Introduction

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1. The Evolution of Open Data

The notions of "open government" and "open data" have both seen a marked uptake in global interest in the last decade. Many countries have issued open government and open data declarations—for example, New Zealand in 2011 and Australia in 2010. In May 2013, the Obama administration in the United States issued an executive order titled "Making Open and Machine Readable the New Default for Government Information." The multilateral Open Government Partnership (OGP), launched at the United Nations in 2011, requires its members to commit to its Open Government Declaration, which includes a commitment to open data. The OGP has grown from eight founding nations in 2011 to 78 countries, with 20 "local" members made up of subnational governments in both the Global North and South. OGP member states undertake to develop action plans and to address the objectives of the movement in their domestic policies. In 2013, the Group of Eight (G8) nations committed to the Open Data Charter, which set out five guiding principles that included a commitment to open data by default. The Open Data Charter is now subscribed to by over a hundred governments and organizations.

According to conventional views, open data consist of government data that are usually provided for free, in a machine-readable format, and with few, if any, restrictions on reuse (Janssen et al., 2012). Open data are made more accessible and usable by the infrastructure that accompanies them, including portals that facilitate searching for and finding relevant datasets. On the one hand, the provision of open data is closely linked to the open government movement. However,

open data are different from other kinds of information provided in the open government context. Unlike information provided under access-to-information regimes, for example, open data are typically data rather than processed information. They are also provided proactively rather than per request. They may also be provided with regular updates. The scope of their reuse is also much broader—open data may be used in analytics by commercial or non-profit actors, they can be combined with other data, and they can be used for purposes that go beyond governmental transparency.

Canada launched its own open government policy, which included commitments to open data, in 2012. It joined the OGP in the same year. Since then, it has developed its open data program, including an open data portal, and an open government licence based on the UK government's. In 2018, Canada was co-national chair of the OGP. Many Canadian municipalities have been at the forefront of open data developments in the country, and most provincial governments have followed suit with open data programs of their own. The Government of Ontario was one of the first subnational governments to join the OGP.

Clearly, the global open data movement has evolved significantly in the course of the last decade. In that short period of time, it has been embraced by governments at all levels around the world, with varying degrees of enthusiasm. In Canada, open data commitments from federal, provincial, and municipal governments have snowballed, becoming increasingly sophisticated. In 2019, for example, Ontario became the first government in Canada to actually commit in legislation to open data (Simpler, Faster, Better Services Act, 2019). Concurrent with this evolution, our geospatial and open data research partnership, Geothink, which convened in 2013, set out to examine how the "geoweb"—the concept of a geospatial web—shapes government and citizen interactions. This Social Sciences and Humanities Research Council of Canada–funded partnership grant, led by Dr. Renee Sieber (of McGill University and a contributor to this volume), included 14 faculty members from Canadian universities, 12 international research collaborators, and 25 research partners from government (the federal, the provinces of Nova Scotia and Ontario, and nine Canadian municipalities). Over the life of the grant, we paid significant attention to the central role played by open data in the geoweb. We found that while there was considerable enthusiasm for open data and much literature that explored methods

for opening data and applications for open government data, there was relatively little research that investigated the benefits and challenges of open data.

In the relatively short span of time in which opening data has become a commitment for so many national and subnational governments, other transformations in the digital and data economy have greatly impacted the value of data and their potential applications. The rise of big data analytics was just the beginning; currently, artificial intelligence (AI) and machine learning are driving technological innovation and, in doing so, are consuming vast quantities of data (Kitchin, 2014). Technological advancements are also increasing the volume, variety, and velocity of data collected by governments, thus changing the significance of open government data, and rendering its practice more complex from practical and policy perspectives (e.g., Scassa & Diebel, 2016; Johnson et al., 2017). Public–private partnerships in smart cities, to provide just one example, have also rendered open data more complex from a public-policy point of view (Scassa, 2020). Some of these complexities relate to who owns or controls the data generated in hybrid public–private partnerships. Some governments may also be increasingly tempted by the potential to license access to particular subsets of government data as a means of generating new revenue (Aggarwal, 2018; Pilon-Larose, 2020). As rapidly as open data has risen in importance, it has been swept into a period of technological change that challenges its foundations.

