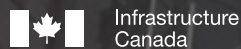
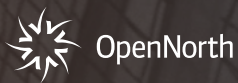


FUTURE CITIES
CANADA

OPEN SMART COMMUNITIES *in* PRACTICE

HOW COMMUNITIES ACROSS
CANADA ADVANCE THEIR GOALS
AND OVERCOME CHALLENGES
USING DATA AND TECHNOLOGY



OPEN SMART COMMUNITIES *in* PRACTICE

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OpenNorth

March 2022

ABOUT OPEN NORTH

Founded in 2011, Open North is Canada's leading not-for-profit organization specializing in open data and open government, civic engagement, and open smart cities. Our mission is to drive research, capacity-building, and network collaboration across and within sectors to advance the responsible and effective use of data and technology that empowers transparent, accountable, and inclusive communities. We support communities to reimagine how to govern data and technology, as well as to make informed decisions for the common good. After developing tools and knowledge, we share them back to the community for all to benefit and move towards a better data and tech future.

For more information visit opennorth.ca



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REFERENCES

LIST OF ACRONYMS

EMIS	Energy Management Information System
FCM	Federation of Canadian Municipalities
GIS	Geographic Information System
ICT	Information and Communication Technology
INFC	Infrastructure Canada
IT	Information Technology
ITI	Information Technology and Innovation
OCP	Official Community Plan
ODC	International Open Data Charter
OSC	Open Smart Community/City
RFI	Request for Information
SCC	Smart Cities Challenge

ABOUT THE REPORT

This report documents the progress of several 'smart city' initiatives currently underway in communities across Canada. It will be particularly useful for local government staff who work within municipal, regional, and other local government structures on initiatives featuring smart or digital components. The report provides a glimpse into the institutional changes that local governments are experiencing and how these align with the ideals of "Open Smart Cities."¹

The report is structured around three common problem areas within the smart and digital space that were identified by working with communities across Canada via the [Community Solutions Network](#). **The report centres on challenges around how to adopt data and technology into local government projects**, or the *means* to achieve better societal outcomes, and not the outcomes themselves.

Chapters 2, 3, and 4 each focus on a single challenge facing many local governments as follows:

- **[Chapter 2: Co-creating strategies with the community](#)**

We observe that many local government services and programs do not reach all residents, contributing to the further systematic exclusion of vulnerable people. This increases barriers for residents' participation in the civic, social, and economic aspects of life.

How are local governments working with partner organizations to improve services and programs for residents, with a focus on underserved communities?

- **[Chapter 3: Collectively managing information and data](#)**

We observe that local governments are not making consistent and deliberate decisions about the collection, management, and sharing of data, thereby limiting their ability to use data to address complex challenges in their communities.

How are local governments working to improve their data governance practices so that data can more effectively be leveraged towards transparent and collaborative decisions?

- **[Chapter 4: Rethinking procurement of digital technologies](#)**

We observe that local government procurement of digital technologies requires public servants to adapt their procurement processes to increasingly dynamic and opaque digital technologies. Established procurement processes are not adapted to meet the needs of the government and solve community challenges.

How are local governments procuring digital technologies to meet their needs and the needs of their community?

The report provides examples of how communities have taken positive actions to adopt and adapt data and technology to overcome these problems. These cases were selected based on their participation in the [Community Solutions Network](#) as well as their connection to the problem area (see [Appendix A](#) for more details).

(1) Lauriault, Bloom, and Landry, "Open Smart Cities Guide."

This report highlights the following seven community examples:

- **Town of Bridgewater, NS** — Procuring an energy management system to tackle energy poverty
- **City of Calgary, AB** — Bridging the digital divide by establishing community partnerships
- **Town of Churchill, MB** — Leveraging data to inform climate change adaptation
- **City of Fredericton, NB** — Creating a civic innovation lab to procure local solutions
- **City of Saskatoon, SK** — Piloting free public internet to address digital inequity
- **District of Squamish, BC** — Opening data for internal and external decision making
- **City of Trois-Rivières, QC** — Driving smart city projects through a shared multi-stakeholder vision

The final section concludes with the following three recommendations to increase the effectiveness of local government approaches:

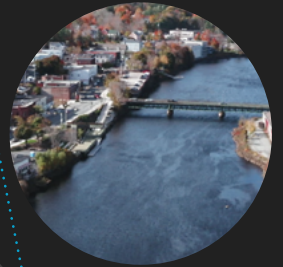
Commit to engaging stakeholders - especially residents - early and often: Local governments worked closely with community

partners to ensure that diverse perspectives are included in projects and initiatives. Residents should be engaged early and often to ensure that their needs are integrated to build ongoing trust and relationships between governments and their residents.

Govern data and technology: Local governments see value in data as a resource to support operations and decision making. This is partially due to the different motivations and skills of, and opportunities for, different departments and organizations. To effectively and collaboratively use data as a resource, governments must explicitly address data and technology governance.

Monitor and evaluate your goals and process: Communities face challenges both internally with processes as well as with setting and achieving realistic outcomes. They want to demonstrate the impact of their work and how individual projects and successes are transformative to their local government operations and desired outcomes. The increased adoption of monitoring and evaluation frameworks will help track progress and communicate success and learnings beyond a team, department, or local government.

