundary information sharing. In *Proceedings of the 9th International Conference on Theory and Practice of Electronic Governance*, pp. 346-349.

Grimmelikhuijsen, S.G., & Feeney, M.K. (2017). Developing and testing an integrative framework for open government adoption in local governments. *Public Administration Review*, *77*(4), 579-590.

Gurin, J. (2014). Open governments, open data. *The SAIS Review of International Affairs*, *34*(1), 71-82.

Hansson, K., Belkacem, K., & Ekenberg, L. (2015). Open government and democracy: A research review. *Social Science Computer Review*, *33*(5), 540-555. doi: 10.1177/0894439314560847.

Harrison, T.M., Pardo, T.A., & Cook, M. (2012). Creating open government ecosystems: A research and development agenda. *Future Internet*, *4*(4), 900-928.

Harrison, T.M., & Sayogo, D.S. (2014). Transparency, participation, and accountability practices in open government: A comparative study. *Government Information Quarterly*, *31*(4), 513-525.

Howard, A. (2012). *Data for the public good*. "O'Reilly Media, Inc.".

Hujran, O., Abu-Shanab, E., & Aljaafreh, A. (2020). Predictors for the adoption of e-democracy: An empirical evaluation based on a citizen-centric approach. *Transforming Government: People, Process and Policy*, *14*(3), 523-544.

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.

Janssen, M., Matheus, R., Longo, J., & Weerakkody, V. (2017). Transparency-by-design as a foundation for open government. *Transforming Government: People, Process and Policy*, *11*(1), 2-8. doi: 10.1108/TG-02-2017-0015.

Janssen, M., Rana, N.P., Slade, E.L., & Dwivedi, Y.K. (2018). Trustworthiness of digital government services: Deriving a comprehensive theory through interpretive structural modelling. *Public Management Review*, *20*(5), 647-671. doi: 10.1080/14719037.2017.1305689.

Janssen, M., Konopnicki, D., Snowdon, J.L., & Ojo, A. (2017). Driving public sector innovation using big and open linked data (BOLD). *Information Systems Frontiers*, *19*(2), 189-195.

Juran, J.M. (1974). Juran's quality handbook (4th edn). Mcgraw-Hill (Tx).

Kalampokis, E., Karamanou, A., Nikolov, A., Haase, P., Cyganiak, R., Roberts, B., Tarabanis, K.A., et al. (2014, October). Creating and Utilizing Linked Open Statistical Data for the Development of Advanced Analytics Services. In *SemStats@ ISWC*.

Kassen, M. (2013). A promising phenomenon of open data: A case study of the Chicago open data project. *Government Information Quarterly*, *30*(4), 508-513.

Khayyat, M., Bannister, F. (2017). Towards a model for facilitating and enabling co-creation using open government data. *Information Polity*, *22*(4): 211-231.

Kim, S., & Lee, J. (2012). E-participation, transparency, and trust in local government. *Public Administration Review*, *72*(6), 819-828.

Lee, C.P., Chang, K., & Berry, F.S. (2011). Testing the development and diffusion of e-government and e-democracy: A global perspective. *Public Administration Review*, *71*(3), 444-454.

Linåker, J., & Runeson, P. (2020). Collaboration in Open Government Data Ecosystems: Open Cross-sector Sharing and Co-development of Data and Software. In G. Viale Pereira, M. Janssen, H. Lee, I. Lindgren, M.P. Rodríguez Bolívar, H.J. Scholl, & A. Zuiderwijk (Eds.), *Electronic Government*, Vol. 12219, pp. 290-303. Springer International Publishing. doi: 10.1007/978-3-030-57599-1_22.

Linåker, J., & Runeson, P. (2021). How to enable collaboration in open government data ecosystems: A public platform provider's perspective. *JeDEM – EJournal of EDemocracy and Open Government*, *13*(1), 1-30. doi: 10.29379/jedem.v13i1.634.

Linders, D. (2012). From e-government to we-government: Defining a typology for citizen coproduction in the age of social media. *Government Information Quarterly*, *29*(4), 446-454.

Nikiforova, A., & Lnenicka, M. (2021). A multi-perspective knowledge-driven approach for analysis of the demand side of the Open Government Data portal. *Government Information Quarterly*, *38*(4), 101622.

Lnenicka, M., & Nikiforova, A. (2021). Transparency-by-design: What is the role of open data portals? *Telematics and Informatics*, *61*, 101605. doi: 10.1016/j.tele.2021.101605.