As we approached the end of our six-year research project, we found that we had already studied and explored the challenges and deployment of open data in the context of government–citizen interactions and had developed considerable expertise on a number of issues. Our researchers had explored hackathons (Robinson & Johnson, 2016), licensing (Scassa & Diebel, 2016), open data and privacy (Scassa & Conroy, 2016; Scassa, 2014a), and the use and uptake of open data (Sieber & Johnson, 2015; Johnson et. al., 2017). We had also begun to critically interrogate the merits of open data and some challenges thereof (Johnson et al., 2017). Nearing the end of the grant, and facing the technological transformations already underway, we considered it an opportune moment to ask: What is the future of open data? We issued a call to those involved in the grant—as researchers, collaborators, or partners—and invited them to reflect upon the future of open data and to contribute chapters addressing their reflections grounded in their disciplinary, interdisciplinary perspectives,

or in their views from outside the academy. This book is the result of that call.

Looking back over the past seven years, we have taken stock of the fact that the landscape of the open data ecosystem has matured and changed, sometimes in unanticipated ways. Our unique vantage point allows us to look both back and forward in order to offer informed insights into what the future of open data may hold. A thread that runs through our work is that we have collectively taken a critical social science perspective, grounded in the imperative that our research should be relevant to our partners in the field, including our government, civil society, and private-sector partners. Accordingly, we anticipate that our insights into the future of open data will combine observations about what our research suggests will happen with a critical perspective on what should happen.

At the time we issued the call, it was not clear to us whether this collection of papers would be an epitaph for open data or a road map to the future. Perhaps ultimately, it is a bit of both. Most of our contributors have not given up on the potential for open data—yet most also acknowledge that it is time to look past the hype of open data, and time also to take stock of the dramatic changes in the evolving data economy and the impact such will have on open data.

2. Unravelling Open Data Assumptions

In the early days of the open data movement, advocates and activists were full of hope and optimism, particularly when the potential of open data was considered in contrast to the migration of government services online through e-government efforts. Open data was viewed as a new way of opening government, encouraging entrepreneurship, engaging citizens, and wiring new ways of working with government for the private sector and civil-society groups. In practical terms, what we find is a mixed record of success, functional rather than robust uptake of open data efforts, challenges, and middling potential being realized (Johnson, 2016; Lauriault et al., 2018).

The extent to which open data has led to governments being more open is rather varied. A review of open datasets on myriad government open data portals reveals a "mixed bag" of high-value, comprehensive, fragmented, quirky, and mundane datasets (Johnson et al., 2017). The desire to identify and release high-value datasets is such that the Government of Canada convened the Canada Open

Government Working Group (COGWG) to frame principles for prioritizing release (Government of Canada, n.d.). The Government of Ontario, which was the first substate actor in Canada to entrench open data in legislation, made efforts to demonstrate responsiveness to the open data community. It initiated a voting process by which people could request particular datasets; they would then prioritize the most popular 25. Public-salary disclosure, ministerial budgets and expenditures, the provincial staff directory, workforce statistics, and vehicle statistics ranked the highest. Substantively, this signals that there is public/entrepreneurial appetite for transparency- and accountability-related datasets.

The relationship between entrepreneurs and civic technology innovators around open data continues to evolve as well. In the early days of open data portals, government staff reported that they were sometimes asked to make a "business case" for opening datasets to the public (Robinson & Johnson, 2016). And it is now commonplace for open data portals to include examples of how the datasets have been used in practice. The City of Toronto's portal, for example, shows a range of applications, including garbage-collection schedules; SeeClickFix, a citizen-reporting platform tied to the city's 311 program; myriad transit apps; and a social well-being index (City of Toronto, 2020). This range shows the civic and private sector using open data for public good and potential profit.

Yet not all open data portals are full of opportunity; the richness, potential impact, usability, and range of data can vary widely. Open datasets of pet and baby names are commonplace across portals. In Brussels there is an open dataset showing where one can find murals of comics graphics and another with the hashtag #doesitfart that identifies which animals are flatulent (Open Data Institute, 2018). These kinds of datasets are fun but not necessarily impactful. Other open data portals look robustly populated with seemingly high numbers of datasets published, but it is important to look further into what these volume numbers suggest. One agonizing trend in open data portals arises when governments post datasets by subgeographic unit (e.g., by municipal ward, by county) instead of at the most aggregated level, such as statistical units, health regions, or electoral districts. This fragmentation can frustrate users, and can also cynically be interpreted as a way to boost the numbers of datasets made open instead of having data that can be widely linked and compared.

