Chapter 5
Situating the Adoption of VGI by Government

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Abstract Governments have long been active online, providing services and information to citizens. With the development of Web 2.0 technology, many governments are considering how they can better engage with and accept citizen input online, particularly through the gathering and use of volunteered geographic information (VGI). Though there are several benefits to governments accepting VGI, the process of adopting VGI as a support to decision-making is not without challenge. We identify three areas of challenge to the adoption of VGI by government; these are the costs of VGI, the challenges for governments to accept non-expert data of questionable accuracy and formality, and the jurisdictional issues in VGI. We then identify three ways that governments can situate themselves to accept VGI—by formalizing the VGI collection process, through encouraging collaboration between levels of government, and by investigating the participatory potential of VGI.

5.1 Introduction

Western-style democratic governments at all levels are often interested in connecting with citizens through the use of Internet-based communications technologies, such as Web 2.0. Creating this new online relationship between governments and citizens can support greater transparency, efficiency, and effectiveness of government services (Brewer 2006; Dovey and Eggers 2008; Saebo et al. 2008). This also can increase the level of citizen participation in decision-making. Numerous technologies have emerged

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to support these types of e-governance initiatives; these platforms can be used to address place-based aspects where governments impact everyday life (Drummond and French 2008). Applications range from easing the daily commute through accessing crowdsourced traffic reports to facilitating discussion on land use development scenarios and to identifying service provision locations. The Geospatial Web 2.0 (or Geoweb) is a set of geospatially enabled online tools and data that can be used to support these types of initiatives (Ganapati 2010; Rouse et al. 2007). The Geoweb serves as a conduit for volunteered geographic information (VGI) sourced from or contributed by citizens as part of a one-way 'government-to-citizen' (G2C) or two-way 'citizen-to-government-to-citizen' (C2G2C) process. By requesting citizen contributions of VGI, a government can potentially create a two-way conversation with citizens that demonstrates their responsiveness to specific concerns.

Two reasons drive the collection and use of VGI by governments and government agencies. First is the potential for citizens, whether they reside inside or outside a given jurisdiction, to act as sensors of their environment (Goodchild 2007). The general trend in downsizing governments at the provincial/state level, driven by neoliberalization, has reduced the resources available to support municipal level decision-making (Dovey and Eggers 2008; Johnson and Sieber 2011a). In North America and Europe, municipalities are being asked to take on increased planning and land management responsibilities but without a corresponding increase in resources or staff support. This creates an opportunity, for better or worse, for the use VGI as a type of 'contracting out' of data collection tasks (Newman et al. 2010), creating a government spatial data infrastructure that is dependent on volunteer effort. This approach to VGI use by governments treats citizens as a distributed set of sensors (Goodchild 2007) to be networked together to supply decision-makers with rich sources of data. Citizens, specifically local residents, are supposedly closer to the phenomena, can identify changes, and report those changes more quickly than government employees reliant on infrequently collected data. Citizens as reference is ambiguous hold a valuable local knowledge of place, and considering that pride of place is a prime motivator of citizens who contribute geospatial information, they are more likely to volunteer that information in digital form (Budhathoki et al. 2010; Elwood 2008). Tulloch (2008) provides a case study of the citizen-based verification of official government-collected data on vernal pools. This task was conducted by a group of citizen scientists, contributing information via a custom-made Geoweb site. This example shows how citizen volunteer efforts can be incorporated into a government process as a way of both saving the government money and utilizing the knowledge of citizens to support decision-making and management.

Second, VGI can be valuable to governments as a form of citizen participation. As opposed to the citizens-as-sensors view, this treats the process of VGI usage as an opportunity for citizens-as-partners to co-produce social, economic, and environmental goals, with the mission of strengthening civil society. For governments, an increased focus on the process of VGI collection and two-way communication, rather than the unidirectional sensor relationship, can support essential participatory components of democratic governance, particularly in reinforcing the transparency and responsiveness of a government to its electorate (Dovey and Eggers 2008;

Ganapati 2011). Similar to how town hall assemblies or letter writing to representatives is a method of sharing citizen perspective with elected officials, VGI holds promise to act as a digital and geospatially referenced conduit to connect elector with both elected official and specific government departments. This strengthening of C2G2C linkages includes the potential for constituents to form a power base for government employee initiatives or support for official policies.