SEVEN OPEN SMART COMMUNITIES IN PRACTICE



District of Squamish, BC

City of Calgary, AB

City of Saskatoon, SK

Town of Churchill, MB

City of Trois-Rivières, QC

City of Fredericton, NB

Town of Bridgewater, NS

1. INTRODUCTION

Canadian communities are experiencing the effects of various crises, from the COVID-19 pandemic, an ongoing shortage of affordable housing, widespread poverty and inequality, as well as localized impacts of climate change.

These crises have been compounded by systemic underinvestment in core municipal infrastructure and programs.² Ultimately, local governments are increasingly forced to deal with complex, interconnected crises that span jurisdictional boundaries without necessarily having adequate power and resources to do so.³ The Canadian housing crisis illustrates this well. Municipalities across the country, both before and during the pandemic, have stepped up to rent, lease and buy housing units to house residents while also building new affordable housing stock.⁴

In the face of urgent challenges, it can be tempting for government staff to adopt a reactive mindset and reach for the first promising, off-the-shelf technological “solution” to address their problem. And although quick fixes may stave off the worst effects of a crisis in the short term, they can (and often do) cause problems down the road. The issue is that digital technologies are not neutral but rather are products of the context within which they

were designed and created. The idea that digital technologies allow local government staff to sidestep thorny political issues and implement an unbiased solution is an illusion. Digital technologies do not just emerge from nowhere, but rather are artifacts of complex sociotechnical systems and power dynamics.⁵ The place that these digital technologies are given in the planning processes, service delivery, and operations of our local governments is a political choice.

The work of planning, making decisions, and delivering services must continue even if local government staff may be constrained by limited resources, insufficient authority, or gaps in human, organizational, and technological capacity.⁶ Local governments need to move beyond short-sighted decision making towards an intentional approach to digital technologies that considers if and how they can enable thriving, just, and sustainable communities. This means a future in which digital technologies serve current residents’ needs and contribute to the creation of durable public institutions, infrastructure, and democratic processes.

Data-driven decision making and technological innovation — when guided by open, smart principles — can enable local governments to make the most of what they have and respond with more effective, sustainable, and equitable interventions.

(2) Slack and Tassonyi, “Financing Urban Infrastructure in Canada.”

(3) Oulahen et al., “Barriers and Drivers of Planning for Climate Change Adaptation across Three Levels of Government in Canada”; Smith and Spicer, “The Local Autonomy of Canada’s Largest Cities.”

(4) Canadian Urban Institute, How Can the Right to Housing Equip Local Governments to End Homelessness?

(5) Micheli et al., “Emerging Models of Data Governance in the Age of Datafication.”

(6) Spicer, Goodman, and Olmstead, “The Frontier of Digital Opportunity.”

ADDRESSING COMMON PROBLEMS USING DIFFERENT APPROACHES

Local governments have been sold the promise that digital transformation will enable their governments to make smarter, better decisions with bigger impact when they adopt data and digital technologies. Over the past two years, the Open North team has heard about the challenges being encountered when moving towards a more digital government.

The main question this report aims to answer is:

What problems are local government staff encountering when adopting data and technology within their operations and what approaches are they taking to overcome those problems?

This report showcases three problems to adopting data and technology tools that cross-cut projects in a variety of different thematic areas and highlights how local government staff are forming strategies and approaches to address them. The focus in this report is the process of staff analyzing and adopting digital technologies as opposed to the impact of digital technologies on larger, societal outcomes.

This report showcases the approaches taken by various communities and how they are selecting methods to overcome challenges.

The aim is to help local government staff assess and identify their problems, pain points, and the best methods to move forward by learning from other communities doing similar work. The report is structured by problem — first providing an introduction to why the problem is a concern and then reviewing how two or three communities are seeking to address that problem within their context.

This report will be most interesting to city staff in small and medium-sized cities who have some experience with smart city or digital projects. An important gap to note is that none of the highlighted communities represent Indigenous governments. This is important because Indigenous communities are also using data and technology to overcome these and other local challenges. We recommend looking to the work of [The Firelight Group](#) and [The First Nations Information Governance Centre](#) to learn more about this work.

The report concludes by summarizing its key findings and proposing recommendations to overcome gaps in the highlighted community approaches. The report does not need to be read from start to finish; instead, it can act as a reference on specific issues when the challenge becomes clear and there is a need to learn more about other community approaches.

SMART CITIES IN CANADA

WHAT IS A SMART CITY?

The idea of optimizing urban living environments using connected data and technologies has been around since at least the 1970s.⁷ Large technology firms such as IBM and Cisco began to adopt the language of “smart cities” by 2010, when the concept became popular in government, academic, and private sectors.