Early open data advocates had the "if you build it they will come" mindset about open data portals. But in reality, these portals, along with other innovations like geoweb mapping tools, face the same barriers: their very existence does not guarantee impact or a natural user group (Sieber & Johnson, 2015). As more governments engaged in the processes of making data open, it quickly became apparent that there were and continue to be material, procedural, and political costs to doing the work (Johnson et al., 2017) of publishing the data people want and find useful. Open is neither cheap nor easy to achieve. In this sense, one of the lessons of the open data experience to date is that it is both a process and a commitment. It is not a problem solved by the creation of a portal stocked with datasets. Further, it requires ongoing engagement between those who supply open data and those who use them.

3. Changes in the Role and Value of Data

As noted above, the dramatic evolution of digital and data-based technologies has had a transformative impact on both the role and value of data. Open data policies were never uniquely about transparency. Many open data policies were implemented with a view to unlocking the economic power of data in the hands of government and making it available to the private sector for innovation purposes (Deloitte, 2012; Global Government Forum, 2020; Duus & Cooray, 2016). On a small scale, government data might be useful for the development of apps or other consumer-oriented services. On a larger scale, government data—particularly geospatial data—might be useful in populating maps or in feeding into data analytics. Big data analytics requires a high volume, variety, and velocity of data; not all open government data would be suitable for such analytics, but some might. Further, as the nature and variety of data collected by governments evolved, there began to be pressure to open not just static datasets but real-time data as well (Scassa & Diebel, 2016).

The rise of the "smart city" created new challenges for open data. In some cases, smart technologies involving sensors that collected significant volumes of data were adopted by cities under contracts that were not necessarily clear about who "owned" the collected data. This issue was relevant both as concerns the right to commercially exploit the data and to the ability of municipal governments to make such data available as open data to stimulate innovation

(Scassa, 2014b). As smart cities have evolved, public–private partnerships are increasingly common around digital infrastructure, and around sensors and related technologies. The role of the private sector in collecting and processing these municipal data raises thorny challenges in determining what data are available as open data. Such challenges turn on whether the data are public-sector data, private-sector data, or a novel combination of both, which calls for new governance mechanisms. Similar challenges are presented by the burgeoning artificial intelligence sector, which is hungry for a broad range of data from public and private sectors alike (Aggarwal, 2018; Kitchin, 2015). These developments are pushing governments to explore data-sharing frameworks other than open data—ones that might facilitate the sharing of data with complex origins or that might raise personal-data issues (Scassa & Vilain, 2019; Scassa, 2020).

Alongside smart city developments, the rapid evolution of AI and machine-learning technologies has also created a thirst for data. While more conventional open data in the form of static datasets might be of limited interest for developing AI, the more complex, live-streamed data from smart city and other sensor technologies deployed by governments are likely of more significant interest. Thus, the value of real-time government data is expanding, and questions are increasingly being raised as to whether "open" is the appropriate policy for valuable data, the licensing of which might offset the costs of collecting and maintaining them. In addition to issues of the cost of open data, data licensing as part of data-sharing frameworks is increasingly being contemplated as a means of protecting privacy and addressing ethical issues in the downstream uses of data (e.g., Dawson, 2020; Scassa & Vilain, 2019).