Despite the identification of reasons why governments would adopt VGI and the Geoweb (Ganapati 2011; Johnson and Sieber 2011a), these motivations alone do not determine whether a government will proactively solicit information or integrate content into policy. Shifting government motivations to participate in concrete actions relies on explicating the organizational and cultural challenges, technological issues, and issues involving the scaled and interconnected nature of governance. As governments adopt different formal and informal processes and tools for gathering, evaluating, and incorporating this type of data into decision-making, critical reflection on the relationship between VGI as a form of citizen participation and the needs and constraints of government is required.

Past research emphasizes the opportunity for VGI and the Geoweb to realize the promise of public participation geographic information systems (PPGIS) (Miller 2007; Sieber 2006), providing a conduit for citizens to share their local knowledge with decision-makers, effecting change, establishing two-way communication, or even circumventing traditional pathways of public participation. To overcome these challenges, VGI researchers can draw on critical GIS studies (Crampton 2009; Schuurman 2000; Sieber 2004, 2006). For example, we are warned of the continued slippage of privacy in a Web 2.0 world (Elwood and Leszczynski 2011; Zook and Graham 2007), and how citizen participation in online deliberation may not match the high levels of participation that are often seen in other online activities, such as social networking and gaming (Chadwick 2009). Echoing critiques of GIS (e.g. Pickles 1995), government adoption of VGI could represent a strategy by government of co-optation or distraction from other more effective forms of citizen engagement. These concerns highlight the need for a better understanding of how VGI and government can integrate and what factors, both of VGI and governments as organizations, affect this adoption. This research differs from the majority of the research around government adoption of VGI, which emphasizes data handling (e.g. evaluating accuracy, understanding citizen motivations to contribute as a mechanism to perpetuate information flows) largely to the exclusion of the democratic process by which governments must act—hence, our use in the chapter title of the word, 'situating', which expresses a social and critical practice.

This chapter draws on our experience developing and implementing VGI applications for government partners in the Canadian province of Quebec. The context of our reflections makes these recommendations particularly relevant to other similar western-style democracies, particularly the United Kingdom, Australia and New Zealand, Western Europe, and the United States. Though there are likely to be differences in VGI adoption in government between municipal and state/provincial governments within one country, or between countries with different political traditions, there are comparative lessons to be drawn from this work that can guide

VGI adoption across multiple contexts. We have been co-developing Geoweb and VGI collection platforms in the rural area of Acton, a municipal regional area, similar to a county but with greater jurisdictional authority (Municipal Regional County of Acton or MRC Acton), approximately 1 h east of Montreal, Quebec. The development is being coordinated by five provincial agencies; the hope is that this will form the basis for further Geoweb developments throughout the province. The specific goals of this project are to engage citizens within community economic development and environmental management using Geoweb applications and to co-develop a sustainable software platform for sharing with other jurisdictions. We implemented projects to create user-generated maps of local economic assets to support regional marketing efforts and to gather citizen reports of riverbank erosion as a component of municipal remediation efforts. Through these two projects in particular, we have been engaged with governments attempting to adopt VGI collection and their associated reactions to the challenges that this adoption creates. These adoption challenges and organizational constraints are the focus of this chapter.

The government agencies with which we work have been initially enthusiastic about the potential of VGI, but this dampens closer to deployment, as they raise questions about the fitness of VGI within government. Across many different types of government, we have repeatedly seen a resistance to the acceptance and use of VGI. Based on these experiences, we have identified a series of broad constraints to the adoption of VGI by governments. These constraints include both the motivational factors that lead government to consider the use of VGI and how these play out on the landscape of organizational structure to impede adoption and use. This means examining government adoption through two models of citizenry: citizens as sensors and citizens as partners. We frame a discussion of ways that governments can situate themselves amongst the constraints so they can adopt VGI.

5.2 The Practice of VGI in Government

The concept of users contributing geographically related information online as participation in governance is not new. In an overview of the use of geographic information systems (GIS) to increase citizen engagement, Ganapati (2010) outlines four broad thematic areas where governments can use the Geoweb for e-government applications: citizen-oriented transit information, citizen relationship management, citizen-volunteered geographic information, and citizen participation in planning and decision-making. Each of these application areas builds on identified roles for information and communications technology (ICT) for e-governance and PPGIS research, providing services to citizens and increasing participation in governance, in many cases through the government acceptance of VGI. The first two of these areas are based on data provision from government to citizens as a form of improved service. Whether this in the form of real-time transit tracking, or by making government data more freely available, these types of initiatives show how governments can

improve services and become more transparent, though these types of information provision activities do not equate with public participation or involvement.

