

THE STATE OF OPEN DATA IN AMERICAN LOCAL GOVERNMENTS

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TABLE OF CONTENTS

INTRODUCTION	1
HISTORY & LITERATURE REVIEW	3
METHODOLOGY	14
DATA ANALYSIS	18
CONCLUSIONS & LOOKING FORWARD	30
SOURCES	33

INTRODUCTION

"In God we trust, all others bring data."

-W. Edwards Demming

"Openness will strengthen our democracy and promote efficiency and effectiveness in government."

- President Barack Obama, January 2009

We live in a world fueled by data. It influences how we understand and change money, energy, policy, and markets. Local governments are keepers of a lot high-value data that has implications for a wide range of people, such as building permits, crime rates, and environmental hazards. This sharing of this information can have a variety of political and economic consequences, but can also provide a more complete understanding of a city for more of the community. Showing trends such as housing demand, demographic shifts, and energy use in a way that is clear and impactful can help shape an image of a city that educates and empowers residents. As American governments, from the White House to city hall, transition to providing many services online, the possibility for digitizing records is entirely within reach. This capability, paired with increasing demands for transparency in governments, has created a unique position for local jurisdictions to begin providing large amounts of data to the public with no limitations on use. This is open data.

This study analyzes the state of open data in cities across the United States. Municipalities are uniquely positioned to create open data programs that have real, immediate impacts in their communities, but also face barriers to implementation that are especially burdensome to smaller governments. This paper seeks to identify benefits and barriers for local government implementation of open data programs measure the state of fifty established programs in cities across the United States. These findings help to take the temperature of existing adoption and can help shape the open data movement going forward.

There are many benefits for cities opening data now, including increased transparency, democratic participation, and increased economic and educational opportunities. However, I believe that the most essential applications of open data frameworks will happen in the future. The impacts of climate change have already started to be seen across the world. Presenting hypotheses about the future does not align as directly with local governments role as does providing current and past findings, as scientific predictions are often not under the purview of city hall. However, establishing infrastructure today to serve as a single point of data for communities can both continue to encourage civic participation and serve as an essential tool for communicating a city's progress to sustainability and resilience.

HISTORY & LITERATURE REVIEW

THE PATH TO OPEN DATA

To examine the current state of open data requires an understanding of how communities and local governments came to strive for transparency, as well as the benefits and barriers found along the way. The adoption of open data principles is still relatively nascent, especially in local governments, and the ideas enveloped in these programs stem from larger trends in governance in the digital age.

As information and communication technologies increased with the advent of computers and the Internet, governments have faced increasing pressure to implement best digital practices to meet the needs of their constituents (OECD, 2003). E-government has been broadly defined by the Organization for Economic Co-operation and Development (OECD) as “the use of information and communication technologies, and particularly the Internet, as a tool to achieve better government” (2003). This emphasizes that the principle focus of e-government is on providing the best form of government, more providing government that is shiny and new with little impact of improving operations or services (OECD, 2003). When available electronic information and communication tools are used properly, they can increase efficiency, allow governments to reach broad populations, and help focus efforts to achieve community goals. Kassen defines e-government as a three-pillar concept, with overlapping components of participation, accountability, and transparency, as shown in **Figure 1** (2013).

FIGURE 1: PILLARS OF E-GOVERNMENT



Source: Kassen, 2013

The propensity for municipalities to govern online has grown and changed with the ever-shifting technological landscape. As the web moved farther from a product created by few players to a platform for the ideas and work of the general public (also known as Web 2.0), integration into everyday lives continued to grow (O'Reilly, 2005). The White House launched its Digital Government Strategy on May 23rd, 2012, which built on a number of existing executive orders focusing on the use of technology to streamline and improve government services (White House, 2013). This strategy set forth goals and principles to guide the transition of governments away from being closed, inefficient providers of public services. The initial and sustaining goals of the strategy are:

- Enable the American people and an increasingly mobile workforce to access high-quality digital government information and services anywhere, anytime, on any device.
- Ensure that as the government adjusts to this new digital world, we seize the opportunity to procure and manage devices, applications, and data in smart, secure and affordable ways.

- Unlock the power of government data to spur innovation across our Nation and improve the quality of services for the American people.

These goals are supported by the Strategy's four central principles:

- An "Information-Centric" approach – Moves us from managing "documents" to managing discrete pieces of open data and content¹⁷ which can be tagged, shared, secured, mashed up and presented in the way that is most useful for the consumer of that information.
- A "Shared Platform" approach – Helps us work together, both within and across agencies, to reduce costs, streamline development, apply consistent standards, and ensure consistency in how we create and deliver information.
- A "Customer-Centric" approach – Influences how we create, manage, and present data through websites, mobile applications, raw data sets, and other modes of delivery, and allows customers to shape, share and consume information, whenever and however they want it.
- A platform of "Security and Privacy" – Ensures this innovation happens in a way that ensures the safe and secure delivery and use of digital services to protect information and privacy (White House, 2013).

All of these principles identify key steps to providing superb governance in the digital age. But they also identify a shift in thinking about the way governments should use technology to connect with communities. While e-government uses information and communication technologies to give information to constituents in a one-way flow, these newer principles *include* the user in the creation, analysis, and management of information, rather than just being a passive recipient. This inclusion of citizens in the e-governing process has led to an increasingly popular extension of e-government into open government.

"Narratives of 'open government' have generally been understood as a reaction to long-standing cultures of governmental secrecy, and, more recently, to the limited scope for citizen participation in policy making" (Davies and Bawa, 2012). Because open government has been

established as the antithesis of this historical secrecy, it has been “conceptually linked to democracy, and seen to be an intrinsic good for modern states” (Davies and Bawa, 2012). This mirrors closely the three pillars of e-government identified by Kassen in **Figure 1**, but provides special emphasis on transparency as an avenue to achieve accountability and participation (2013). This heightened focus on transparency in e-government has naturally unfolded into demand for the release of government records that are provided without restriction to the public, most frequently called open data.