The changing value of data in a data-driven economy has also raised concerns over data sovereignty. Data sovereignty has both broad and narrow meanings. In the narrow sense, some have begun to advocate for policies of data localization—in other words, requiring that certain data (usually personal information) be stored within the physical boundaries of the state in which the data are collected (Brehmer, 2018). Data-localization advocates are motivated by concerns over privacy and security—fearing that offshore storage of personal data exposes individuals to unacceptable risks (Chander & Lê, 2015; Brehmer, 2018). Others are concerned about the cybersecurity implications of the offshore storage of crucial data (Brehmer, 2018; Baezner & Robin, 2018). Yet another view of data sovereignty

includes the ability of state actors (including law enforcement) to access data through domestic legal channels rather than petitioning for access overseas, where they risk having domestic production orders rejected in a foreign jurisdiction (Daskal, 2016). The term "data sovereignty" is also used in a much broader sense by a growing number of Indigenous communities worldwide (Kukutai & Taylor, 2016; FNIGC, 2020). This view of data sovereignty is more robust and touches on sovereignty not just in storage and access to data but also in terms of being able to control decisions about what data are collected, according to what parameters, and for what purposes. Data-sovereignty concerns, both narrow and broad, go beyond open data concerns. However, they overlap with open data to the extent that data sovereignty requires a level of control that includes the ability to decide which data are to be made open. It certainly also includes the ability to place limits on access to and reuse of data.

Although big data analytics, smart cities, AI, and machine learning are all part of an ongoing digital revolution that has, in a relatively short space of time, changed the open data landscape, it is important to keep in mind that the economic value of open data has always been an element that has driven governments in their development of open data portals and programs. From the early days of open data, there has been an uneasy relationship between open data and open government. Democratic value alone has not been sufficient to drive the open data agenda; there is an intrinsic link between openness and economic value (Robinson & Johnson, 2016).

4. The Chapters in this Collection

It is within this context of, on the one hand, sober reflection on the "realities" rather than the promise of open data and, on the other, the rapidly evolving technological context that is shaping a new data-driven economy that the chapters in this collection are situated.

This book opens with a reflection on the origins of the practice of sharing data with a particular focus on Canada's engagement and efforts. Tracey Lauriault draws from her depth of experience as an early open-data advocate and her ongoing critical data studies research to evaluate the assemblage of ecosystems from which Canadian open data efforts emerged. She reminds us that open data has a rich and diverse genealogy, and that this genealogy may contain

the DNA that will shape its future evolution. Her chapter concludes with reflections that bridge this past practice into current, and future, open data efforts, with a particular focus on the role of open data in smart-technology systems.

The second section of the book is titled "Pitfalls and Opportunities." As we move from early, optimistic thinking that open data was an innovative idea into a data-governance ecosystem that is more mature, the community of open-data users and researchers is well positioned to move beyond generic "open data is good" propositions to exploring more nuanced assessment.

In her chapter, "Open Data and Confidential Commercial Information," Teresa Scassa identifies this growing tension between public- and private-sector data as a part of the future of open data. She looks at access-to-information laws in Canada to show how the laws as they are currently framed place considerable restrictions on governments when it comes to sharing information that is identified as confidential commercial information or even "commercially sensitive" information. Just as open data regimes have had to find ways to balance privacy with open data, she suggests that similar balancing measures might be required to address the private-sector interests that are intertwined with an ever-growing volume of government data.

In "Reusability of Publicly Accessible User Data on Platform Websites," Haewon Chung explores a source of open data that is not governmental and that is "open" in a more contested sense. Platform websites host considerable volumes of data (not all of which is personal data) that are broadly publicly accessible, although they often use a variety of legal, technological, and contractual measures to limit the ability of others to harvest and use this data. Nevertheless, Chung argues that there are good reasons why much of this data should be considered open in the sense of being available for free and unrestricted access and use.

Both Scassa and Chung explore a future in which private-sector organizations contribute to the store of data available for reuse. In both cases, government policy/law/regulation play a role. Scassa argues for a reworking or reinterpretation of those laws limiting the disclosure of some types of data as open government data, while Chung suggests that changes in laws, or in their interpretations, should provide more liberal rights to reuse publicly accessible data. In this vision of the future of open data, the data sources are not just

public sector, and openness is not necessarily entirely within the control of the party claiming rights in the data.

In their chapter, "Challenges to the Access of Government Open Data by Private Sector Companies," Peter Johnson and Christine Varga raise a question that is fundamental to the provision of open data: What does it mean to "access" data? By asking this question from a private-sector open data-user perspective, their research reveals that access for this user group is more dynamic and complex than might have been originally anticipated.