Many examples of e-government activities focus on the prosaic functioning of governance-service provision and strategic planning issues. The most prominent usage of VGI has been in acute responses to a natural or human-generated crisis. Many of these occurred exogenously to government, in a sense responding to the failures of governments to act swiftly to identify hotspots and distribute aid. The earliest example is the use of Google Maps to encourage volunteers to contribute information about Hurricane Katrina impacts in 2005 (Miller 2007). This information was used to support official government rescue efforts. Similar uses of VGI have been seen in responses to wildfires (De Longueville et al. 2010; Goodchild and Glennon 2010) and earthquakes (Zook et al. 2010). Given that each of these examples was developed externally to government organizations, yet has as an outcome the mobilization of decision-making and demand for government action, it raises questions about the ability and desire for governments to directly accept and act upon VGI. The utility of VGI for many decision-making tasks has been identified, but the process through which VGI can be adopted by government remains to be negotiated.

5.3 Adoption of VGI in Government

In addition to learning from existing e-government examples, governments will likely look to their experiences with GIS when they decide to adopt VGI. Although both are geospatial and rooted to place, adoption of the Geoweb, that is, the underlying platform upon which VGI is added, differs from GIS implementation in government. One significant area of difference is in the locus of development. GIS implementation steps, such as the customization of the software, acquisition of framework data sets, and the purchase of hardware, are conducted under a mandate of a government agency or department. Even if GIS forms a part of a multi-agency activity, governments—here, we refer largely to municipalities or regional agencies—have considerable control over purchases, staff, and data. By contrast, many Geoweb platforms operate outside of existing government mandates and processes. The hardware and software stack are now hosted in the Web-based 'cloud' and often reliant on a software-as-a-service (SaaS) model of distribution. VGI generation is external to the organization compared to the internal data of the organization typically fed into a GIS. This allows citizens to circumvent government, making the VGI adoption process different than that of other types of technologies within government, such as GIS (Budic 1994; Goelman 2005), planning support systems (PSS), and spatial decision support systems (SDSS) (Geertman 2006; Vonk et al. 2007). GIS, PSS, and SDSS adoption within an organization often starts with software being purchased or developed to accomplish a set series of tasks (Nedovic-Budic 1998).

Technology adoption research has focused on the bridging of a perceived gap between technology developer, tool, and user, where addressing identified constraints is within the sphere of influence of either developer or organization (Johnson and

Sieber 2011b; te Brömmelstroet and Bertolini 2008; te Brömmelstroet and Schrijnen 2010). VGI demonstrates the need to negotiate adoption in a more fluid fashion, one that is not simply focused on a developer meeting the needs of the user. In a governance context, these roles are shared by citizens, community organizations, non-governmental organizations (NGOs), universities, information technology (IT) companies, and multiple levels of government. For example, the citizen can fill roles as the developer of technology, VGI contributor, and the user of contributed data sets. Citizens can build their own mash-ups and develop their own mobile apps. Citizens produce (the subject of VGI), they consume (traditional GIS), and they create value-added, derived information as well. An IT company may develop tools but is also the user, accessing citizen VGI for marketing purposes. Governments now develop Geoweb applications to gather VGI for specific purposes, using third-party platforms such as Twitter and Google Maps, though they have little control, ownership, or input into these platforms. With these competing priorities, Geoweb applications have multiple objectives, which may be only peripherally related to those of government. From a developer perspective, the tools to collect VGI are not simply refined, retracted, or revised to better meet the needs of government; instead, they evolve in response to corporate and user-community preferences. Government adoption of VGI and its underlying Geoweb platform operates through a more interconnected and complicated set of pathways compared to traditional types of geospatial technology, where software is provided by one developer and data is shared internally or sourced from other government agencies (Harvey 2003; Onsrud and Pinto 1991).

We define broad characteristics of VGI that challenge the technology adoption processes in government, generate new organizational constraints, or reinforce existing constraints that can impede adoption. These are the costs of VGI, the challenges for governments to accept non-expert data of questionable accuracy and formality, and the jurisdictional issues in VGI.

