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Reflecting on the Success of Open Data:
How Municipal Government Evaluates their Open Data Programs

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ABSTRACT

Despite the high level of interest in open data, little research has evaluated how municipal government evaluates the success of their open data programs. This research presents results from interviews with eight Canadian municipal governments that point to two approaches to evaluation: internal and external. Internal evaluation looks for use within the data generating government, and for support from management and council. External evaluation tracks use by external entities, including citizens, private sector, or other government agencies. Three findings of this work provide guidance for the development of open data evaluation metrics. First, approaches to tracking can be both passive, via web metrics, and active, via outreach activities to users. Second, value of open data must be broadly defined, and extend beyond economic valuations. Lastly, internal support from management or council and the contributions of many organization employees towards the production of open data are important forms of self-evaluation of open data programs.

KEYWORDS

Civic Technology, Evaluation, Government, Metrics, Open Data, Open Government, Organizational Adoption

1. INTRODUCTION

As part of open government and transparency movements, there has been a dramatic shift towards opening and distributing raw datasets for public and private sector use (Bartenberger & Grubmüller, 2014; Gurstein, 2011). Traditionally, this data would be analyzed and released in report form, with little to no access to the underlying raw data. As a counter to this traditional model, significant amounts of data collected by government, covering topics such as infrastructure, programs and services, demographic and descriptive profiles of the population, are now provided through open data portals for use by citizens, other levels of government, and the private sector. Often, this open data is used to enable civic technology applications, namely mobile phone applications used by citizens to access municipal government services or programs. For example, a common application such as a transit scheduling smartphone application requires a connection to government transit data that is of good quality, regularly maintained and updated, and provided to developers in an appropriate and accessible format (Johnson & Robinson, 2014; Longo, 2011). This type of civic technology application, often developed by third-parties, represents a rapidly growing area of information technology entrepreneurship, and one that is fuelled by the transition from closed data to open government data (Desouza & Bhagwatwar, 2014).

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Open data programs are used to take data collected by government and deliver it to end users. These programs are often driven by motivations such as the search for efficiencies, increased transparency, and the creation of economic value (Bedini et al., 2014; Sieber & Johnson, 2015). These open data initiatives call for data, once limited to internal organizational use, to be opened up to the public at no cost, with few restrictions (Longo, 2011). Although the term open data is relatively new, the concepts of freedom of information and access to government data have been present for decades (Bonina, 2013). The Open Knowledge Foundation defines 'open' as the freedom to use, reuse and redistribute without restrictions beyond a requirement for attribution and share-alike (Open Knowledge Foundation, 2016). As well as emphasizing the importance of usability and access, "The work shall be available as a whole and at no more than a reasonable reproduction cost, preferably downloading via the Internet without charge. The work must also be available in a convenient and modifiable form" (Molloy, 2011, p. 1). Janssen et al. (2012) define open data as non-privacy-restricted and non-confidential data, produced with public money and made available without restrictions on usage or distribution.

Despite the widespread use of open data to underpin civic technology applications, a research gap exists in understanding how these open data initiatives are evaluated by government, and how their value and impact are defined (Sieber & Johnson, 2015). There are ample implementation challenges to the delivery of open data, including concerns of data privacy and security, data format(s), and especially understanding the type of data being provided (Yu & Robinson, 2012). Given the rush to provide open data, critical reflection is required to understand the challenges of providing open data, including how a provisioning government evaluates their open data program. Open data is an emerging field, with little coordinated effort to reflect on and measure the value derived by various user groups (Feick & Roche, 2013), despite research that suggests much potential value (Boulton, Rawlins, Vallance, & Walport, 2011; Janssen, Charalabidis, & Zuiderwijk, 2012). Open data has typically been evaluated from a demand perspective, that is, from the perspective of the end user, such as the private sector or citizens/citizen groups (Desouza & Bhagwatwar, 2014). These evaluations have focused on the economic potential of open data, including what types of businesses access and use open data, what is the contribution to innovation, the local economy, and also the social or political benefits, for example contributions to government transparency and civic engagement (Gurstein, 2011; Johnson & Robinson, 2014).