Elizabeth Judge and Tenille Brown's chapter on open data and government brings a new consideration for governments planning to launch, maintain, or enhance their open data efforts: liability. Again, building on the embryonic theme of "open data is good," the authors, both legal scholars, flag liability law as a prospective new challenge to open data. Through their assessment of the extent to which governments might be held liable for actions or omissions arising from government-provided open data, their work reinforces the tension between open data opportunities and obligations.

The third section of our book is titled "New Landscapes for Open Data." In their chapter, "Examining the Value of Geospatial Open Data," Sarah Greene and Claus Rinner examine a subset of Vancouver, Toronto, Edmonton, and Ottawa's open data provision. They focus on the types and distribution of geospatial open data and their relationship in helping local governments achieve their economic-development goals attached to broader open government initiatives.

In "Data for Development: Exploring Connections between Open Data, Big Data, and Data Privacy in the Global South," Teresa Scassa and Fernando Perini look at how open data is faring in less developed countries. In those contexts, the supply of open government data may be limited by the resource issues faced by governments that either lack the ability to collect the primary data at regular intervals or to fund and support open data programs, or both. Interestingly, in some contexts, governments have looked to the private sector as a source of open data.

Although rarely explicitly stated, open datasets are predominately gathered from urban and suburban settings. This predominance is not surprising given that populous areas lend themselves more naturally to the infrastructures that gather the data. Renee Sieber and Ian Parfitt, in their chapter "The Future of Open Data is Rural," argue that there are limits to conceptualizing open data as a

rural phenomenon. As a result, more attention and research must focus on expanding the capacity of rurally based governments to be more active participants in open data efforts.

In the final chapter of this book, Pamela Robinson and Lisa Ward Mather draw links between the other chapters of the book and the future of open data in a world embroiled in rapid change and facing significant challenges. These include the COVID-19 global pandemic, the climate emergency, and our collective efforts to confront systemic racism. Many of our contemporary challenges have clear points of connection to data, as governments seek solutions in evidence-based decision-making, and as the private sector turns to data-driven technologies and analytics. These challenges, therefore, reinforce the pressing nature of the central question of this book: What is the future of open data?

Clearly, there is a growing demand for a greater volume and variety of high-quality open data. As many of our authors suggest, this demand may push the boundaries of what is understood as open data. As the demand for datasets expands, so too do demands for frequent updates and even real-time data. The costs of maintaining such systems of open data, combined with potentially greater concerns over privacy and ethical reuse, could spur a different approach to open government data, one that imposes more licensing restrictions to achieve certain ends, or one that requires some form of cost recovery. At the same time, some private sector actors might increasingly become sources of some form of open or freely shared data, and platforms will find themselves inadvertently a source of scraped, publicly accessible data. The legitimacy of modes of accessing and using these data will depend upon laws in place within jurisdictions. While not open data in its conventional sense, the ability to access and use these diverse sources of data will shape what data are open for access and development.

5. Signals about the Future of Open Data from our Contributors

In each chapter, the authors address the future of open data. The different visions presented reflect the complexity of the evolving data context. In her tracing of the history of open data in Canada, Tracey Lauriault argues that in order for the future of open data to remain open and to serve its originally democratic intent, actors in the open data ecosystem need to both know their history and also keep their

attention broadly focused on changes in the technological assemblage. Her appeal for a governance framework that extends beyond open data advocates to include allied actors, including government staff and scientists from spatially oriented disciplines, is important, and it presents pragmatic challenges. With the accelerating trend toward smart city adoption, the momentum is moving toward datasets to be closed and proprietary rather than open in what she calls a "data-enclosure movement." Building on Sieber and Johnson's (2015) work showing that simply opening the data is not enough to ensure their use and uptake, Lauriault adds the further caveat that a history of open data does not ensure a future that is also open. New working relationships with new partners are needed if we want to make further progress with open data.

In their chapter about open data and government liability, Judge and Brown discuss the relevance of liability laws for government policies around open data and argue that, in order to realize the benefits of open data, a statutory framework should be created for all levels of government in Canada. This framework would outline the duties and responsibilities for governments and citizens, and would provide predictability and clarity for all members of the open data ecosystem. It would also incentivize the government to proactively release open data in the public interest.