5.3.1 The Costs of VGI

Any new technology will introduce additional resource costs for government. For VGI, these costs can be both financial, for software and services, and human resource costs, for training to negotiate the VGI learning curve and additional staff to support the VGI gathering process. Each of these areas of resource cost will differ depending on the type of government organization. In general, for government agencies with larger budgets or an existing GIS division, there is likely greater capacity to absorb the costs of gathering and using VGI. These agencies have existing spatial data that can be combined or refined with VGI. They likely have staff trained in system administration, computer server maintenance, and ability to build computer applications. Geoweb platform development requires a shift in domain knowledge that more resembles this type of system administration as opposed to spatial analysis. For local and regional governments, there still may be many good reasons to use VGI, yet the infrastructure required to support its gathering may not exist or be

otherwise inadequate. This is a similar dynamic as is found with many types of IT and GIS adoption in municipal planning organizations, where availability of financial and human resources represents a significant contributor to adoption (Al-Kodmany 2000; Carver et al. 2001).

The resource implications of the Geoweb framework used to collect VGI are generally ignored in academic literature, with the prevailing view being that these tools are easy to deploy and lightweight (Haklay et al. 2008; Hudson-Smith et al. 2009; Turner 2006). Though the financial cost of access to many platforms, such as Google Maps (http://code.google.com/apis/maps/index.html) and Open Layers (http://openlayers.org/) may be low or free, the skills cost to develop anything more than a basic solution can be prohibitive, requiring advanced computer programming skills. Add to this the cost of maintaining and eventual refreshing of a site, and there may be a substantial resource cost for governments. Even governments that are active on free social media sites, such as Twitter and Facebook, may find that they require additional training and resource expenditure to gather, respond to, and analyze contributed information. The human resources cost of VGI is also based on the modification of existing workflow and organizational process to accept this new form of input. Depending on the specific government process into which VGI is to be incorporated, this could require a chain of employees to adapt their workflow. For example, with a government service municipal request system, citizens submit a request for service to repair issues such as broken street lights or potholes. Without a robust integration into a municipal workflow including dispatchers, workers, and a response to citizens once work is completed, such a system may add considerably to workload.

In MRC Acton, the costs of VGI have been encountered in several ways. First, resource costs have largely focused on human resources, as staff negotiate the learning curve for understanding and using VGI. Despite the presence and frequent use of traditional desktop GIS in MRC Acton, we found that this did not adequately prepare staff for gathering or using VGI, underlining the distinct difference in adoption between these two technologies. As discussed earlier, the spatial analysis skills used in GIS are not directly transferrable to the systems administration and Web development skills used in gathering and using VGI. Considering this, for the introduction of VGI within government, it must be noted that skills and experience using GIS are not directly transferrable.

Second, though VGI is often promoted in terms of resource benefits and cost savings, in our partnership with MRC Acton, we discovered that there are opportunity costs as well. We have postulated that VGI could reduce the political distance between the state and citizens, but it could also simultaneously increase the political distance. We are working with a community-based organization to provide a Geoweb platform to support the identification and management of riverbank erosion. Farmers and land owners would report erosion as a first step to government action mitigating that erosion. However, the reporting of erosion itself was revealed to possibly identify farmer malfeasance in their land management practices, which may lead to increased costs for the farmer who reported the erosion. In this way, erosion monitoring becomes a delicate negotiation of protecting identification of

the farmer as well as revealing location-based information. There are numerous informal practices that occur face-to-face that would be impeded in this digital broadcast of problems.

5.3.2 *The Challenge for Governments of Accepting Non-expert Data*

As a data type contributed by a variety of individuals, VGI fundamentally differs from traditional forms of data collected by experts that is often used in government GIS (Budhathoki et al. 2008). Goodchild (2007) highlights this difference between data that is voluntarily asserted first-hand, by an individual without formal qualifications in that domain, and data that is authoritative, or collected within a formalized framework, often at a distance, by an expert in the subject, as part of their paid work. The latter is the realm of GIS, where it is unquestioned that data is generated by experts in their field; the data can still have errors but at least the source is unquestioned. Governments face a formidable challenge in accepting VGI when they shift from the use of only expert data to a mixed model that can evaluate and incorporate citizen volunteered data. This shift requires that governments engage with several aspects of the VGI creation process, including the individual contributors of VGI, a step towards widespread participation that many in government may not be ready to take.