Longo, J. (2011). # OpenData: Digital-era governance thoroughbred or new public management Trojan horse? *Public Policy & Governance Review*, *2*(2), 38.

Lourenço, R.P. (2015). An analysis of open government portals: A perspective of transparency for accountability. *Government Information Quarterly*, *32*(3), 323-332.

Lourenço, R.P. (2013, September). Open government portals assessment: a transparency for accountability perspective. In *International Conference on Electronic Government*, Springer, Berlin, Heidelberg, pp. 62-74.

Lourenço, R.P., Piotrowski, S., & Ingrams, A. (2017). Open data driven public accountability. *Transforming Government: People, Process and Policy*.

Máchová, R., Hub, M., & Lnenicka, M. (2018). Usability evaluation of open data portals: Evaluating data discoverability, accessibility, and reusability from a stakeholders' perspective. *Aslib Journal of Information Management*.

Matheus, R., & Janssen, M. (2015). Transparency Dimensions of Big and Open Linked Data: Transparency as Being Synonymous with Accountability and Openness. In M. Janssen, M. Mäntymäki, J. Hidders, B. Klievink, W. Lamersdorf, B. van Loenen, & A. Zuiderwijk (Eds.), *Open and Big Data Management and Innovation*, Vol. 9373, pp. 236-246. Springer International Publishing. doi: 10.1007/978-3-319-25013-7_19.

Matheus, R., & Janssen, M. (2017). An Evaluation Framework for Linked Open Statistical Data in Government. In M. Janssen, K. Axelsson, O. Glassey, B. Klievink, R. Krimmer, I. Lindgren, P. Parycek, H.J. Scholl, & D. Trutnev (Eds.), *Electronic Government*, Vol. 10428, pp. 255-263. Springer International Publishing. doi: 10.1007/978-3-319-64677-0_21.

Matheus, R., Janssen, M., & Janowski, T. (2021). Design principles for creating digital transparency in government. *Government Information Quarterly*, *38*(1), 101550. doi: 10.1016/j.giq.2020.101550.

Mayernik, M.S. (2017). Open data: Accountability and transparency. *Big Data & Society*, *4*(2), 2053951717718853.

McBride, K., Toots, M., Kalvet, T., & Krimmer, R. (2018). Open Government Data Driven Co-creation: Moving Towards Citizen-Government Collaboration. In P. Parycek, O. Glassey, M. Janssen, H.J. Scholl, E. Tambouris, E. Kalampokis, & S. Virkar (Eds.), *Electronic Government*, Vol. 11020, pp. 184-195. Springer International Publishing. doi: 10.1007/978-3-319-98690-6_16.

McGuinness, T.D., & Schank, H. (2021). *Power to the public: The promise of public interest technology*. Princeton University Press.

Meijer, A.J., Curtin, D., & Hillebrandt, M. (2012). Open government: Connecting vision and voice. *International Review of Administrative Sciences*, *78*(1), 10-29.

Meijer, A.J. (2007). Publishing public performance results on the Internet: Do stakeholders use the Internet to hold Dutch public service organizations to account? *Government Information Quarterly*, *24*(1), 165-185.

Min, B.K.H. (2010). *Democracy and light: public service provision in the developing world*. University of California, Los Angeles.

Morgeson, I.I.I., VanAmburg, F.V.D., & Mithas, S. (2011). Misplaced trust? Exploring the structure of the e-government-citizen trust relationship. *Journal of Public Administration Research and Theory*, *21*(2), 257-283.

Nam, T. (2011). Whose e-democracy? The democratic divide in American electoral campaigns. *Information Polity*, *16*(2), 131-150.

Neumaier, S., Umbrich, J., & Polleres, A. (2016). Automated quality assessment of metadata across open data portals. *Journal of Data and Information Quality (JDIQ)*, *8*(1), 1-29.

Nikiforova, A., & McBride, K. (2021). Open government data portal usability: A user-centered usability analysis of 41 open government data portals. *Telematics and Informatics*, *58*, 101539.

Noveck, B. (2017). Rights-based and tech-driven: Open data, freedom of information, and the future of government transparency. *Yale Human Rights and Development Law Journal*, *19*, 1-46.

Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*. Cambridge university press.