The future of open data includes new challenges and opportunities for governments seeking to respond to private-sector interests in open data. In their study of private-sector interaction with government open data, Johnson and Varga suggest that governments work to improve data access in order to increase open data usage and, ultimately, demonstrate the value of open data. Analyzing the challenges of private-sector open data users, they conclude that, in the future, governments should provide improved access to linked open data, and implement and follow common open data standards. However, they qualify their discussion, stating that open data initiatives should not focus entirely on one type of user, lest other users be disadvantaged.

The Sieber and Parfit chapter is an important reminder that the future of open data needs to have a broader geographic reach beyond urban centres. The ability of rural areas to provide open data and realize the value from that data is affected by factors such as large spatial area, low population density, lack of government resources and technical skill, and, as a result, limited market incentive to develop open data or broadband Internet service. Building open data

ecosystems in rural areas depends upon addressing key challenges, such as the lack of digital infrastructure, and the need to build capacity—including digital literacy and technical capacity. Promising approaches may include collaboration between rural communities to develop common standards and generate "a critical mass of interoperable data" that attracts business opportunities. The authors also suggest that rural areas engage in participatory and place-based rural economic development that can account for the community's specific characteristics.

Scassa and Perini's chapter firmly reminds the open data community that the open data ecosystem is established and growing in the Global South, thus further amplifying the calls for bigger open data geographies. As in the Global North, there are significant needs for building governance frameworks, and this chapter flags the importance of a human-rights-based approach to this work. Importantly, whether north or south, there is significant value in research about the emergence and delivery of open data efforts that must be shared. These kinds of case studies can help accelerate collaborative learning across continents, from south to north and vice versa.

In their evaluation of the value of geospatial open data, Greene and Rinner analyze the distribution and prevalence of GIS-ready data files, and conclude that a more strategic approach to opening data could help build support for open data programs. In particular, they advocate for releasing datasets that support the stated purpose of a municipality's open data initiative. Their study could help cities develop strategic guidelines to help direct data releases in response to user needs.

In her chapter, Teresa Scassa explores a possible future of open data in which increasing amounts of data in the hands of government are privately owned. She notes that governments that purchase confidential commercial data or commercially sensitive data may not legally be able to release those data as part of an open data catalogue. Such a situation could cause government open data offerings to be significantly reduced in time. She argues that in order to support open data in the future, governments must begin to attend to claims of confidential commercial information and assess these claims from the perspective of the public interest. There are proactive measures governments can implement in order to limit such claims if they are unreasonable.

Chung discusses technological and legal issues around the reuse of publicly accessible data hosted on private-sector platforms and concludes that legislation is required to support third-party use of public user data. Such legislation is necessary because these data are an important resource, and because the businesses that host these data will establish data-reuse policies that maximize profit. Such businesses cannot be expected to do what is in the public interest.

In sum, these chapters point to the durability and ongoing momentum of the open-data movement, and they signal directional changes if this movement is to carry on. It is clear from the research shared here that the future of open data is one in which the involvement of new actors is necessary to ensure that open data remain open; to make certain that the datasets that are shared are actually relevant and useful to civil society, government, and private-sector users; and to continue the efforts need to move the data out of portals and into users' hands. The future of open data must be guided by much-needed new legal and governance frameworks that protect privacy, ensure public-good outcomes emerge, and reduce risk and liability. And the future of open data needs to recognize that regardless of the pattern and form of communities, from rural to urban, the interconnectedness across this transect requires much broader thinking and engagement. The research casts an eye toward the future of open data, projecting a new time horizon with a long to-do list of how to advance the work.

Collectively, the chapters of this book push at the boundaries of both the nature and scope of open data. They reflect the changes wrought by the expanding role of data in the economy and in innovation. They also reflect the complicated relationships between government and the private sector, and between governments and citizens, when it comes to data.

Robinson and Ward Mather close the collection with a chapter that bridges the time in which this research was conducted with the current and future set of conditions to which open data needs to respond. Now, as much as before, there clearly remains a role for open government data. Government is a source of very particular types of data, the collection of which is not easily replicated elsewhere. While the future of open data may be an expanding and changing one, at its core will remain the importance of governments as a source of quality, accessible, and reusable data that can drive objectives of transparency and accountability, stimulate innovation, and increase citizen engagement.

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