There have been many attempts to identify what precisely makes the “smart city” different from previous urban models. According to Kitchin, a smart city is one whose “economy is increasingly driven by technically inspired innovation, creativity and entrepreneurship, enacted by smart people” and that “can be monitored, managed and regulated in real-time using ICT [information and communication technology] infrastructure and ubiquitous computing.”⁸

There are many critiques of the smart city, especially the dominant role played by corporations and consultancies in defining the vision of and developing related technologies.⁹ For example, private-sector dominance — also known as corporate capture — is a concern because it incentivizes the prioritization of business interests over the interests of residents.¹⁰ As the recent failed Sidewalk Toronto development proposal demonstrated, plans to embed digital infrastructure into the urban fabric without consultation and consideration of the local context — especially if private-sector interests are involved — could meet with resistance from residents and civil society alike.¹¹

(7) Kitchin et al., “Creating Smart Cities.”

(8) Kitchin, “Making Sense of Smart Cities.” 131.

(9) Hollands, “Critical Interventions into the Corporate Smart City.”

(10) Grossi and Pianezzi, “Smart Cities,” 79.

(11) Morgan and Webb, “Googling the City.”

WHAT IS AN OPEN SMART CITY?

The Open Smart City Guide V1.0 therefore endeavoured to develop a different vision of the smart city, whereby:

Residents, civil society, academics, and the private sector collaborate with public officials to mobilize data and technologies when warranted in an ethical, accountable and transparent way to govern the city as a fair, viable and liveable commons and balance economic development, social progress and environmental responsibility.¹²

The Open Smart City concept was created as “a way to bridge sectors, and to build on good practices so that these systems are developed and governed with the public good in mind.”¹³ An Open Smart City includes five characteristics governing data and technological solutions in the city.¹⁴

(12) Lauriault, Bloom, and Landry, “Open Smart Cities Guide,” 6.

(13) Lauriault, “Chapter 2: Looking Back Toward A ‘Smarter’ Open Data Future.” 11.

(14) Lauriault, Bloom, and Landry, “Open Smart Cities Guide,” 6.

Five characteristics of an Open Smart City¹⁵

1.

Governance in an Open Smart City is ethical, accountable, and transparent. These principles apply to the governance of social and technical platforms which includes data, algorithms, skills, infrastructure, and knowledge.

2.

An Open Smart City is participatory, collaborative and responsive. It is a city where the government, civil society, private sector, the media, academia and residents meaningfully participate in the governance of the city and have shared rights and responsibilities. This entails a culture of trust and critical thinking and fair, just, inclusive and informed approaches.

(15) Lauriault, Bloom, and Landry, "Open Smart Cities Guide,"

3.

An Open Smart City uses data and technologies that are fit for purpose, can be repaired and queried, their source code are open, adhere to open standards, are interoperable, durable, secure, and where possible locally procured and scalable. Data and technology are used and acquired in such a way as to reduce harm and bias, increase sustainability and enhance flexibility. An Open Smart City may defer when warranted to automated decision-making and therefore designs these systems to be legible, responsive, adaptive and accountable.

4.

In an Open Smart City, data management is the norm and custody and control over data generated by smart technologies is held and exercised in the public interest. Data governance includes sovereignty, residency, open by default, security, individual and social privacy, and grants people authority over their personal data.

5.

In an Open Smart City, it is recognized that data and technology are not the solution to many of the systemic issues cities face, nor are there always quick fixes. These problems require innovative, sometimes long term, social, organizational, economic, and political processes and solutions.

WHAT IS THE ROLE OF LOCAL GOVERNMENTS?

Creating smart cities involves many actors, including the private sector, residents, civil society, and governments. However, this report focuses on the role of local governments and the institutional changes that these governments undergo on their way to becoming open smart cities.¹⁶

Digital transformation is a key component of these institutional changes. As opposed to just moving analog services online, digital transformation involves ensuring that “services are designed for digital, [and] they’re designed for users.”¹⁷ Services are redesigned from the ground up to be digital and place the needs of all people using the service first — not simply legacy processes that have been retrofitted with new digital technologies. An example of this is real-time status updates for government applications, such as permanent residency or tax filings.

Becoming a digital government is challenging. Local government staff must navigate the political, historical, and practical context surrounding each of their decisions. Staff must balance considerations from leaders and the community as well as overcome systemic under-resourcing. Through these pressures, staff adopt a variety of approaches to overcome their challenges. The developed solutions highlighted below can serve as inspiration and guides to bring value to other communities. This report shows how different communities have different visions that are locally specific and require different approaches to leverage local relationships and resources to overcome common challenges.¹⁸

(16) Open Smart City and smart approaches are not only being adopted by “cities”, but also by towns, counties, regional governments and other local governments.

(17) Aitken, “Governance in the Digital Age,” 44.

(18) Meijer and Bolívar, “Governing the Smart City”; Spicer, Goodman, and Olmstead, “The Frontier of Digital Opportunity.”

CATALYZING SMART CITIES IN CANADA: THE SMART CITIES CHALLENGE AND THE COMMUNITY SOLUTIONS NETWORK

The Government of Canada — through its public infrastructure department, Infrastructure Canada (INFC) — launched the nationwide Smart Cities Challenge (SCC) in 2018.¹⁹ The SCC aimed to improve outcomes for residents, innovate and think big, create new partnerships and networks, and share their learnings with other communities.²⁰ In 2019, INFC announced four winners: the City of Montreal, QC (\$50 million prize); Nunavut Communities, NU (\$10 million prize); the City of Guelph and Wellington County, ON (\$10 million prize); and the Town of Bridgewater, NS (\$5 million prize). The challenge, through its criteria for success, helped to define how local governments approached developing smart cities throughout Canada.