Recent efforts to evaluate open data have rested on the capabilities of the technical infrastructure of open data provision, for example, with the methods of data provision, sharing, and metadata (Charalabidis, Loukis, & Alexopoulos, 2014; Zuiderwijk, Janssen, & Parnia, 2013), evaluation of open data policy and barriers to the release of data (Bertot, McDermott, & Smith, 2012; Conradie & Choenni, 2014; Zuiderwijk & Janssen, 2014) and also in bridging research from organizational constraints to technology adoption (Johnson & Sieber, 2011; Rogers, 2010; Vonk, Geertman, & Schot, 2005). From reviewing the existing open data literature, there is a developing understanding of the value that open data holds across stakeholders (Bonina, 2013; Charalabidis et al., 2014; Jetzek, Avital, & Bjørn-Andersen, 2013). In a foundational piece, Janssen et al (2012) give a broad view of the potential value of open data in specific Dutch government agencies. The authors establish three main categories of benefit for open data; political and social (transparency, public engagement, improved policy making), economic (innovation, process improvement, economic growth), and operational and technical (quality checks on data, data reuse, data merging). These broad categories of value provide a framework for further follow-up research, creating the opportunity to compare specific types of open data evaluation methods employed by different government agencies.

The main approach of this research is exploratory, aiming to reveal the self-evaluation mechanisms currently used by government open data programs. It takes a supply perspective – that is, how do governments, as data providers, evaluate the performance of their open data programs, with understanding how governments currently self-evaluate their open data programs seen as a key step towards assessing the value of those programs. Government self-evaluation can be framed from those

both inside and outside of the open data generating organization. For example, internal to government evaluation may be official mechanisms, such as annual reports, presentations to supervisors or council, or other feedback from internal users or contributors to the open data program. External evaluations include ways that government asks open data users for feedback, either passively through web metrics (downloads, access statistics on open data portals), or actively through direct contact and engagement with open data users.

A series of qualitative, semi-structured interviews with eight Canadian municipalities at different stages of open data provision maturity are used to understand both existing approaches to how governments currently track open data use, and also to identify the criteria for open data provision success. Using a case study approach that compares several municipalities at different points of open data provision and adoption, the research described here represents a preliminary step in a multi-stage research project that aims to increase our understanding of the use and value of open data, in terms of its economic value, but also the value of transparency, services to citizens, and democratic engagement. These findings show ways of modifying or enhancing existing evaluation activities with the goal of developing improved ways for government to assess the use and value of their open data programs.

2. EVALUATING OPEN DATA: COMPARING EIGHT CANADIAN MUNICIPAL OPEN DATA PROVIDERS

This research involved eight Canadian municipalities at various levels of maturity for delivering open data, for example, some of the first large cities to deliver open data in Canada, mid-sized cities that are newer providers of open data, and a rural municipality that has only just recently begun to deliver data. The open data programs included were, in some cases, one-off initiatives and in others part of a broad coordinated open government strategy. Similarly, the goals of each open data program varied, though were each underpinned by a desire to improve transparency, accountability, and to provide data for a variety of end user communities. In each case, the municipality interviewed provided an online open data catalogue that included a variety of datasets, including spatial data, such as roads, property parcels, and other infrastructure data, services such transit or recreational program schedules, and transparency data, such as councillor or program expenditures. These datasets are provided according to a permissive license that encourages re-use and sharing, meeting the generalized definition of open data, as provided by the Open Knowledge Foundation (2016). This sample included representatives from the large (approximate population of greater than 1 million in metro area) Canadian cities of Toronto, Edmonton, and Vancouver, mid-sized cities (100,000 - 500,000 residents) of Victoria, Surrey, and Waterloo, the regional municipality of Waterloo, and the rural municipality of North Frontenac, Ontario (less than 10,000 residents).

Municipalities recruited to participate in this research were drawn from a pool that included several municipalities involved with a multi-year research study on open data in Canada (www.geothink.ca). Semi-structured interviews with key contacts at each municipality were conducted by telephone, between the months of October to December, 2014. For each of the eight responding governments, interviewees were recruited who had deep knowledge of their open data program and its history and development. The exact named role of the contact individual(s) changed depending on the particular government, but could include representatives from the geographic information systems (GIS) department, communications department, shared city services, or a specific open data program. These representatives of government open data programs were asked to identify, from their perspective, who their users are, what their open data is used for, and to detail procedures or strategies that they employ to evaluate their programs, including tracking or measuring the use of their data, both internally and externally. Questions focused on understanding how open data use was evaluated at each municipality, including how third-party open data applications and end users were identified. Interviews were audio recorded, transcribed, and coded for major themes and commonalities between municipalities. From these key informant interviews, three key areas are presented; who uses municipal

open data (both internal to government and external users), what outcomes from open data programs constitute success, and what are existing approaches to evaluating open data. Each of these areas of results are presented in further detail.