One of the most significant shifts between traditional forms of expert-collected data and VGI is the individual who is doing the data collection. Rather than a team of trained experts that collect data using specialist tools such as remote sensing, or formalized methodologies, such as a government census, VGI is largely contributed by individuals as a leisure or non-paid work activity (Goodchild 2007; Newman et al. 2010; Tulloch 2008). Citizens instead are considered holders of valuable local knowledge (Elwood and Ghose 2004). Despite evidence that non-experts can indeed contribute information (Budhathoki et al. 2010; Haklay 2010; Parsons et al. 2011), the characterization of VGI as an informal data source, one created by non-experts or 'neogeographers' as a hobby (Hudson-Smith et al. 2009; Turner 2006), may in fact prevent governments from considering VGI as a serious source of data. This terminology and phrasing can often be saddled with negative connotations when compared to authoritative and expert data provided by government agencies (Harvey 2007). To better integrate VGI into government and decision-making, the continued use of these terms may serve to marginalize VGI as a data type, regardless of its fitness relative to authoritative sources.

The perception of VGI as varying significantly in quality compared to authoritative sources is a constraint on government adoption. This aspect of constraint is based on the legal implications of government error—essentially, who will get blamed if data are wrong. Compared to authoritative data, two assessments of Open Street Map, one of the largest VGI collection platforms, have found variable levels of congruence with authoritative data sets, ranging from poor to excellent, with populated areas often

displaying improved coverage (Girres and Touya 2010; Haklay 2010). The challenge to the use of VGI is that it could be considered unscientific due to data quality issues surrounding its collection. For example, information about sitings of endangered species could then be ignored in areas proposed for logging. Without a firm view of the quality of VGI, it can be difficult for a government to know how much weight should be given to citizen opinions or comments.

A defining characteristic of VGI is that it is often contributed within multiple informal, casual, and unstructured contexts (Elwood 2009; Flanagin and Metzger 2008). The data may or may not be sufficiently complete, that is, seamless over a spatial extent. Because of this informality, the quality of VGI can vary considerably. For example, unstructured or qualitative data, such as Twitter postings or freeform text in online review sites, can be rich sources of information but simultaneously difficult to incorporate into a decision-making process (Johnson et al. 2012). Concerns over the quality and accuracy of VGI serve as a significant disincentive for governments (Haklay 2010; Seeger 2008). VGI has potential to support governance because the data can help correct errors, refine the data through precision, and fill in gaps where there are no government employees. However, governments at all levels are reminded of their legislated obligations for due diligence in planning. Whether or not VGI is considered an acceptable data source for decision-making, support can depend on the credibility of the source, the presence of a mass volume of like contributions, and favourable comparison to other traditional data types (Flanagin and Metzger 2008; Haklay 2010).

Governments face challenges in utilizing non-expert data. Establishing the credibility of a source may demand that government knows who exactly is providing the data, to ensure it reflects the constituency in question and not the result of outside agendas. Due to the largely anonymous nature of many online activities, governments may never be able to fully verify even the general characteristics of those who contribute VGI (Budhathoki et al. 2010). Can governments be confident that VGI is the product of individuals with first-hand knowledge of a given phenomenon? Or is data contribution driven by a specific agenda? This becomes particularly salient if VGI is collected to assess public perceptions. VGI can be considered a convenience sample of one particular subset of the population, rather than representative of the whole. This contrasts markedly to official data sets gathered with random samples of the population that can therefore support rigorous statistical analysis. These concerns can be partially addressed through creating a VGI collection framework with a strong emphasis on identifying individual contributors (Seeger 2008). Techniques used to verify identity include logins, mail-outs with access codes, and IP logging to ensure participants are from within a certain geographic area. Each of these techniques does come with a risk of alienating or otherwise reducing participation, either because participants want to be anonymous or have difficulty navigating extra layers of technology (Brewer 2006; Vonk et al. 2005).