To continue supporting applicants and winners, INFC funded the [Community Solutions Network](#), which is a community-centric program for city builders to connect and build a national centre of excellence in open smart cities. A program of [Future Cities Canada](#), the Network serves every type of Canadian community: large, mid-sized, Indigenous, small, and northern. [Open North](#) is the lead technical partner and provides valuable research information and learning opportunities, including this report.

This report is part of Open North’s ongoing work on the practical application of the *Open Smart Cities Guide V1.0*,²¹ which defined the

(19) The SCC was modeled after a similar competition in 2015 by the U.S. Department of Transportation. The Canadian competition primarily differed by requiring community participation through the planning and implementation of the smart city projects as well as providing multiple awards based on community size; Goodman et al., “Public Engagement in Smart City Development.”

(20) Infrastructure Canada, “Smart Cities Challenge.”

(21) Lauriault, Bloom, and Landry, “Open Smart Cities Guide.”

characteristics of an Open Smart City. Other related reports include the *State of Open Smart Communities in Canada*,²² which highlighted trends in open smart city initiatives, and *Creating Civic Value in Open Smart Communities*²³ which highlighted the levers city staff can use to ensure civic value is generated by data and technology projects and processes. A full list of resources is listed in [Appendix B](#).

The following three chapters explore three problems impacting communities across Canada as they adopt data and technologies. Each chapter provides select community profiles to highlight how communities are approaching the problem and what resources they are using to find success.

(22) Pembleton et al., "State of Open Smart Communities in Canada."

(23) Claudel and Nitoslawski, "Creating Civic Value in Open Smart Communities."

2. CO-CREATING STRATEGIES WITH THE COMMUNITY

We observe that many local government services and programs do not reach all residents, contributing to the further systematic exclusion of vulnerable people. This increases barriers for residents' participation in the civic, social, and economic aspects of life.

How are local governments working with partner organizations to improve services and programs for residents, with a focus on underserved communities?

WHY ARE LOCAL GOVERNMENTS CONCERNED ABOUT THIS ISSUE?

Local governments across Canada have a responsibility to ensure that all residents are provided with the tools to fully participate in civic, social, and economic aspects of life within their neighbourhoods. This is what is known as a “wicked problem”²⁴ which confounded local governments long before the COVID-19 pandemic began. Yet, during the pandemic and its associated economic shutdowns, access to quality internet became a further exclusionary force — called the digital divide.²⁵

During the 2020 global economic shutdown, instead of digitalization being a future goal, it became an immediate necessity to restart municipal operations, services, and communications to residents. In efforts to mitigate the

negative impacts of the pandemic and communicate public health information to residents, cities rapidly transitioned various aspects of their operations into the online space by using a variety of new technologies and platforms. This was accompanied by the rapid digitization in other forms of life including employment and remote work, education, and even socialization. The relationship between the city, its residents, and between residents digitized nearly overnight.

The impacts of this transition do not affect all residents equally. In fact, the digital divide that already existed within and across cities was amplified by the rapid, unplanned, and uncoordinated shift to digital technologies in all aspects of life. Research has found that the digital divide during COVID-19 has primarily impacted low-income and elderly residents.²⁶ This increased digital barrier builds upon existing exclusions of low-income and elderly residents to fully participate in urban life.

(24) Rittel and Webber, “Dilemmas in a General Theory of Planning.”

(25) It is important to note that the three examples below are medium to large urban centres. The digital divide is most strongly felt in Canadian rural communities, which are not highlighted here; Weeden and Kelly, “The Digital Divide Has Become a Chasm: Here’s How We Bridge the Gap.”

(26) Andrey et al., “Mapping Toronto’s Digital Divide.”

WHAT CHALLENGES DO THEY FACE?

Although tackling inequality in Canada is a long-term challenge, it must begin with equipping all residents — with a central role for structurally excluded populations — with the necessary information and the ability to meaningfully participate in the civic decision making and the design of core city services that impact them.

COVID-19 forced traditional access points to close and be replaced with digital alternatives. This caused a disproportionately negative effect on those without the skills or means to access the internet²⁷ and highlighted the importance of consistent and high-quality digital access for communicating and participating in all facets of life.²⁸

The current challenges require a concerted effort to co-create strategies that lead to equitable outcomes, respect human rights, and support health and well-being. This chapter explores three community examples where staff have made intentional efforts to collaborate with local stakeholders to engage

residents from underserved communities and create opportunities for meaningful participation.