DEFINING OPEN DATA

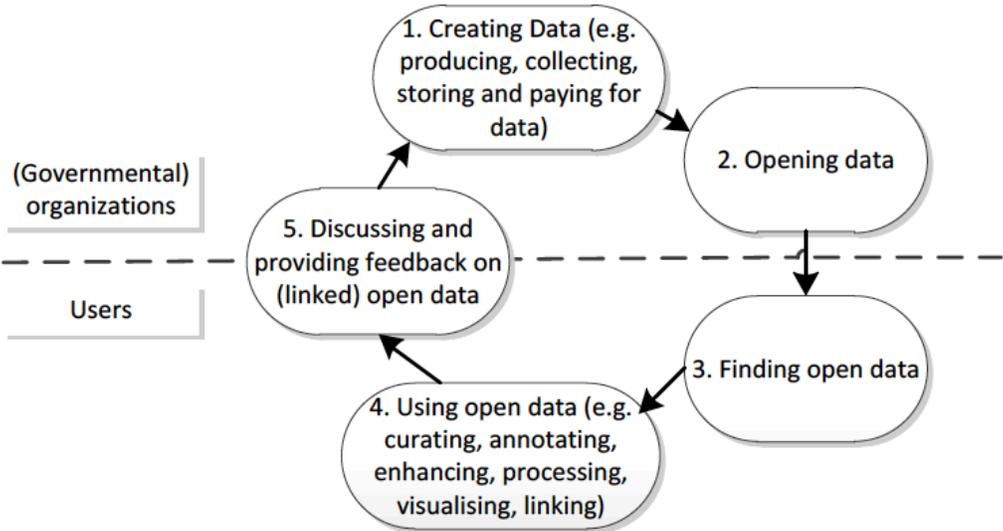
Janssen and Zuiderwijk define open data as “non-privacy-restricted and non-confidential data that is produced with public money and is made available without any restrictions on its usage or distribution” (2012). Newsom elaborates on this by adding that high quality open data must also findable, standardized, and trustworthy, but most importantly it must share a compelling narrative that provides “a way for people to relate to and use it” (2013). These authors provide two different ideas that together shape a complete image of open data – what it needs to be to be open (Janssen and Zuiderwijk’s definition) and what it needs to be to be useful (Newsom’s definition).

While often discussed as a standalone program to be implemented, open data is more appropriately looked at as a process. Cities are continually growing, changing, and accruing new information. Janssen and Zuiderwijk contest that seeing open data not just as a product, but as a process, allows for the perception that “new applications and use of open data might result in new insights, which might result in new ways of using open data” (2012). Davies and Bawa present two different ways to view this process, first stating that in some governments open data programs have “initially been justified on the basis of the contribution open data can make to ‘open government, emphasizing citizen entitlements over the state, and the need to foster greater transparency and accountability in decision-making and resource allocation processes” (2012). Open data can also be presented as way to “draw more upon technological narratives of openness as facilitating new modes of production, enabling more efficient delivery of services, or as supporting the role of competitive market forces in the operation of

government services” (Davies and Bawa, 2012). While these ultimate objectives may differ from city to city, the open data process remains the same.

Zuiderwijk, et al., explain the open data process in five, high-level steps, illustrated in **Figure 2** (2012). First, public organizations (at any scale) create the data, through collecting, coordinating, and compiling resources with government funding. Next, officials elect which datasets to publish and where to make the data available (such as a new online portal or the city website). The third step is the transition from government action to public consumption of open data, which happens when the published data is “can be used, reused and redistributed by everyone, without restrictions from copyright, patents or other mechanisms of control” (Zuiderwijk, pg. 157, 2012). Linking to other information, drawing connections, visualizing, and presentation brings data out of rows in Excel and into meaningful knowledge that can empower communities to understand and participate in the governments serving them. Finally, the success or failure of the process (in bringing about the intended consequence) is analyzed by both the provider (government organizations) and user (the public, businesses, and non-profits). This feedback informs future creation of datasets and allows the process to continually grow to serve the changing needs to the public (Zuiderwijk, et al., 2012).

FIGURE 2: THE OPEN DATA PROCESS



Source: Zuiderwijk, et al., 2012

This process encourages a relationship between the public and local governments that relies on constant feedback and discussion. Rather than the traditional, top-down relationship between municipalities and citizens, in an open data system, “The public is outside the organizational boundaries and outside the control of the hierarchy. In fact, the public becomes part of the data processing system and might process data, enrich data, combine it with other sources, and might even collect their own data (for example, through the use of their mobile phones). This resembles a change in the traditional boundaries between public organizations and the public, in which virtually anybody in the world has access to the data” (Janssen, 2012). With this radical restructuring of the citizen/government relationship, comes new challenges and new rewards. An analysis of the existing literature finds a host of benefits to come from open data, as well as an equal number of barriers to successful implementation.

BENEFITS

Civic data in the digital age is transforming how local governments can communicate between departments as well as to members of the public. Data has been collected by cities for years, on topics as wide ranging as building permits and birth records. Often, this information is filed away, out of the public eye, until a large project or public data request calls it into the light (Hillenbrand, 2013). Putting this data in a place where citizens, entrepreneurs, and even other city departments can access, analyze, and apply data to spearhead real civic engagement has the potential to drastically change the landscape of local government.

Kassen notes that in an effective open data program, “providing a free public access to various official files the government not only becomes presumably more transparent but also more efficient as it potentially could promote civic engagement by enabling citizens to participate in various discussions on how to better address their needs. For instance, by publishing datasets as a raw material in a machine readable format which then are selectively processed by independent developers for their e-government projects, it could increase the overall cost effectiveness of the local government due to the citizen sourcing process” (2013). By using

open data to encourage community organizing, cities can gain insights from civic leaders to better shape the municipality's understanding of resident's needs and desires.

This focus on efficiency is incredibly important for local governments, who often operate within small budgets. The establishment of an open data program does not necessarily require hiring new staff, as existing staff can create an oversight board for open data program operations that engages multiple city departments without placing undue burden on an individual (Sunlight Foundation, 2014). When analysis and application comes from new collaboration between departments, between citizens and the city, and outside of city hall entirely, a range of new applications and ideas can surface by bringing together stakeholders around information that wasn't previously available. Having a champion for the program, to ensure that active communication and application of data continues, greatly improves the likelihood of sustaining success and development of the open data process (Code for America, 2014).

Open data programs depend on the private non-profit sector to diffuse and promote the open data concept across a community. In Chicago, private organizations including the MacArthur Foundation, Sunlight Foundation, Code for America and Metro Chicago Information Center helped the City by offering financial and technical assistance. Open data implementation efforts, such as grants, hackathons, and civic coding challenges provide a "more flexible result-oriented way of decision-making with active participation of the local society" (Kassen, 2013). These partnerships also help get the word out about the availability of data and reduce trust barriers the city may experience if implementing the open data program alone.