Tulloch (2008) discusses the use of VGI gathered in Second Life as a support for park design that raises several questions. First, is gathering citizen feedback in this way sufficient to fulfil community involvement requirements? Should input from VGI be balanced with traditional forms of citizen input, such as town hall style meetings, and where should it fit compared to forms of citizen participation such as

steering committees and citizen design teams? These legal obligations inherent to governance at all levels are real constraints to the government acceptance of VGI as a data source, as they privilege the status quo data sources that are known entities, or at least have failings that are acknowledged. This mismatch between VGI as a product of often unknown provenance with a variable degree of data quality should be considered as a significant barrier for government adoption of VGI.

Our own research has found that a lack of complete government control over the data collected by and displayed on a VGI platform creates considerable anxiety over deployment. Concerns were present over both the contributed data and the base map data. With our government partners, we used the proprietary Google Maps platform, which provided several advantages, including free satellite imagery, built-in geocoder, and a popular user interface. However, there were also trade-offs, with inaccuracies present in the base map, and coarse resolution imagery, especially in rural areas. There was substantial criticism levied at the accuracy of the Google Maps base map. For example, partners with local knowledge found many mislabelled roads and names of pre-amalgamation hamlets and villages that were no longer commonly used. Officials assumed that this data shown in Google Maps was not authoritative and had questions about provenance and update frequency. Later, when it was discovered that the Canadian federal government base map contained the same errors, government partners had a more positive view of Google base map coverage. This positive view was reinforced when change requests submitted to Google were reflected in the base map within weeks, compared to government base map change requests that could take substantially longer to be reflected, often requiring changes to be published on an annual basis. This example demonstrates how the provenance of data (the 'known' federal data vs. the 'unknown' private company data) can affect willingness to use, regardless of any actual difference between the data.

5.3.3 The Jurisdiction of VGI

It is easy to think of geospatial technologies not simply as place representative but place bound. However, as an online technology, VGI can cross spatial scales ranging from the local to the global. This has significant implications for how governments interact with citizens and whether the directionality of power flows can be rewired (Crampton 2009; Sieber 2004). This phenomenon is termed jumping scale (Cox 1998; Smith 1993) and is relevant to a governance context in use of VGI. Jumping scale refers to an action where individuals operating at one scale (e.g. community scale) circumvent or bypass an intermediary scale of decision-making (e.g. municipal government) to argue their issue at a 'high' level (e.g. provincial or federal level) (Cox 1998; Swyngedouw 2004). For example, VGI may be generated in response to a local issue but then communicated to provincial or federal level decision-makers in a call for intervention. This brings pressure from both the local and national level

on other levels of government. This cross-scale aspect means that citizens can use VGI to circumvent the traditional pathways of public participation, though this in turn may not fit will with formal decision-making structures.

The cross-scale nature of VGI presents an obstacle to governments in several ways. First, this type of activity can result in a government losing some control over a particular issue, as VGI can be communicated without regard to political boundaries. As VGI is communicated to other levels of government, more players become implicated in solving or answering an issue. This may be a positive factor, such as in the case of a resource-constrained local government looking to secure greater funding from provincial or federal levels to combat a particular problem. This loss of control also means that a government can be overruled or removed from the decision-making process. There is a danger that after asking citizens to contribute on a particular issue, governments may not be able to properly respond to the citizen feedback, as the required action may be beyond the mandate or geographic region of the government. For example, a municipal government may ask for citizen input on land rezoning, yet this rezoning may require provincial or regional approval. This can create a situation where expectations are raised as to the type of result that will be delivered. This issue is long-standing in planning; in that if citizens are to be asked to contribute, a government must be willing and able to act on that advice (Wittig and Schmitz 1996). Though VGI contributions may be cross-scale, the political decision-making and mandate of governments are not equally flexible.

Our own research in Acton has uncovered the use of VGI to jump scale. We are working with a community-based watershed management organization in Acton to deploy a Geoweb site as a conduit for citizen reporting of erosion and other environmental problems. This process is occurring at a watershed scale, which has only recently become a decision-making boundary in Quebec. The provincial government has created this new jurisdiction for issues like erosion; however, few mechanisms are in place to support integration of citizen or community organization perspectives with the provincial-level policy development process. The community-based watershed management organization is using the Geoweb to collect its own VGI, which then is submitted to provincial ministries to support funding grants at the watershed level. This demonstrates how VGI that is reflective of a local perspective can be leveraged to impact other scales. Local VGI gathered in this manner is used to cross scales, allowing the community-based organization to argue for improved watershed-level support from provincial government.