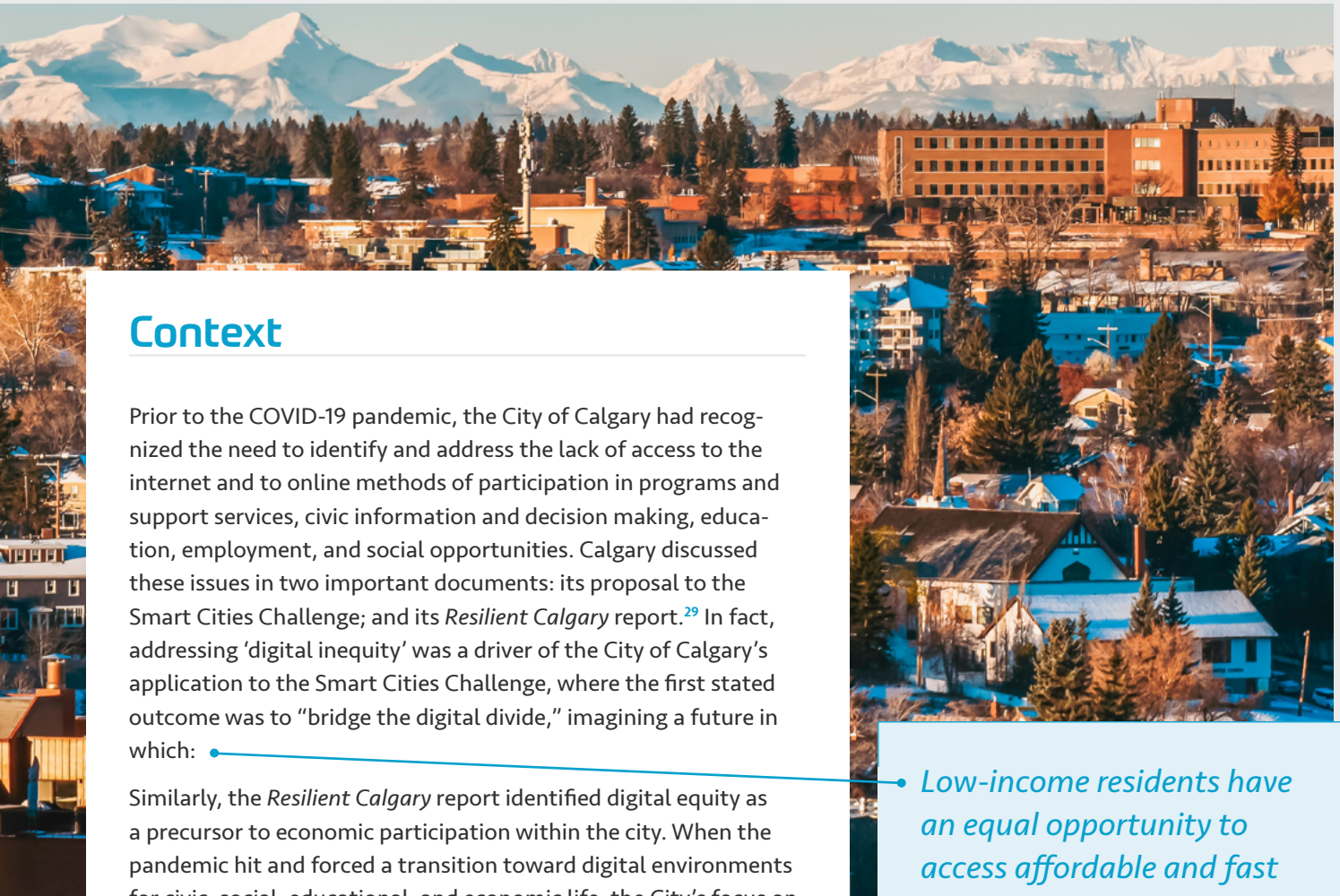
- The City of Calgary pursued a digital equity strategy by first developing an understanding of the level of connectivity, literacy and access around the city through conversations with community stakeholders.
- The staff at the City of Saskatoon were also interested in promoting digital equity through access to the internet, and opted to tangibly address needs in one neighbourhood before expanding the program to other areas of the city.
- The City of Trois-Rivières recognized that emerging equity and inclusion issues, including digital equity, require cross-sectoral collaboration to identify and address the scope of needs. To this end, it facilitated the development of a network of stakeholders to align strategy and allocate resources.

These three examples also underscore that, although it may be unrealistic to solve issues of digital inequity and lack of public participation overnight, every community can take action that gets them closer to a solution.

(27) Andrey et al., “Mapping Toronto’s Digital Divide.”

(28) In the context of urban areas, digital exclusion primarily impacts low-income and elderly residents who do not have the skills to use digital tools and/or the means to purchase reliable and high-quality internet.

PROFILE 2.1: CITY OF CALGARY, AB



Context

Prior to the COVID-19 pandemic, the City of Calgary had recognized the need to identify and address the lack of access to the internet and to online methods of participation in programs and support services, civic information and decision making, education, employment, and social opportunities. Calgary discussed these issues in two important documents: its proposal to the Smart Cities Challenge; and its *Resilient Calgary* report.²⁹ In fact, addressing 'digital inequity' was a driver of the City of Calgary's application to the Smart Cities Challenge, where the first stated outcome was to "bridge the digital divide," imagining a future in which:

Similarly, the *Resilient Calgary* report identified digital equity as a precursor to economic participation within the city. When the pandemic hit and forced a transition toward digital environments for civic, social, educational, and economic life, the City's focus on bridging the digital divide was reinforced further.

(29) City of Calgary, "Resilient Calgary."