2.1. Who Uses Municipal Data?

A fundamental component of evaluating any program or service is to track how it is being used and by whom. Receiving feedback from those accessing a service is typically the first step towards evaluating existing services, and precursor to enacting changes or improvements. In an open data context, without feedback from external users, such as citizens, the private sector, or other open data users and stakeholders, it can be difficult for government to focus efforts to evaluate and improve open data programs. When considering how open data was used internal to the organization, respondents identified the government itself as a major user community. In this way, employees in different departments or divisions within the municipality would access open data directly from the public facing portal, as this was in many cases the most up to date repository of data. One city found that "some divisions within the city haven't been able to get the data they wanted from other divisions. So the open data crew comes along helps to get that data into the open data site. This lets the division go into the open data site to get the data that they couldn't get from a direct conversation." Examples of this type of internal data use included employees in a public health division accessing data on ward boundaries that would then be combined with public health data for analysis, or an engineering department accessing land development data directly from the open data portal. With these examples, the public-facing open data portal becomes a sharing point for government data that has relevance internally, replacing ad-hoc systems of sharing and data exchange that may have been built on specific relationships between users and data custodians.

Additional examples of internal uses of data come from project-based groups within government that have a mandate to provide external reports or services to citizens. One respondent indicated that a team within the municipality drew heavily from the open data portal for visualizing data, with the open data team playing an important role in value-added analysis and visualization of data, finding that "those publishing the data are also the one driving the visualization. It is more common that the dataset owners work with the operational team to produce visualizations". This is an example of how governments use open data internally to create output for public consumption, a derivative product of open data combined with other data, and targeted towards a specific audience. Municipalities use open data internally as a support for their community outreach tasks, for example to provide mapping interfaces and visualizations for citizens who do not have technical background to view information on relevant municipal issues. This use was highlighted by one rural municipality, commenting that "Absolutely, all the time… there are a lot of the web maps you'll see based on issues that are going on". This respondent created web maps showing cell phone service towers in the area as a response to citizen complaints about poor reception in the largely rural township. Data for the location of towers came from the federal government, but was used to support municipal decision-making and lobbying efforts to telecommunications companies. In this way, government employees are using open data internally, but the results of this use are then made public, effectively creating an external use of open data, via reports and mapping applications.

In identifying the external users of their open data portals, government respondents indicated that they have only a high-level sense of who these individuals or groups of users are. Main categories of external users identified are; engineering consultants, property developers, post-secondary and graduate students, other government agencies, and academics. To a lesser extent, the local software development and not-for-profit communities were identified as users of open data. This generally low level of awareness of the user community was generated by a lack of detailed user tracking metrics embedded in government open data portals. Aside from basic analytics such as downloads, page views, rankings of popular datasets, and Internet Protocol logging to determine coarse geographic location, none of the cities interviewed had registration or reporting requirements that would be able

to identify or track users who access data. A frequently heard message from respondents was that "We don't actually track individual users, we don't record tem or track in any specific way. In some ways it's not required, but we don't really care who uses it – it's open". This lack of user registration or tracking means that municipalities have little first-hand information about how their open data user community interacts with the government data portal. All respondents noted that they had no type of mandatory registration of users, commenting that this goes against the spirit of open data, namely the freedom to access data.