Finally, open data is an important tool to forward the e-government goals of participation, accountability, and transparency. According to Kassen, by promoting participation, accountability, and transparency, open data creates a "favorable environment for proactive civic engagement by providing a real opportunity for independent developers to create applications by using available datasets from the web-portal without any official permission. In turn, these independent projects could promote citizen-sourcing by inviting members of the local communities to cooperate in providing additional information necessary for effective

functioning of the existing applications (e.g. collecting citizens' data for mapping, visualizations, ranking of the transportation routes, building permits, crime data, polluted sites, etc.), and, creating a new environment for cooperation between local government and citizens, i.e. truly transforming traditional ways of political communication" (2013).

BARRIERS

Zuiderwijk, et al., recognize that although postulating the broader benefits of open data is easy, it can overlook the barriers to implementing these programs in a way that provides any benefit to the public (2012). Despite the numerous, unthought-of possibilities, open data as it currently stands faces two distinct sets of challenges – making these programs possible for governments to provide, and making the outcomes useful to the public.

Barriers for Local Governments

In a political and legal environment that is increasingly sensitive to issues of privacy, the mass publishing of government data for anyone's use (or misuse) is a clear roadblock for many jurisdictions. "In open data," says Zuiderwijk, et al., "the allocation of the roles of provider, processor, owner, and maintainer complicates accountability issues. Which party is to blame when results of the processing of open data are incorrect? No one has an overview of what is done with the open data, and even having such an overview might violate the basic idea of open data" (2012). The authors argue that this challenges one of the core principles of open government. The purpose of publishing this information is to create a more transparent government, which in turn ideally increases official's accountability to the public they serve. The legal understanding that the publishing body is explicitly not liable for any misinformation given through open data is at conflict with the hope for a more accountable government, especially in times of crisis when communities expect local leaders to intervene (Janssen and Zuiderwijk, 2012).

Gavin Newsom, in his 2013 book *Citizenville*, describes the chilling effect transparency can have for governments. Although this transparency may discourage bad behavior on behalf of elected officials and staff, he says, it can create fear of an electronic "paper" trail that is easily picked apart by critics to the detriment of a project or individual (Newsom, 2013). Additionally,

Newsom, despite being steadfast in his belief in government transparency, admits that from a pragmatic standpoint, closed systems are inherently easier to manage for politicians and city staff. This is due in part to the remnants of bureaucracy (across all levels of government) that has long been closed to the public. Newsom also experienced a negative relationship between the data he directed for release in San Francisco and the associate news media. As Newsom puts it “Scandals sell, problems sell, and people don’t buy good news. We tried hard to open up our data, but in the end we failed—which is not an acceptable outcome. We must find a way to bring out the positive aspects of data and weather the inevitable criticism, because data’s too important to hide” (2013).

Barriers for Users

When analyzing the process of open data, the application of the information by the user is arguably the most important (**Figure 2, Step 4**). Whether the purpose of open data is to deepen of democracy through transparency or to encourage efficiency and innovation, the ability of the user to interact with the information can entirely determine the success of the process. That said, in the raw form, much of the data currently being opened by local governments lacks the narrative that provides an avenue for the public to really understand and interact with information. Even when cities meet every criteria to make available data that is high-value, low-restriction, and broadly accessible, a growth in the digital divide may render this information virtually useless to a majority of possible users.

The assumption of the user’s technical capability, states Janssen, et al., is underestimated in many assessments of the availability of open data. The current focus of open data use is often centered on “how to easily use data embedded in software applications, whereas linking and combining data by users requires sophisticated knowledge,” statistical techniques, and ability to visualize and present data, despite the scarcity of these capabilities in the general public (Janssen, et al., 2012). In the study, “One interviewee remarked, ‘Use is limited to the happy few, those who are educated and have time to explore new business opportunities.’” (Janssen, et al., 2012). While some cities may open data in hopes of encouraging innovation, which would filter through these select entrepreneurs to interpret the data for the public, this barrier to access may undercut claims of increasing transparency for the general public. The benefits

of open data may still outweigh the barriers, but the digital divide outlined here shows that the open data process may not be inherently valuable to the general public without buy-in from citizens that can help shape the narrative for the rest of the public.

The issue of a digital divide in relation to open data includes lapses in access to digital technology as well as digital literacy. Nguyen and Boundy highlight that the participatory gap in digital technology “signifies that even if individuals have access to computers, smartphones, or the Internet, they may lack the skills, education, or familiarity to take advantage of the opportunities” this information provides (2014). While local governments may still rely on external forces to find creative, useful applications for data, ensuring that this data serves the community, even if doing so requires additional effort to communicate data equitably. The digital divide has impacted all areas of e-governance, creating a sustained disadvantage to groups with the lowest level of access to these technologies, even though these same groups often have some of the highest interaction with governments (OECD, 2013).

METHODOLOGY

This study was completed through both a qualitative review of existing literature and policies and a high-level quantitative analysis. First, a comprehensive literature review was conducted using Google Scholar and Lexis Nexis to develop a clearer understanding of the principles of open data in local governments, as well as the benefits and barriers to implementing these policies. To develop a contextual quantitative understanding of open data in the United States, cities with open data programs were analyzed using two primary sources – data.gov and the Sunlight Foundation, described below. This analysis focuses specifically on the role of local governments at the city level, so county governments and other non-city entities were removed from consideration.

Data.gov: This federal platform categorizes government entities with open data programs on levels – U.S. States, U.S. Cities and Counties, International Countries, and International Regions. Because this analysis specifically examines open data within

cities, only the U.S. Cities and Counties dataset was used, which at the time of analysis listed 47 units of local government. After disqualifying counties and other bodies of local government, 34 cities remained for analysis.

Sunlight Foundation: The Sunlight Foundation (SLF), a national nonprofit focusing on government transparency hosts a map of open data programs called “Open Data Policies at Work” (Sunlight Foundation, 2014). When the list was analyzed, 34 bodies of local government with open data policies were listed, 32 of which were qualified for analysis.

After compiling the two eligible lists and recognizing overlap (15 cities were listed on both data.gov and SLF), there was a final list of 50 city-run open data programs. All information from these two sources was taken in January 2015. It is important to note that this is not a complete list of all cities in the U.S. with open data policies and portals, as these programs are continually being adopted across the nation. An increasing number of cities are opting for more transparent government policies, and this list captures a picture of some of the longer, more established programs.