Challenge

Despite digital equity having been identified as a challenge area in the SCC application and the *Resilient Calgary* report, these documents did not result in the provision of adequate funding that would allow action to address digital challenges across the city. As the COVID-19 pandemic began to rapidly shift the way residents interacted in all spheres of life, the issue of digital equity in the City of Calgary reemerged as a critical issue.

Low-income residents have an equal opportunity to access affordable and fast connections through technology-in-hand. They are free to engage with their communities in new and different ways. They can access new employment opportunities, training programs, educational programs and connect with family and their community.³⁰

(30) City of Calgary, "Outcomes."

Approach

Through prioritization and short-term service pivots, city operations continued during the onset of the pandemic and pivoted to providing critical services to vulnerable neighbourhoods.³¹ For example, *Calgary Neighbourhoods* — the City’s business unit tasked with addressing the social needs of individuals and communities — worked with community partners to coordinate the delivery of computers to vulnerable populations through existing networks of service providers and associations. The relative ease of the transition to a digital work environment was the outcome of disaster planning and preparation in response to the 2013 floods in Calgary and ongoing weather events such as fires, droughts, and hail that are induced by climate change. City staff have clear procedures and experience transitioning to online and remote work environments.

Through this short-term, action-oriented work, the need for a longer-term strategy to address the digital divide and the lack of internet access for communities and individuals emerged as a priority. Although the delivery of laptops met an important need for hardware, without quality access to the internet, residents struggled to get information from the city, continue to study, work, pay bills, or participate in social activities.

(31) This program targets low-income Calgarians, children and youth, and seniors.

Leveraged Capacity

Two individual city staff, one from *Calgary Neighbourhoods* and the other from Information Technology (IT), were seconded to work exclusively on developing a strategy for “Digital Equity.” After quickly recognizing gaps in community knowledge and unique localized challenges, the duo endeavoured to create an ecosystem map of service-providing organizations. They took a one-on-one approach to building connections with individuals at organizations that already have trust-based relationships with vulnerable communities. One external advisor explained that “part of connectivity is partnering with people who work with these people directly [...] and have access to these communities.” This outreach involved having conversations with service providers and other local groups, listening to the challenges that emerged within the “new” normal of a largely online world. Through these conversations, they identified organizations as strategic partners and will co-create a strategy; some of these organizations will be less active in the planning phase and some will be solution-focused (i.e., telecommunications companies). The aim is to build on the information from the one-on-one conversations and work with community stakeholders to develop a strategy to collaboratively address digital inequity as a city.



Future Directions

While the final strategy is still being developed, important directions have emerged:

1. The initiative will establish an internal advisory group composed of individuals in various business units who have expressed an interest in supporting digital equity across the city. In addition to the internal advisory team, the staff envision a formalized network with an established governance structure that includes service providers and local associations working together to implement aspects of the strategy.
2. The strategy will include direct engagement with vulnerable people to validate and deepen the city's understanding of the challenges associated with a lack of access to the internet. This will complement ongoing data and information stemming from the network of intermediary organizations.
3. There is a recognition that any digital equity strategy must be integrated with other existing and emerging City of Calgary strategies. For example, digital service standards must be designed to ensure that they are responsive to residents. Similarly, local government staff should create digital engagement strategies that accommodate residents' digital skills and ability to engage online. Further, the digital equity strategy must complement the goals of other strategies such as age-friendly strategies, local immigration partnerships, and other poverty eradication strategies.

The City acknowledges that the impact of the digital equity strategy will largely depend on how it interacts and partners with adjacent strategies and processes.



PROFILE 2.2: CITY OF SASKATOON, SK



Context

The City of Saskatoon — the largest city in Saskatchewan — was a top 20 finalist in the 2018 Smart Cities Challenge. Although unsuccessful in their application, their participation in the process sparked conversations and action among city staff. Saskatoon identified access to the internet as a key priority area in their Smart Cities Challenge submission.³² One of the application's key objectives was the installation of internet access points at various locations throughout the city in order to provide youth — specifically Indigenous youth — with access to a digital portal to connect them to relevant information and services.

(32) City of Saskatoon, "ConnectYXE Smart Cities Challenge."

Challenge

Like in many cities across Canada, the COVID-19 pandemic reinforced the necessity of internet access for Saskatoon residents. While businesses and services (such as libraries) that previously provided internet access were closing due to public health measures, other elements — schools, work, and city information and services — were increasingly being delivered online. The pandemic highlighted the digital inequity that existed, as stated:

The COVID-19 crisis has forced our attention towards the systemic problems impacting vulnerable people in our community. Low-cost Wi-Fi Internet access points, often the only means of accessing critical services are often impractical to reach, cost prohibitive, or unwelcoming to the general public.³³

(33) City of Saskatoon, "Public Internet Access Pilot Project Charter."

Approach

In response, the City of Saskatoon approved funding to initiate a pilot project for free public Wi-Fi that would both address the immediate needs presented by the COVID-19 pandemic and generate an evidence base to help the City develop an understanding of what its role should be in future initiatives. Even though the pilot project was a response to an urgent need, city staff still wanted it to align with their long-term goals to improve digital capacity and digital transformation in the City.