2.2. What Outcomes Constitute Success?

When asked about what outcomes constitute success, respondents highlighted three main areas; quantitative metrics of data download or use, the continued publication of data and support from colleagues in this mission, and the need to frame success as improved service to citizens, rather than as a simple generation of cost savings or economic benefits. Firstly, respondents were clear that the continued publication of new data was a major indicator of success. One city responded that "If we get a new dataset up, we're really happy. The zoning data that went out about four months ago was a huge victory for us, because we've been asking over and over again for it". This simple data provision outcome does not necessarily show how much a particular data set was accessed or used, making the use of a quantitative measure, such as open data web portal downloads, a companion metric to the provision of data. For many municipalities, the use of web metrics was a basic method of tracking use. "We are we can measure things like downloads, time spent on pages, where visitors are coming from", though this was also seen as limited, "…the way that our portal is implemented, it doesn't have great tools for user logging, but we do monitor the downloads stats, keeping track of what's popular". Despite the limitations of web metrics, this outcome was seen as a concrete deliverable that could be used to support the addition of new datasets to the open data program, an often challenging undertaking. Given that a significant part of making data open requires networking with data custodians throughout the organization, the evidence of use provided by a quantitative measure of access, despite its relative crudeness and limited insights, was seen as valuable.

Second, the process of identifying and working to make data open was framed as an opportunity for a type of internal validation for open data teams. Positive feedback and support from colleagues to identify and prepare specific datasets for inclusion on the open data portal provided evidence of organizational support for open data. Two municipalities specifically emphasized the importance of getting cooperation or support from the internal publishers of the datasets. This challenge is elaborated upon by one of the municipalities, "As the person who is moving our open data initiative forward, I'm not actually the publisher of any datasets, I don't own any of them. So I have to first of all get a sense of where they are and then have the buy-in and support of the people who are actually the data publishers so that they understand the value of it, they are providing it and supporting it and that we're updating it". This type of internal validation through support from colleagues and overall organizational support for the mandate of producing and expanding an open data portal shows how the successful 'making' of open data goes beyond a specific job description. Rather, it can become the key responsibility of a few select open data champions with support from all data custodians across the organization.

Lastly, the respondent sample considered that economic and cost savings were not seen as a major outcome or success of open data provision. Frequently considered as an important impact or benefit of open data (Janssen et al., 2012), cost savings via the reduction of data collection tasks across departments, allowing citizens to directly access data, saving staff time answering requests, and through increases in staff efficiency in accessing data, were not seen by the study sample as major outcomes from open data. From the eight interviewees, there was little awareness of direct cost savings in their organization that had been generated through open data provision. Rather, a greater focus was made on the efficiency benefits, such as those derived from centralized data sharing and the identification of similar data sets collected by different departments that could then be combined.

Within this discussion of cost saving, a frequently occurring preference was to shift from a focus on the potential economic benefits of open data and instead frame open data as more of a means of providing better information and a valuable service to citizens. In many instances, open data was positioned as one part of a broader open government strategy, based around a "…recognition that when we talk things transparency and accountability, that open data would only be one component of that. It's bigger than just data, it's how you interact with your city from the service desk counter to the telephone to the website and everything else, and that really is open government." This reframing of open data away from a focus on economic benefits shows a concerted effort on the part of open data advocates to perhaps broaden the definition of open data success within their organization, with the full realization that there are significant challenges to tracking and evaluating the exact economic benefit of open data use.

2.3. Current Approaches to Open Data Evaluation by Government

As a way to better understand the existing approaches to open data evaluation, respondents were asked about current evaluation mechanisms in their organization, particularly those that may be conducted by open data program managers or other senior staff. At the time of interviews, none of the respondents indicated that there was an existing review or evaluation process that focused specifically on the open data portal or program, but rather that open data was evaluated through ad-hoc reporting as one part of broader departmental initiatives. The role of elected council in open data programs was seen to be very important. In many cases, council, or one 'activist' member of council, was the driving force behind the development of an open data program. This type of support from elected councillors was seen as a type of ad-hoc internal evaluation where open data programs received support and direction, though this support from council was rarely unanimous, and could at times be very critical. For example, one respondent from a large city indicated that on council and in senior administration, attitudes towards open data, though general positive, were somewhat limited. "We did present the open data program to the management committee this summer and it was very well received. The management committee is critical so we might be able to say that based on their reaction, there's an indication of support. But if you start to investigate and look for council opinion on it, it's quite limited. And even in the current election if you were looking at the people running for mayor, it's not coming up in the conversation". This city found it difficult to advance in their open data strategy with the tight constraints placed on information release and the constant need to persuade council or present them with a "sales pitch". In this way, in the absence of a formal evaluation process or even specific management responsibility for open data, direct support from council and senior management was seen as an important conduit for feedback and support.