After the initial determination of cities to be examined, both demographic and program data was collected. Population information was gathered by using the DP05 data table from the US Census Bureau’s American Community Survey (ACS) 2013 5-year estimates. The cities were divided into regional groups using the six regions identified in *Risky Business*, a risk-assessment report studying the impacts of climate change across the United States.

To examine the comprehensiveness of each program, factors of a strong open data policy were identified (**Table 1**). Then, each city’s policy was given a binary response for each criteria met, with a yes equaling one point and a no equaling zero points. Additionally, one point was allotted for each open data program database the program was featured on (data.gov, SLF, or both), giving an additional advantage to those programs recognized on both sites as a sign of further program establishment.

Defining success can be difficult in nascent areas of technology or policy, especially when many of the outcomes (positive or negative) are yet to be seen. However, this study provides an important look at the reasons more successful programs have flourished, so that future applications of these programs to promote resiliency can be based on an understanding of what already works. It also identifies which aspects of opening data have been more difficult for local governments to achieve, which can help guide future research.

TABLE 1: POLICY ANALYSIS CRITERIA

<i>Open Data Portal</i>	<ul style="list-style-type: none"> • Easy-to-access, searchable hub for multiple data sets (Sunlight Foundation, 2014).
<i>Data Formats for Greatest Technical Access</i>	<ul style="list-style-type: none"> • Release information in open and machine readable formats, so that data can easily be accessed, analyzed, and converted to new uses. • Example: CSV in lieu of XLS for spreadsheets, because CSV can be read by a broader range of software.
<i>No Restrictions on Access</i>	<ul style="list-style-type: none"> • Both open data policies and the Terms of Use (or Terms of Service) associated with government data should maximize the accessibility and use cases for data. While a disclaimer of warranties can be added to limit government liability, this mandate should pose no further restrictions, such as by limiting who or for what purposes the data be used (Sunlight Foundation, 2014). • Example: No technical restrictions such as registration requirements, access fees and usage limitations
<i>Explicitly License-Free</i>	<ul style="list-style-type: none"> • Data must be clearly labeled as in the worldwide public domain, and/or given an explicit public domain dedication, removing any potential copyright protections (Sunlight Foundation, 2014). • Example: Giving data Creative Commons Public Domain Dedication
<i>Published Metadata</i>	<ul style="list-style-type: none"> • Provide a common and fully described core metadata scheme (as well as other documentation) • A strong metadata scheme takes its lead from common international meta attributes (such as DCAT), and allows data publishers to classify contextual fields or elements within their datasets (Sunlight Foundation, 2014).
<i>Bulk Data Publishing</i>	<ul style="list-style-type: none"> • Bulk access provides a simple means of publishing data sets in full by enabling the public to download all of the information stored in a database at once (Sunlight

	Foundation, 2014).
<i>Ongoing Publication and Updates</i>	<ul style="list-style-type: none"> • Data should be made available as close as possible to the time that it is collected. It is not enough to mandate the one-time release of a data set, because it becomes incomplete as soon as additional data is created but not published. • In order to ensure that the information published is as accurate and useful as possible, specific requirements should be put in place to make sure government data is released as close as possible to the time that it is gathered and collected (Sunlight Foundation, 2014).
<i>Designated Authority</i>	<ul style="list-style-type: none"> • Designate a single authority empowered to resolve conflicts and ensure compliance with new open data measures. • Creating oversight does not necessarily require hiring new staff. Responsibility can be distributed among departmental coordinators who meet regularly, for example, to reduce the burden of oversight (Sunlight Foundation, 2014).

DATA ANALYSIS

DEMOGRAPHIC & GEOGRAPHIC INDICATORS

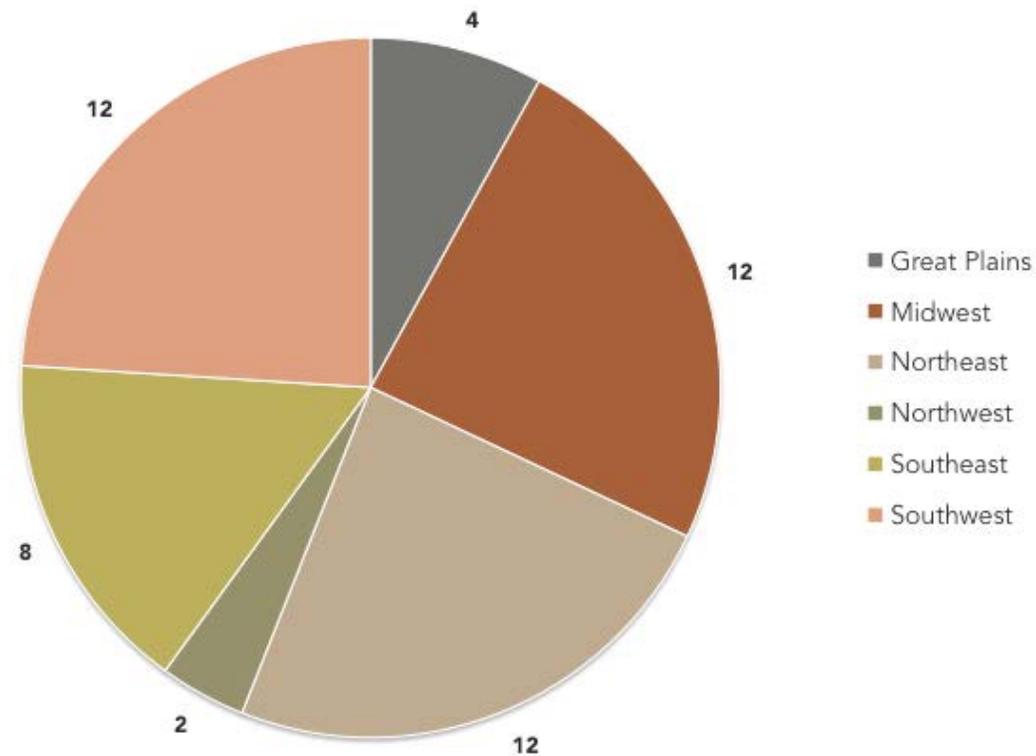
The cities examined in this study exist across a wide range of demographic, economic, and environmental conditions. Over half of the cities had populations greater than 200,000 (**Table 2**). Six of the fifty cities (12%) had populations over one million; only one had a population smaller than 10,000.