The pilot project was developed in collaboration with the Inter-Agency Response to COVID-19 Team, a group made up of community-based organizations. The location for the pilot project was selected based on data collected by the Inter-Agency Response team and the Saskatoon Public School Division, in combination with census data identifying populations with high equity needs. Based on this data, it was deemed that there was a solid enough foundation to initiate the pilot project without first directly engaging residents — which would have been complicated by provincial restrictions and City engagement policies limiting in-person gatherings to maximize safety for staff and residents during the pandemic. Ultimately, the City decided to delay its resident engagement until it was able to do so in a way that would meet the unique needs of this demographic while observing local health orders and civic engagement policies during the pandemic.

Leveraged Capacity

The City decided to take action, using limited existing infrastructure and co-creating a strategy with community-based organizations. Although there was an established Inter-Agency Response to COVID-19 Team that validated the need for the project, the member organizations were primarily focused on their own direct response and could not commit to data sharing or collaboration during the pandemic. An outcome of the pilot project is to identify and develop partnership opportunities with service-providing organizations, community associations, and businesses. The City is now exploring partnerships with all relevant stakeholders, including businesses, community groups, educational institutions, and other cities or experts who are deploying public Wi-Fi initiatives.

The City is also working on a grant application to hire two students. Its plan is to use this additional external capacity to study the impact of building materials on the strength of the public Wi-Fi signal, as well as to develop metrics for the project.



Future Directions

Saskatoon's pilot project demonstrates a commitment to quickly respond to needs articulated by concerned resident groups. Because residents were not consulted prior to the implementation of the pilot project, the City intends to conduct a robust engagement process with a focus on the implementation of the project. Specifically, the public engagement strategy will involve engaging with residents living in the pilot location to learn if they were able to access the wireless internet service, how well it worked for them, and what improvements could be made if the pilot project were to be expanded. City staff recognize that although they may not necessarily have the trust-based relationships required to meaningfully engage residents, project planning for the pilot has allowed City staff to begin to develop relationships with organizations (i.e., school boards and community-based organizations) that have existing relationships with potential beneficiaries in the community.

Despite the limited scale of engagement for the wireless internet initiative, city staff have not lost sight of the need to develop and build upon the pilot project success. Information and learnings will contribute to a long-term strategy that aligns with the overarching needs of the community. The City of Saskatoon's strategic plans include the development of a smart city strategy including better access to online city services. A cornerstone of this strategy will be to improve their understanding of how to address digital inequity, which is compounded by non-existing or poor internet access that limits access to online city services. Equitable access to the internet is a necessary precondition for many of the digital elements outlined in other corporate strategies (e.g., the Fibre-optics strategy, bus rapid transit strategy) and will require attention and prioritization within Saskatoon's digital planning. In the long run, the project will enable residents to participate in decision-making and engage in ways that they were never able to in the past. It will facilitate participation in other areas of life including social, educational, and work options.



PROFILE 2.3: CITY OF TROIS-RIVIÈRES, QC

Context

The City of Trois-Rivières is a mid-sized city located between Québec City and the City of Montréal along the St. Lawrence River. The community faces a number of cross-cutting challenges, especially retaining local expertise and talent from their higher education institutions. For example, private and public institutions alike have difficulty recruiting and retaining staff despite Trois-Rivières' student population of over 10,000. This, among other local challenges such as creating a sustainable city, led the City to develop its [Plan Stratégique de Communauté Intelligente](#) [The Smart Community Project strategy]³⁴ to focus on intersectoral collaboration rather than mere technology adoption.