In general, there were challenges faced by governments in understanding what their open data was used for. For all respondents, their knowledge of the use of open data are gathered in an ad-hoc manner, for example, when an open data user specifically reaches out and either advertises that their product is built with municipal open data, or by municipal staff simply searching through conventional online search channels for media mentions of municipally-related news that reveals the use of open data. Despite no formal registration or reporting requirements, governments have supplemented this ad-hoc searching for open data applications with two other channels; the first is emailed questions from users about existing open data or requests for open data, and the second is through application development competitions or hackathons that provide a forum where city staff meet open data users face-to-face for the purposes of working with or developing products using open data.

Interaction between government staff and users via email and social media was reported to be a key way that government could understand and connect with open data users, forming a continuous evaluation of an open data platform. "…if evidence continues of public interaction with the site, if people continue to download datasets, they continue to make requests or have questions about it, as long as there's evidence of public interaction I think that's the measure of success." Additional direct commentary and evaluation of government open data from external users comes in the form

of error reports on specific datasets. Many municipalities highlighted receiving reports of errors which improved their information accuracy, particularly when an open data site was first launched; "When we first launched our external web mapping application, I got lots of feedback about data errors. 'This facility is in the wrong place, this park is mislabeled, this road is wrong' that kind of thing. By making so much data available in a map, I got tons of feedback at that time." Respondents also noted that face-to-face interactions with open data users provided a conduit for feedback on both specific datasets and also on the open data program or platform in general. These face-to-face meetings were not frequent, typically coinciding with hackthon-style events. When asked about how their municipality interacts with users face-to-face, and how they gather feedback on open data, one respondent indicated, "We see them (open data users) at some public outreach events and that's how we find out. Or other people find out from conferences and they let us know as well, so it's usually word of mouth." This supports the idea of hackathons as not primarily feedback-gathering venues, but rather as open data-related events, with opportunities for additional ad-hoc feedback. Through these channels, government respondents learned about their open data users and community more broadly, as well as receiving specific feedback on datasets and on open data issues more broadly. This mix of passive (email) and active (hackathon, face-to-face) outreach to the open data community shows how governments connect with users and receive external evaluation in ways that are less structured than a registration or reporting requirement.

3. EVALUATING OPEN DATA PROGRAMS: COMMON FINDINGS FOR GOVERNMENT

Through interviewing representatives of eight different Canadian municipalities, this study has found that many are unaware of the users and uses of the data provided via their open data catalogues. This lack of awareness is attributed to the open and accessible nature of the data provision method itself, which precludes registration or other restrictions on data access. Accordingly, the current understanding of open data use is generated through passive external feedback to government, such as news stories, and email or telephone calls from data users, or periodic active contact between municipal staff and users, via events such as hackathons or developer contests. Despite challenges in tracking open data use, municipal staff exhibited a desire to know more about how open data was being used and by whom, and to gather more specific feedback to improve open data delivery, as a step towards evaluation of their open data program. This movement towards an evaluation of open data demonstrates relative maturing of open data provision in Canada, where the technical, organizational, and legal constraints in providing open data, while still very real in many cases, are potentially becoming of a secondary nature to usage and evaluation concerns. The findings of this research as described above show ways that governments can modify or enhance existing evaluation activities with the goal of development of an understanding whom accesses open data and what value is generated. These findings are derived from the interviews with survey respondents, and are framed as actions that many of the respondents are either planning or have employed. These focus on improved strategies for the tracking of data use, framing open data value in broad way that extends beyond economic value, and encouraging a development and refinement of internal evaluation mechanisms.

3.1. Finding #1: Improved Tracking of Open Data Use

A consistent concern of respondents was the ability to track who was accessing municipal open data, with the goal of better recording and quantifying the user community of open data. Tracking users has many challenges, and also was seen to be against the general principles of an open data program. Additional concerns included creating a distinction between access and use. For example, a particular dataset could be accessed many times, yet not be actually used in a meaningful way. Other datasets could be rarely downloaded or accessed, yet could find themselves as the centerpiece of a business model based around open data, as this dataset is subsequently shared or consumed widely, often in a

converted or altered form. These are the types of cases that passive tracking of open data use, using such approaches as downloads of datasets from an open data portal, do not measure.