Norris, D.F. (2010, October). e-government . . . not e-governance . . . not e-democracy not now! not ever? In *Proceedings of the 4th International Conference on Theory and Practice of Electronic Governance*, pp. 339-346.

Norris, D.F., & Reddick, C.G. (2013). E-democracy at the American grassroots: Not now . . . not likely? *Information Polity*, *18*(3), 201-216.

Ojo, A., Stasiewicz, A., Porwol, L., Petta, A., Pirozzi, D., Serra, L., Vicidomini, L., et al. (2018, May). A comprehensive architecture to support Open Data access, co-creation, and Dissemination. In *Proceedings of the 19th Annual International Conference on Digital Government Research: Governance in the Data Age*, pp. 1-2.

Parent, M., Vandebeek, C.A., & Gemino, A.C. (2005). Building citizen trust through e-government. *Government Information Quarterly*, *22*(4), 720-736. doi: 10.1016/j.giq.2005.10.001.

Parsons, T. (1965). Full citizenship for the Negro American? A sociological problem. *Daedalus*, 1009-1054.

Peixoto, T. (2012). The Uncertain Relationship between Open Data and Accountability: A Response to Yu and Robinson's the New Ambiguity of Open Government. *UCLA L. Rev. Discourse*, *60*, 200.

Pérez, C.C., Hernández, A.M.L., & Bolívar, M.P.R. (2005). Citizens' access to on-line governmental financial information: Practices in the European Union countries. *Government Information Quarterly*, *22*(2), 258-276.

Pipino, L.L., Lee, Y.W., & Wang, R.Y. (2002). Data quality assessment. *Communications of the ACM*, *45*(4), 211-218.

Piotrowski, S., & Liao, Y. (2012). The usability of government information: The necessary link between transparency and participation. *The state of citizen participation in America*, 163-194.

Purwanto, A., Zuiderwijk, A., & Janssen, M. (2020). Citizen engagement with open government data: A systematic literature review of drivers and inhibitors. *International Journal of Electronic Government Research*, *16*(3), 1-25. doi: 10.4018/IJEGR.2020070101.

Reggi, L., & Dawes, S. (2016, September). Open government data ecosystems: Linking transparency for innovation with transparency for participation and accountability. In *International Conference on Electronic Government*, Springer, Cham, pp. 74-86.

Ruijer, E., Grimmelikhuijsen, S., & Meijer, A. (2017). Open data for democracy: Developing a theoretical framework for open data use. *Government Information Quarterly*, *34*(1), 45-52.

Ruijer, E., Détienne, F., Baker, M., Groff, J., & Meijer, A.J. (2020). The politics of open government data: Understanding organizational responses to pressure for more transparency. *The American Review of Public Administration*, *50*(3), 260-274.

Ruijer, E.H., & Martinius, E. (2017). Researching the democratic impact of open government data: A systematic literature review. *Information Polity*, *22*(4), 233-250.

Ruijer, E., Grimmelikhuijsen, S., Hogan, M., Enzerink, S., Ojo, A., & Meijer, A. (2017). Connecting societal issues, users and data. Scenario-based design of open data platforms. *Government Information Quarterly*, *34*(3), 470-480.

Ruijer, E., Grimmelikhuijsen, S., Van Den Berg, J., & Meijer, A. (2020). Open data work: Understanding open data usage from a practice lens. *International Review of Administrative Sciences*, *86*(1), 3-19.

Safarov, I., Meijer, A., & Grimmelikhuijsen, S. (2017). Utilization of open government data: A systematic literature review of types, conditions, effects and users. *Information Polity*, *22*(1), 1-24.

Saxena, S., & Muhammad, I. (2018). Barriers to use open government data in private sector and NGOs in Pakistan. *Information Discovery and Delivery*.

Schmidthuber, L., Hilgers, D., Gegenhuber, T., & Etzelstorfer, S. (2017). The emergence of local open government: Determinants of citizen participation in online service reporting. *Government Information Quarterly*, *34*(3), 457-469. doi: 10.1016/j.giq.2017.07.001.

Shkabatur, J. (2012). Transparency with (out) accountability: Open government in the United States. *Yale L. & Pol'y Rev.*, *31*, 79.

Susha, I., Pardo, T.A., Janssen, M., Adler, N., Verhulst, S.G., & Harbour, T. (2018). A research roadmap to advance data collaboratives practice as a novel research direction. *International Journal of Electronic Government Research*, *14*(3), 1-11. doi: 10.4018/IJEGR.2018070101.