TABLE 2: CITY SIZE

	<100,000	100,000-199,000	>200,000
Number of cities	13	9	28
Percentage of total	26%	18%	56%

Figure 2 shows the regional distribution of open data programs. Of the fifty cities, the Midwest, Southwest, and Northeast had the largest portion of programs, with 12 cities (24%) in each region. The Northwest, with only Portland and Seattle included in the study, had the smallest number of open data programs. This may be related to findings surrounding city size – Portland and Seattle are overwhelmingly the Northwest’s metropolitan population centers, with fewer large cities in Oregon or Washington state than are found in the Northeast corridor or California alone.

FIGURE 3: NUMBER OF CITIES BY REGION



OPEN DATA PORTAL

The number of publically available datasets found in the sample cities ranged from zero (for cities that hadn't yet established a portal for electronic transmission of data) to over 4,000. Some cities have an open data policy, but have yet to begin hosting it in a single place, as is recommended by the Sunlight Foundation. Only five cities had not published any data at the time of analysis, leaving forty-five cities with a wide range of publication sizes (**Figure 3**). 47% of these forty-five cities had published between 1 and 99 datasets at the time of analysis, with another 38% having published between 100 and 499. Only three of the forty-five cities (Seattle, Washington, New York, New York, and Kansas City, Missouri) had published over 1,000 datasets (**Table 3, Figure 4**). As discussed in the review of existing literature, sheer number of datasets does not automatically reflect the quality of the program, with much of the benefit resting in the value and applicability of the datasets. However, this does represent the

commitment of these cities to continually publish information for public consumption and garner a commitment to transparency across city departments.

FIGURE 4: CITIES WITH PUBLISHED DATASETS

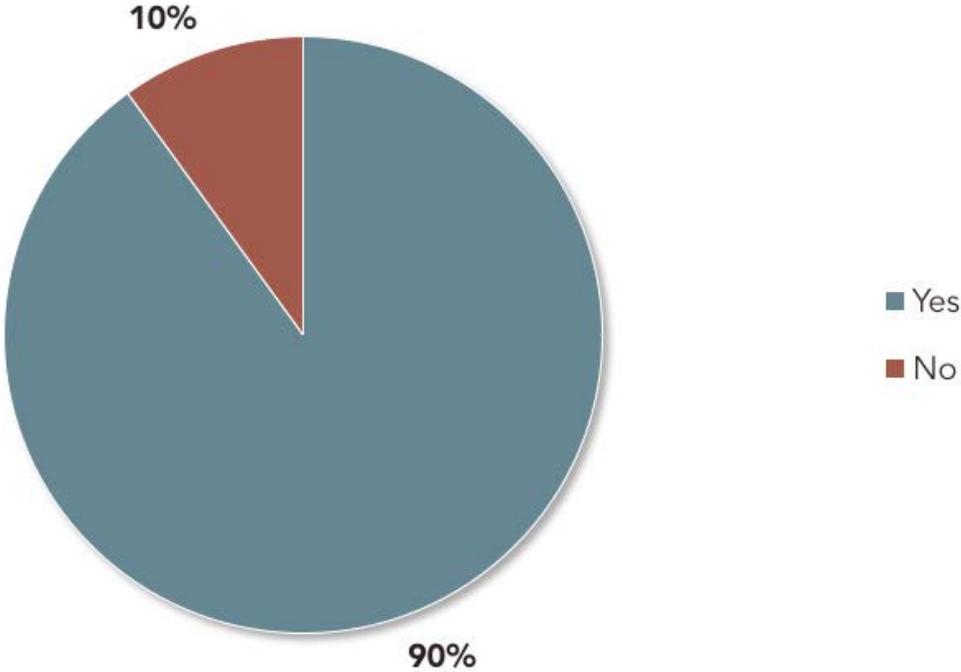
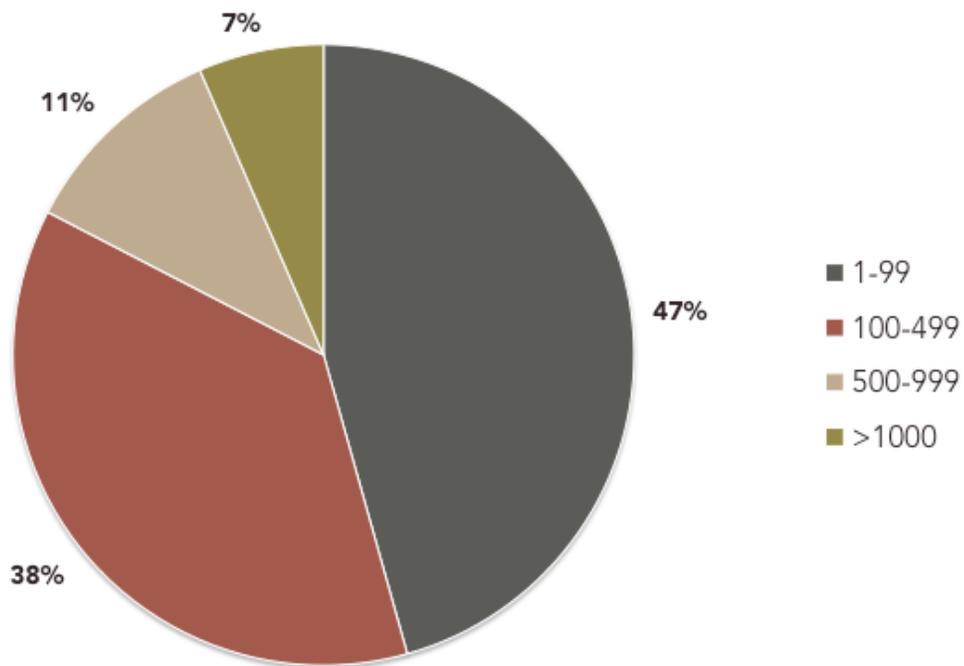