5.4 Situating Government to Adopt VGI

The generation of VGI and its acceptance by governments is an emerging phenomenon, and as such, the adoption challenges to its use and application are fluid. Through the identification of constraints to the use of VGI by governments, we aim to provide increased clarification as to how the use of VGI can be negotiated. From

this analysis we define three ways that governments can situate themselves to more fully participate in gathering and using VGI: increased formalization of VGI collection, encouraging collaboration between governments, and reviving the role that VGI can play in seeing citizens as partners in knowledge generation and improved decision-making.

5.4.1 Increasing Formalization of VGI Collection

For governments to accept and use VGI, one blockage is the value—both real and perceived—of the data. Without confidence that VGI represents citizen input, governments will have a difficult time justifying the use of VGI within their decision-making tasks. Due to the legal framework in which official decision-making must occur, particularly around issues with a geographic context, such as facility siting, land use, and property rights, there must be a defensible process followed to justify taking a course of action that may have negative implications for a certain group of citizens or that is based on input from citizens. In balancing the needs and desires of society as a whole, which can involve reconciling many contradictory opinions and viewpoints, decision-makers must rely on data and information that can be defended as valuable input from citizens and reflective of real citizen concerns. As a new technology, there are still many questions surrounding the value of VGI compared to traditional methods of citizen input. For example, what weight should a decision-maker give to a perspective supported by VGI compared to a perspective supported by citizens who attended a town hall meeting? Is the method of participation (digital vs. in person) indicative of the strength of agreement or opinion? Though each of these questions requires significant follow-up research, issues concerning the value of VGI are reflective of government concern or focus on process, rather than the issue itself.

Due to the structured and formalized way in which government operates, a more formalized VGI collection process, with a focus on data quality and strict controls to contribution, and crowdsourced verification may prove beneficial. For government to adopt VGI, linking it to official government structures and decision-making processes, this may require the institution of specific rules and regulations that can constrict or even eliminate participation. One example of this may be the requirement to officially register on a site using one's real name or other identifying characteristic. The user who feels comfortable contributing VGI anonymously may not feel the same when asked for identifiable information. The identification of individual contributors on some level, not necessarily by name, but as a resident of jurisdiction may impose a constraint on participation in an official context that would not be present in a more informal VGI implementation. Despite these constraints on participation, for VGI to be accepted as a legitimate data source for use in decision-making, a collection framework that enforces some degree of identification and places a frame on types of participation can begin to address some of the government concerns surrounding contributed data.

5.4.2 Encourage Collaboration Across Governments

We identified the cross-scale nature of VGI to be a challenge for government acceptance of VGI. One of the main challenges is that governments are restricted to a certain mandate and constrained geographic area, whereas VGI may be contributed by individuals outside of the area and on topics that are outside of the mandate of any one government agency. With increased government collaboration, VGI can be directed to effect change at the appropriate decision-making level. For example, VGI collected by a municipal government that indicates action required on the part of a provincial government is more likely to be acted upon if the provincial government is involved with or at least aware of its collection. Stronger collaboration between governments will facilitate the ability of citizens to jump scale. Though this type of process has benefits for citizens, it may not have similar benefits for governments and indeed may be actively resisted by governments.

There are practical reasons for increased collaboration between governments, such as realizing cost savings in the collection of VGI. This is relevant at the municipal level and in rural or remote locations, where the IT support staff required to operate a VGI collection framework may not exist. This type of collaboration already exists in many places, as groups of municipal governments will contribute to the shared development of technologies or the joint funding of IT systems, such as enterprise GIS (Budic 1994; Harvey 2003). Sharing expertise on VGI development also can involve collaboration with private enterprises, universities, and non-profits through the use of open source technology (Hall et al. 2010). Similarly, increased collaboration between governments can ease the diffusion of VGI technology. One of the main mechanisms through which technology is transferred in government and organizations in general is through a community of users (Budic 1994; Onsrud and Pinto 1991). In many instances, a driving factor in GIS adoption in municipal planning agencies has been the use in other, similar type agencies. The lessons learned by one agency can make introduction and adoption in another agency easier. This type of diffusion can occur over similar government levels (such as municipal) and also to different scales of government.