Based on the experience of respondents, these passive forms of tracking use should be coupled with active outreach involving staff. This emerged based on the success of several hackathon, civic technology, or developer community-focused events hosted by various respondents. At these events, it was possible for municipal staff to gather information from open data users that is both more detailed and relevant than what can be gathered from web metrics of open data use, such as downloads. Active outreach to connect with open data users can provide an avenue for municipal staff to uncover how data is being used, what constraints may be present to data access, and also open up a conversation around potentially new datasets to be made available or other issues related to data access and use. This responds to the call from Janssen et al. (2012) to challenge pervasive myths of open data, including that the publication of data will automatically generate benefits. Rather, it is the continued work from government agencies and private/public sector infomediaries (Janssen & Zuiderwijk, 2014) that support users in deriving value from open data (Yang, Lo, Wang, & Shiang, 2013). For example, recent work evaluating hackathons and sponsored contests, points to the potential of these events, not necessarily to procure or create specific applications or products, but as community engagement opportunities (Johnson & Robinson, 2014; Longo, 2011). To support this type of active outreach, it is imperative that municipal government committed to open data support staff financially and allocate resources to host such events, ensuring that attendance is there. In many ways, these types of events mirror traditional civic participation events, in that they represent an opportunity for city hall to be opened up, though in this instance to a specific user community.

3.2. Finding #2: Use a Broad Definition of Value

When discussing the success or outcomes of open data, the first type of value often presented is economic value. There is a natural focus on economic benefits and cost savings associated with open data provision, particularly as governments aim to prove the 'worth' of their investments of time and effort in the provision of open data. Janssen et al. (2012) found that participants identified that economic growth is one of the overarching arguments for government provision of open data. Typically, the economic justification for open data hinges on the belief that releasing data to the public will stimulate innovation, support the creation of new businesses, and add value to the economy (Davies & Fumega, 2014; Deloitte Analytics, 2012). The economic potential of open data is also often framed through cost savings to government, as the presence of an open data portal may mean that municipal workers have to manage a smaller number of requests for information. This could result in a time-savings for employees, save on administrative costs and opportunity costs associated with providing case-by-case access to selected datasets (Charalabidis et al., 2014; Jetzek et al., 2013).

The findings of this research supports these general areas of economic value as generated by the provision of open data, however it must be noted that these cases of economic value generation or savings were considered by the interview sample as difficult to validate. While undoubtedly there was savings in terms of staff time spent dealing with requests for data, given the wide range of tasks expected from staff, there were no notable redundancies created in terms of staff positions. In fact, an expansion of the complement of staff involved with developing and delivering open data was seen, with the development of new job positions and responsibilities that differ from traditional data-handling occupations within government. In this way, the provision of open data was seen by the respondents as more of an improved service offering compared to a direct cost savings, with goals of transparency and service to citizens and business being more critical measures of success compared to accounting for dollars saved. Additionally, the economic impact from applications or businesses that rely on access to government open data were seen as being difficult to comprehensively track and to measure. To better establish this economic value of open data, direct follow up with private sector organizations that use government open data within their business models would be required, to better understand the impact of open data as a contributor.

In summary, a finding from this research and from the sample interviewed is that while some sense and understanding of economic value from open data does exist, it is preferable that when evaluating the success of an open data program, that value be framed in a broader sense, one that matches more closely with government objectives of transparency and improved service to citizens, rather than exclusively through an economic value lens. In this way, the development and promotion of an open data program becomes more closely aligned with open government policies, forming a key, visible manifestation (Bartenberger & Grubmüller, 2014; Bertot et al., 2012). This places open data along a trajectory of fitting multiple organizational priorities, rather than simply a business development or economic development mandate (Sieber & Johnson, 2015).