TABLE 3: NUMBER OF PUBLISHED DATASETS

	1-99	100-499	500-999	>1,000
Number of cities	21	17	5	3

FIGURE 5: NUMBER OF PUBLISHED DATASETS



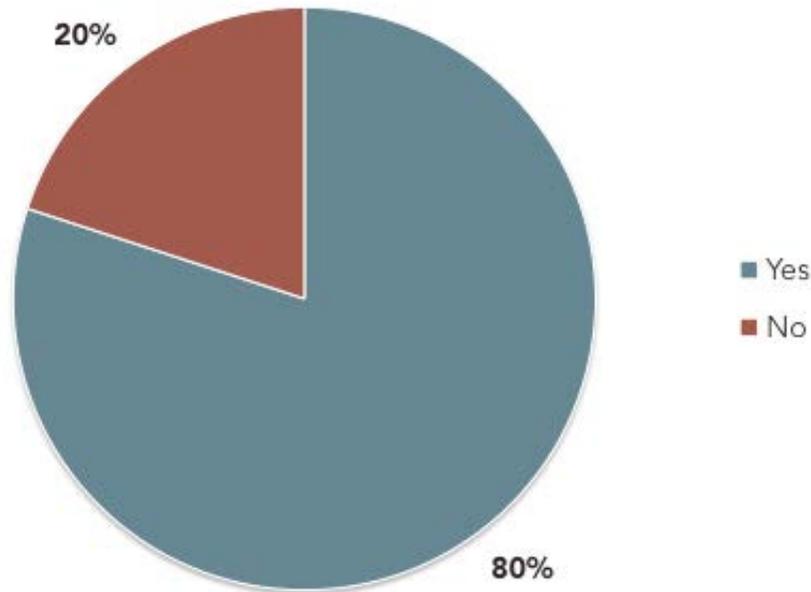
ACCESSIBLE DATA FORMATS

Of the cities sampled, 40 (80%) had published data in accessible formats. While this does not ensure application, it increases transparency by broadening the possible applications, ease of visualization, and breadth of users who can access the data from their platform of choice. By using data formats that lend themselves to “easy and efficient reuse,” such as JSON, XML, and CSV, more advanced analysis is possible (Sunlight Foundation, 2014). Certain platforms, such as those developed by Socrata, automatically allow the user to select the format of their choice.

TABLE 4: CITIES WITH ACCESSIBLE DATA FORMATS

	Yes	No
Number of cities	40	10

FIGURE 6: CITIES WITH ACCESSIBLE DATA FORMATS



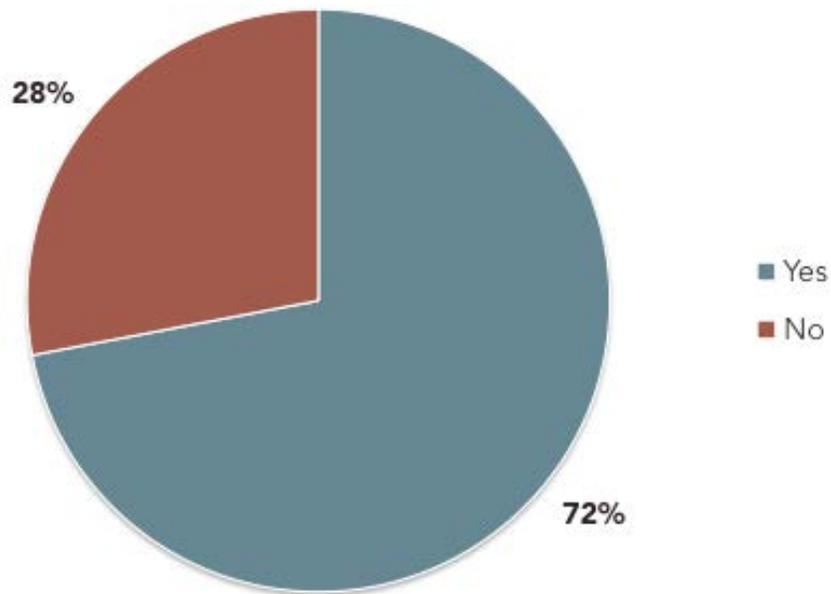
NO RESTRICTIONS ON ACCESS

Impediments to access, such as login requirements, access fees, and download restrictions, can deter users and increase barriers to use for communities. In the cities sampled, 14 placed some restriction on access, most commonly login requirements. The ability to access public data without giving user information to the data manager is an important to encourage liberal access and use by the public. Almost three fourths of all study cities met this requirement.

TABLE 5: CITIES WITH NO RESTRICTIONS ON ACCESS

	Yes	No
Number of cities	36	14

FIGURE 7: CITIES WITH NO RESTRICTIONS ON ACCESS



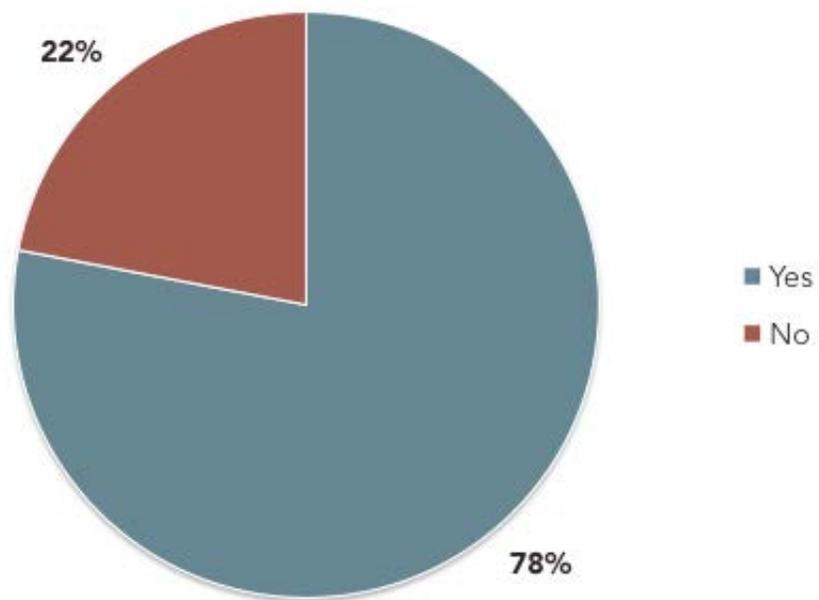
LICENSE-FREE

39 cities provided data that was explicitly license-free. Because of jurisdictional variances in copyright law, only portals that plainly stated this condition were considered a “yes” (Sunlight Foundation, 2014).