5.4.3 Investigating the Participation Potential of VGI

Fundamentally, the process of citizen generation of VGI, government acceptance of this input, and resulting action can represent a variety of forms of participation in governance. Participation can be limited, with citizens treated as passive sensors, feeding data to higher-level decision-makers in a one-way process. Alternately, citizens can be engaged as partners, contributing information as part of a two-way dialogue surrounding an issue and providing an opportunity for direct democracy, enabled by information technology. In situating government to adopt VGI, the use of this approach to facilitating public participation provides one of the most compelling

arguments for its adoption and use. In a political climate increasingly defined by microtargeting of communities of interest and much hyperbole about government openness and accountability, the acceptance of VGI as an input to decision-making can position governments as responsive and directly connected to the electorate. Key to realizing this vision is the translation of citizen VGI into actionable policy, a process and transformation that is still very much untested. As such, there exists the potential for VGI generation, with its novelty and experimental status, to be an unintentional (or regrettably intentional) distraction from conventional and possibly more effective forms of citizen participation in decision-making.

The use of VGI within a participatory process can give flexibility to governments, providing a new media with which it can distribute information (e.g. in the form of KMLs) or make more transparent its practice. Used in this way, VGI presents an opportunity for governments to both accept large amounts of data directly from citizens, but also to use that conduit to allow access to government data sets, and even direct discussions with civil servants and decision-makers. This draws on PPGIS research in which the process of place-making via a digital form matters as much if not more than the output—the resulting map or database. Governments can, with examples like the city-based Apps for Democracy contests (http://www.appsfordemocracy.org), spur innovation and entrepreneurship. It also can set new avenues for engagement, reaching out to under-represented groups and reformatting the directionality of power flows. This can bring into contact dissimilar groups, generating conversation, agreement, and eventually action. It is through this type of communication that deep and lasting changes to governance structures and communities are created (Wittig and Schmitz 1996).

5.5 Conclusions

Like the introduction of ICT and GIS into government, there are many possible constraints to the adoption of VGI. These may be technical, organizational, or otherwise based on the local context and VGI implementation process. The negotiation of these constraints requires that governments identify potential bottlenecks and proactively position themselves to address them. This is a significant challenge and one that we have aimed to emphasize. There are many ways in which VGI can add value to government operations. At the most basic level, it represents citizen input, and when incorporated into governance, there is the potential for VGI to represent the kind of direct democracy that defines a vibrant civil society, with citizens engaged as partners in the co-production of decision support information. In a more activist fashion, VGI can be considered an expression of citizen perspective that is often circulated outside of conventional avenues of public participation in governance. Does VGI have a significant role to play as a way to undermine or circumvent governments, replacing defective governance processes with citizen-led initiatives? With the increasing devolution of federal and provincial responsibility to the municipal and community level, or with the wholesale shrinking of governments due to neoliberal policies, can VGI serve multiple roles, as both a response to, and

as an outcome of retrenchment? Much as the social economy seeks to fill the gaps of failed neoliberal policies, can VGI and the communities that create it be considered a product or service produced without regard to the private and public economies (Amin et al. 2002; Carpi 1997)?

The path towards greater adoption and use of VGI in governance has many barriers. One significant issue that bears further investigation is the integration of VGI into the government decision-making process, with a focus on identifying the reasons why decision-makers would reject or accept VGI for a specific decision. Implicit in this assessment is to compare the level of trust that decision-makers or planners would have in a VGI data set, compared to an authoritative data set, provided that there is an acceptable level of congruence between the two. With the support of an authoritative data set, would the decision-maker trust the VGI data set? Would this trust extend to a situation where there is no congruent authoritative data set? And similarly, if a VGI data set is in direct conflict with an authoritative data set, is this sufficient for a decision-maker to question the authoritative data set? What would lead the decision-maker to trust the VGI data set over the authoritative data set? Identifying other factors outside of simple congruence may illuminate essential components of the decision-making process that are equal to, or perhaps more important than the simple accuracy or quality of a data set. For example, does the currency of the data set (presuming VGI is more current) matter, particularly in rapidly changing political landscapes? Does the fact that VGI represents citizen (and elector) voices hold sway with decision-makers, particularly elected officials? These questions and more related to them are essential avenues of future work in determining the fit or failure of VGI within the process of governance and decision-making.

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