3.3. Finding #3: Development of Internal Support and Review Mechanisms

From the perspective of the study sample, a key component to the success of open data programs was internal support, specifically from elected council, and also support from departments across the organization in contributing data to the open data program. Achieving support from council was often seen as the first step towards legitimizing the open data program across the organization, which would then lead to increased buy-in from staff. This buy-in from staff was critical, as it would make the identification of data to be made open much easier. The promotion of open data itself across the organization was seen as a critical step in the evaluation of open data in that it allowed the open data team or advocate to work more quickly and easily to set up. Organizational buy-in has been frequently identified in technology adoption literature as an important component to easing organizational adoption (Geertman, 2006; Iemma, 2012). A key step to supporting organizational adoption was the creation of a full-time position of open data advocate to work with specific departments to move a dataset from closed to open, including creating or modifying an existing workflow to ease this process. This role of open data advocate mirrors recommendations from GIS and PSS adoption literature that advocates for the use of organizational chauffeurs to guide system implementation (Vonk et al., 2005; Vonk, Geertman, & Schot, 2007). This role of an open data advocate or open data team also provides resources to increase the internal evaluation of open data programs and policies, including the development of review mechanisms. In this way, governments looking to evaluate the success of their open data programs should look first internally to develop mechanisms to record and track both the process of delivering open data from the unit creating data to open data portal, and to track the use internally across departments. Quantifying the internal value of open data can be used to galvanize government towards improving the delivery of open data, and also open up formalized avenues for the incorporation of external user feedback. Simply put, without a functioning internal review mechanism, external reviews may not become actionable items, nor have support from relevant parties in government.

4. CONCLUSION: GATHERING FEEDBACK TO SUPPORT THE IDENTIFICATION OF OPEN DATA VALUE

A better understanding of existing and potential open data evaluation mechanisms, from the perspective of government, is a first step towards establishing the value of open data for diverse stakeholders. Understanding how government obtains the feedback required for self-assessment can be used as a framework for the development of a supply-side assessment of open data. Additionally, through the development of supply-side assessment metrics, the demand-side perspectives of open data users can be strategically incorporated to form a direct conduit for user feedback into an open data provisioning system.

The development of evaluation metrics for government open data is a challenging undertaking. The desire for quantitative metrics fits with a general societal push for government to quantify and enumerate performance, proving the benefit and results generated through public expenditures. This objective may not be entirely desirable or have alternate impacts, such as the prioritization of release of

commercially-relevant data at the expense of societally-relevant or transparency data. Given the nature of open data and the mandate that data be provided with minimal restrictions, additional challenges to this quantification of open data are created. Preliminary approaches to accounting for open data use have largely been limited to the external enumeration of datasets provided by a government department and their relation to specific industrial sectors (healthcare, energy, transportation, etc.). A significant example of this enumeration approach is evidenced by the Open Data 500 program (The GovLab, 2016). Though this approach begins to show the intricate connections between data users and providers, it does not show how that data was actually used, the degree of use, and the end benefit that this data access may have supported. To move towards this type of understanding of open data, a more nuanced and detailed mechanism such as qualitative interviews or case studies are required. More specifically, the Open Data 500 approach, as something led from outside of government, does not directly assist government in identifying users and communicating with them about the specifics of open data provision, constraints to use, and how to overcome these types of barriers.

It is important to reflect on the comments from Janssen et al (2012), that value from open data comes not from its provision, but from its use and connection between provisioning government and end user. This requirement for open data use as a prerequisite to generate value is regularly emphasized in open data literature (Bonina, 2013; Jetzek et al., 2013; Yu & Robinson, 2012), however actual studies that track this value in a detailed way are few (Charalabidis et al., 2014; Cranefield, Robertson, & Oliver, 2014; Yang et al., 2013). Expanding these types of studies are critical to moving beyond the hype of open data provision and towards a deeper understanding open data provision and use, including organizational and social issues, as well as continued challenges to selecting data for release, privacy, data quality, and licensing choices.

The main contributions of this research are that the value of open data is not limited to access (though this is certainly seen as one basic definition of success), but rather that the value or success of open data is a combination of access, integration/analysis, application, and feedback from users to government. In evaluating open data programs, municipal governments encounter many challenges to tracking use and translating this use into specific metrics of value. A critical component to this evaluation is the direct engagement of government with open data users, either through passive methods, such as web metrics and email, or through more active methods, such as hackathons and direct outreach. Coupled with this direct engagement is the development of internal evaluation mechanisms and chains of responsibility that will allow external feedback to be turned into actionable items. In this way, external evaluations can be turned into internal actions that improve both the process of open data delivery by government, and also better tune open data program offerings to the specific needs of a community of users. This type of evaluation, carried out by government, is a critical part of the ongoing maturation of open data delivery.

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