TABLE 6: CITIES WITH LICENSE-FREE DATA

	Yes	No
Number of cities	39	11

FIGURE 8: CITIES WITH LICENSE-FREE DATA



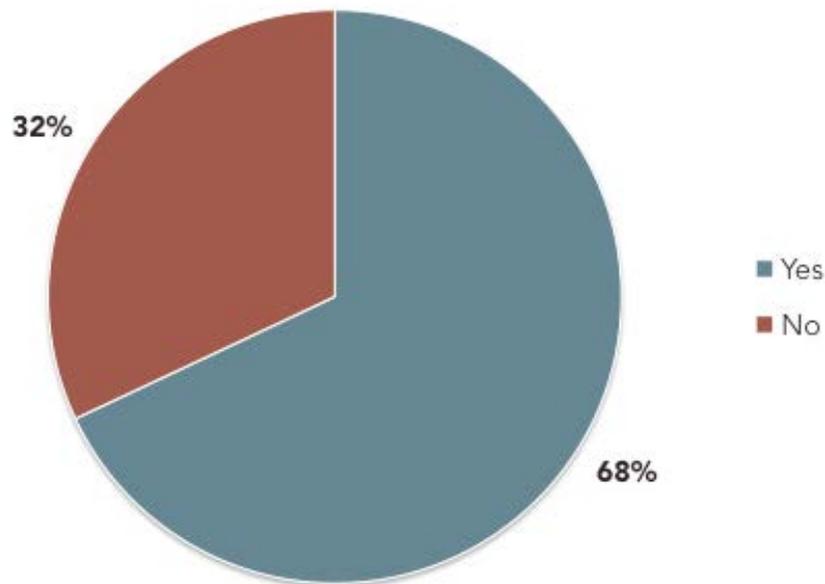
PUBLISHED METADATA

Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Providing this information can greatly increase the value of data for a range of applications and future uses by helping to validate data sources, points of contact, and update history (Project Open Data, 2015). Over one third of cities studied did not publish metadata with open datasets.

TABLE 7: CITIES WITH PUBLISHED METADATA

	Yes	No
Number of cities	34	16

FIGURE 9: CITIES WITH PUBLISHED METADATA



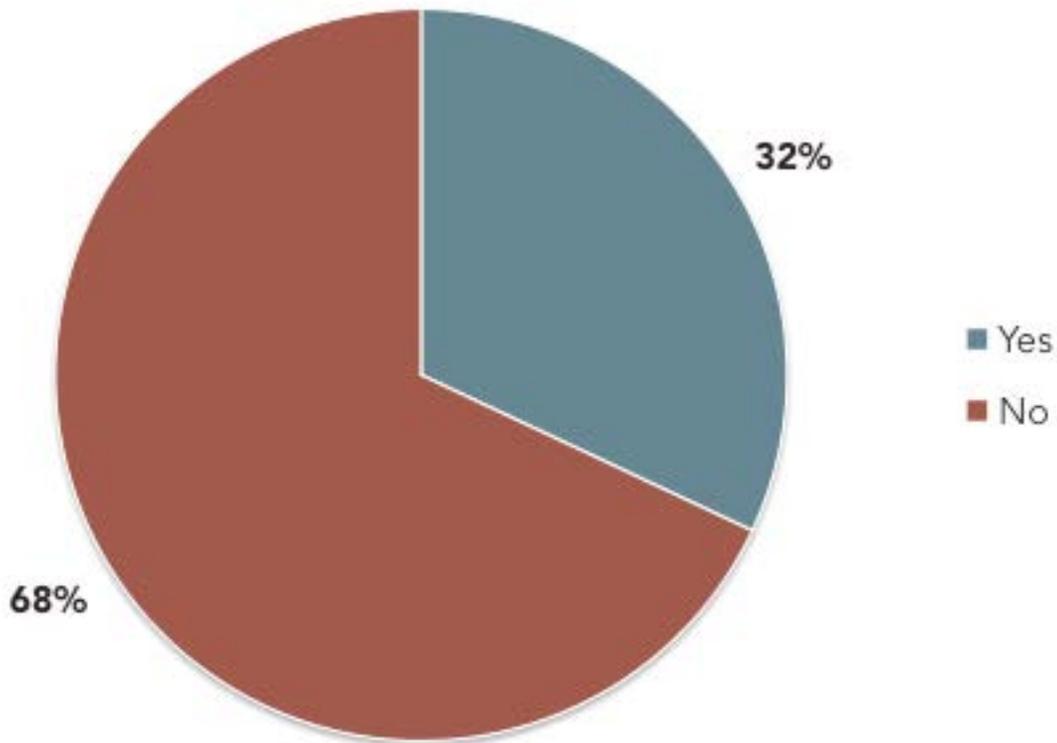
BULK DATA PUBLICATION

Bulk access enables the public to download all of the information stored in a database at once. This demonstrates an extra step towards supporting maximal reuse and analysis of data (Sunlight Foundation, 2014). Only 32% of cities in the study offered the publication of and option to download open datasets in bulk.