Tolbert, C., & Mossberger, K. (2006). The effects of e-government on trust and confidence in government. *Public Administration Review*, *66*(3), 354-369. doi: 10.1111/puar.2006.66.issue-3.

Vetrò, A., Canova, L., Torchiano, M., Minotas, C.O., Iemma, R., & Morando, F. (2016). Open data quality measurement framework: Definition and application to Open Government Data. *Government Information Quarterly*, *33*(2), 325-337.

Von Krogh, G., Haefliger, S., Spaeth, S., & Wallin, M. (2012). Carrots and rainbows: Motivation and social practice in open source software development. *Management Information Systems Quarterly*, *36*, 649-676.

Wang, R.Y., & Strong, D.M. (1996). Beyond accuracy: What data quality means to data consumers. *Journal of Management Information Systems*, *12*(4), 5-33.

Wirtz, B.W., Weyerer, J.C., & Rösch, M. (2019). Open government and citizen participation: An empirical analysis of citizen expectancy towards open government data. *International Review of Administrative Sciences*, *85*(3), 566-586.

Yang, T.M., & Maxwell, T.A. (2011). Information-sharing in public organizations: A literature review of interpersonal, intra-organizational and inter-organizational success factors. *Government Information Quarterly*, *28*(2), 164-175.

Yang, T.M., Pardo, T., & Wu, Y.J. (2014). How is information shared across the boundaries of government agencies? An e-government case study. *Government Information Quarterly*, *31*(4), 637-652.

Yu, H., & Robinson, D.G. (2011). The new ambiguity of open government. *UCLA L. Rev. Discourse*, *59*, 178.

Zhang, J., Puron-Cid, G., & Gil-Garcia, J.R. (2015). Creating public value through Open Government: Perspectives, experiences and applications. *Information Polity*, *20*(2-3), 97-101.

Zhu, X., & Freeman, M.A. (2019). An evaluation of US municipal open data portals: A user interaction framework. *Journal of the Association for Information Science and Technology*, *70*(1), 27-37.

Zilla, C. (2022). Defining democratic inclusion from the perspective of democracy and citizenship theory. *Democratization*, 1-21.

Zuiderwijk, A., & Janssen, M. (2014). Open data policies, their implementation and impact: A framework for comparison. *Government Information Quarterly*, *31*(1), 17-29.

Zuiderwijk, A., Janssen, M., & Davis, C. (2014). Innovation with open data: Essential elements of open data ecosystems. *Information Polity*, *19*(1-2), 17-33.

Zuiderwijk, A., Janssen, M., & Dwivedi, Y.K. (2015). Acceptance and use predictors of open data technologies: Drawing upon the unified theory of acceptance and use of technology. *Government Information Quarterly*, *32*(4), 429-440.

Appendix A

Appendix A: User group analysis coding examples						
Dataset name	Description provided	Citizens	Private sector	Non-profits	Researchers	City agencies
2017–2018 Diversity Report Diversity Efforts	Diversity efforts for DOE Schools	X				X
FDNY Monthly Response Times	Average response times to incidents by Year, Month, Incident classification and borough	X				X
SNAP Center Wait Time	Aggregate monthly wait times for clients at SNAP Center services	X				X
Anticipated RFP	List of upcoming Requests for Proposals		X	X		X
Inventory of New York City Greenhouse Gas Emissions – Citywide GHG Emissions Summary (2016)	Inventory of New York City Greenhouse Gas Emissions – Citywide GHG Emissions Summary (2016)	X			X	X
Entry Point LCR Monitoring Results	Daily results from the entry points for orthophosphate, pH, temperature, conductivity and monthly alkalinity, calcium, lead and copper – Bi annually updated				X	
Directory of Adult Shelter Performance Ranking FY 2011 Q3 2011 Q4	List of Facilities, Providers and their Rankings for Q3 2012 and Q4 2011	X	X	X		X
2019 Volunteers Count Report – Boroughs	The annual NYC Volunteers Count report is the City's largest scan of residents volunteering at organizations across New York City. Organizations, including City agencies, Mayoral offices, and nonprofits, are surveyed to understand how residents volunteer within the city's infrastructure to strengthen communities at the neighborhood level. All participating organizations are recognized for their contributions in the annual NYC Volunteers Count report.	X	X	X		X

Author biography

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