TABLE 8: CITIES WITH BULK DATA PUBLICATION

	Yes	No
Number of cities	16	34

FIGURE 10: CITIES WITH BULK DATA PUBLICATION



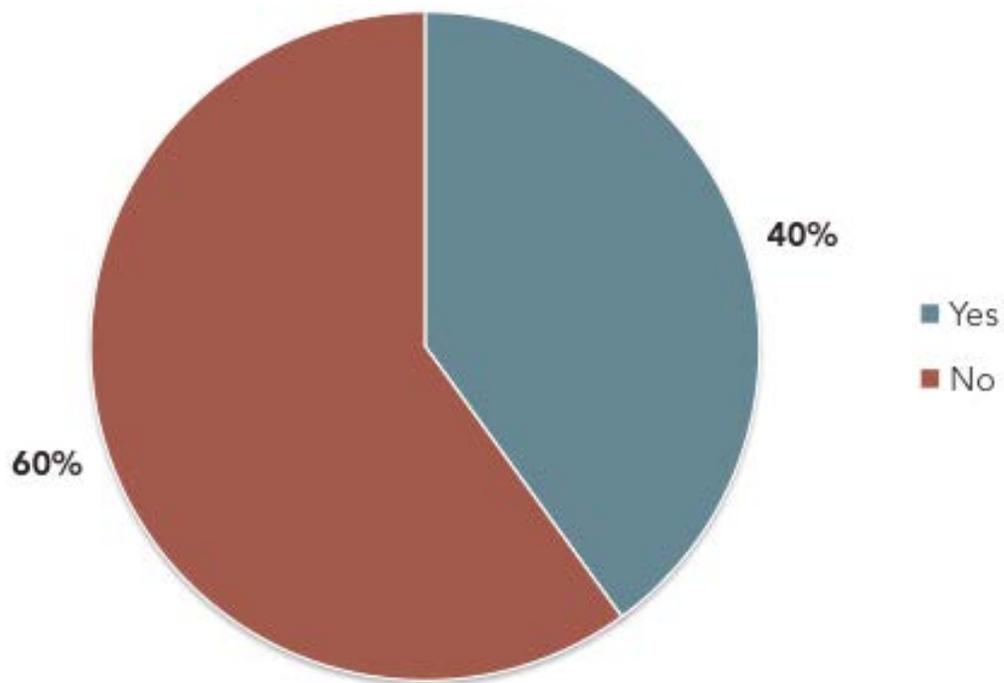
ONGOING PUBLICATION

E-government and open data are alluring in a large part because they offer access to “real time” information about a city. While providing a single release of data is still a step towards transparency, this information becomes outdated and incomplete almost instantly after publication because of the dynamic nature of local governments. This rate of publication can be made simpler with the use of electronic applications and filing (such as for building permits), a central data server, and APIs (Sunlight Foundation, 2014). However, most cities still depend on staff to upload data to open data portals. This can be costly, cumbersome, and get lost in the shuffle of day-to-day tasks without a commitment to ongoing data collection and publishing. 40% of the cities in this study demonstrated a commitment to ongoing publication.

TABLE 9: CITIES WITH ONGOING PUBLICATION

	Yes	No
Number of cities	20	30

FIGURE 11: CITIES WITH ONGOING PUBLICATION



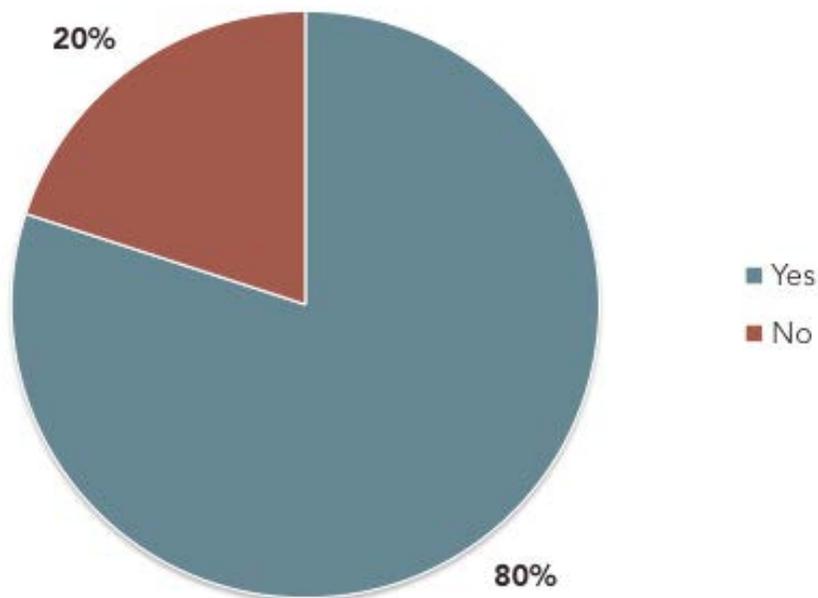
DESIGNATED AUTHORITY

Authorizing a single department or individual to manage and resolve conflicts surrounding the open data program helps ensure consistency and compliance. The open data authority can also serve as champion for sustained implementation and applications of the open data process by building relationships with other departments and residents (Sunlight Foundation, 2014). 80% of the cities in the study had designated an individual, often in a Chief Information Officer position, or department to serve as the open data program’s designated authority.

TABLE 10: CITIES WITH A DESIGNATED AUTHORITY

	Yes	No
Number of cities	40	10

FIGURE 12: CITIES WITH A DESIGNATED AUTHORITY



CONCLUSIONS & LOOKING FORWARD

Of the eight criteria used to conduct a high-level quantitative analysis of local government open data programs, six saw achievement from at least half of the cities surveyed. Considering nearly all of the programs examined were established in the last five years, this demonstrates accomplishment not just in program establishment, but also in creating open data programs that meet necessary standards for successful dissemination. The cities studied have established partnerships with local programmers, business owners, and leaders to create high value civic tools, and will serve as leaders to other cities moving towards transparency.

In a world of such rapid digital expansion, new ideas for applications of technology must be taken with a grain of salt. Many applications are touted as silver bullets, only to never gain momentum, or lose footing shortly after take off. This is the reality of the private sector, and in the public sector often an election cycle only adds to the barriers that may halt burgeoning technologies. However, there is something more resilient seeming in the promise of open data. While some technologies stemming from large releases of government data may come and go, structures of government that are increasingly transparent and involving of their citizens seem here to stay. Structuring open data programs as processes rather than products also positions local governments to adjust open data to specifically meet the needs of their communities. While national and state governments have more financial and technical capacity to develop large programs, local governments are uniquely positioned to create long lasting partnerships and citizen buy-in through agility and understanding.

Local governments have acted as an essential front line of the fight against climate change. The mobility to act while global governing bodies sift through tremendous legislative and political barriers has been crucial in building momentum towards change. This capacity to get broad buy-in and pass meaningful policies can also be applied to further the implementation of open data. Conversely, the resilience of the structure of open data processes in creating sustaining, conversational relationships between people and governments will be essential in finding solutions to climate change. Local governments will be important players, especially in increasing resiliency to climate impacts such as sea level rise, drought, and high heat. Since 2011, the Open Data for Resilience Initiative has been supporting effective disaster risk

management, primarily in developing nations (GFDRR, 2015). A crowd-sourced understanding about community vulnerabilities paired with government data and mapping helps direct long-term policy as well as immediate aid. Using open data platforms to start building community resilience before a climate-related disaster occurs has the potential to minimize harm and speed up recovery time. This application should be continually explored and tested as part of a comprehensive climate change policy.

Monitoring the success of these programs over time will be crucial for reevaluating the open data process to best serve the relationship between local governments and communities. The standards that are used to evaluate effective local data programs today focus on making information available for maximal reuse, rather than tailoring government data releases for specific projects. As technology changes, the open data process may identify different standards to define successful programs, but they will still create data that is maximally reusable and accessible.

Many of the issues facing cities and communities in the future can be predicted, but not known. Open data cannot bridge this. However, building an understanding of existing problems, from flooding to crime, and ensuring that government officials and community members are working from the same information. As our interconnectedness as a society continues to grow, establishing an effective, consistent mode of communication between local governments and communities will be essential for solving problems from the past and addressing new challenges in the future.

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