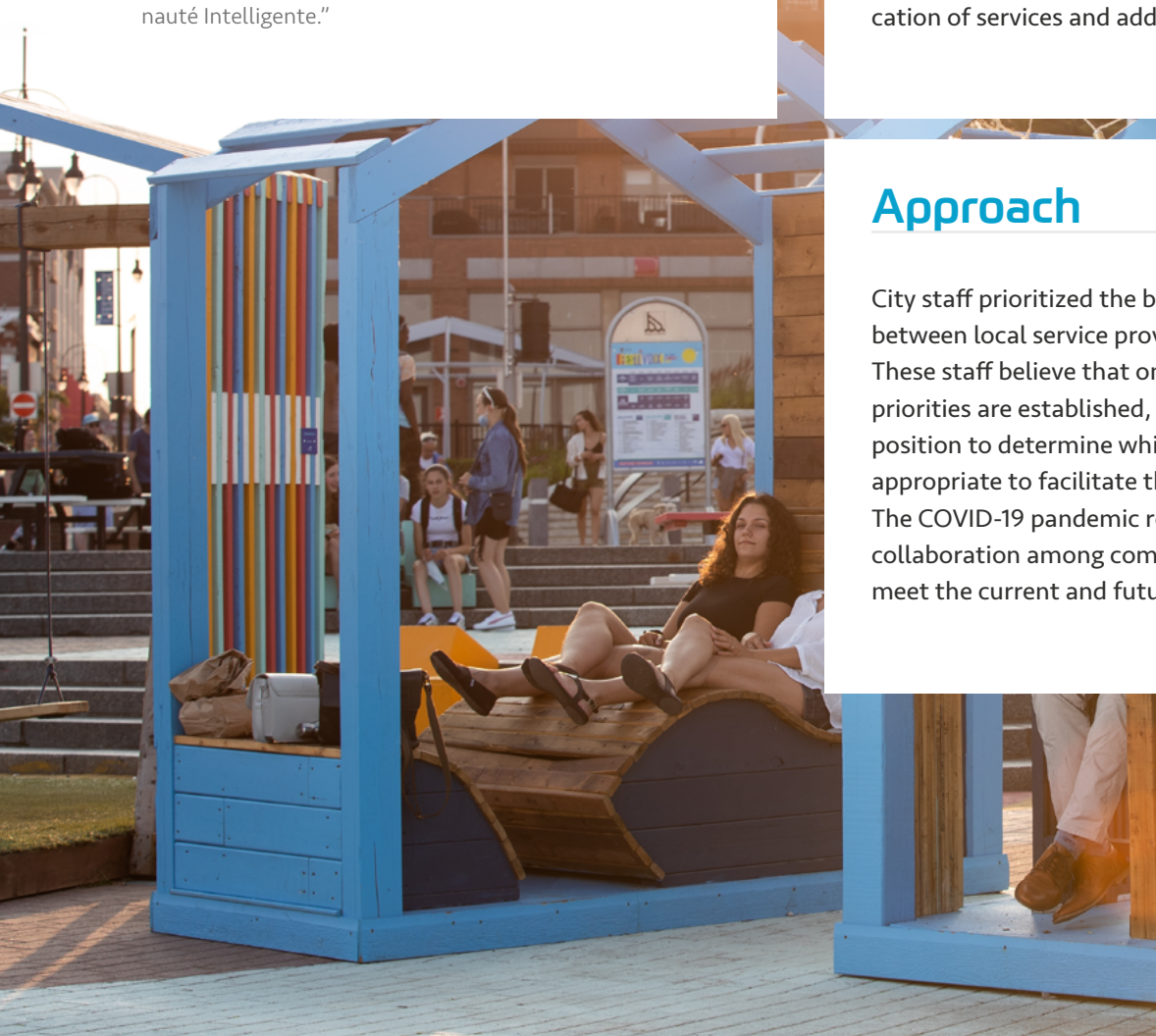
(34) City of Trois-Rivières, "Plan Stratégique de Communauté Intelligente."

Challenge

Although the community faces a number of emerging issues in different areas, the various public-facing stakeholders continue to predominantly work in isolation to address them. The City has recognized that there is no single institution responsible for addressing many of the community challenges and, thus, a collaborative approach is required. Despite having access to the technology and data to improve and tailor service delivery within Trois-Rivières, there are gaps in reaching the needs of some of the population. Each of the public-facing organizations — including public health, school boards, economic development and business associations, and academic institutions — has a strategy for addressing the diverse needs of residents in Trois-Rivières. What is lacking is clear and ongoing communication between and among these organizations with a focus on avoiding duplication of services and addressing gaps.

Approach

City staff prioritized the building of relationships between local service providers and stakeholders. These staff believe that once the relationships and priorities are established, they will be in a better position to determine which technology is most appropriate to facilitate the desired collaboration. The COVID-19 pandemic reinforced the need for collaboration among community organizations to meet the current and future needs in Trois-Rivières.



Leveraged Capacity

The City recognizes that there are extensive skills, experience, and resources within the other public-facing institutions operating in Trois-Rivières. Although the individual strategies of these organizations do not include collaborative approaches, there are overlapping areas of interest and priority. Through a multi-stage process, the organizations will identify key people who have a broad perspective on programs and services and present this to the members of the advisory group. Following the completion of the organizational presentations, the members of the advisory group will propose a project under one of the three identified topics including civic participation, mobility, and green technology. The advisory group will then prioritize a few tangible projects for collaboration and demonstrate how to be a “smart” community. The emphasis of the demonstration project on smart communities is to communicate that it is within the scope of responsibility for each organization, not just the City.

Future Directions

The future will involve a collaborative governance approach to focus on harder-to-reach and marginalized populations within the City. Although the advisory group has acknowledged the challenges of homelessness, immigration, and a lack of economic opportunities, the initial proposed projects will aim to make a tangible impact in the broader community. Once the structure for collaboration is established and they have successfully completed some demonstration projects, the advisory group will address the digital divide and dive deeper into projects that include Artificial Intelligence, smart mobility, and other open smart community technologies.



SUMMARY

In this chapter, we have seen how three local governments worked with partner organizations to serve their residents. Each community profile focused on underserved communities, with the aim of ensuring that all residents are able to meaningfully participate in civic, social, and economic life. The following section summarizes how three communities approached this work.

Comparing the community approaches:

Although each of the community examples had a different catalyst, all recognized the need to create a broad network of stakeholders to adequately identify and address their challenges. While recognizing the emerging challenges of homelessness and a lack of community inclusiveness, Trois-Rivières determined that its starting point needed to be an alignment of strategies between local service providers and stakeholders. Similarly, Calgary recognized a gap in its knowledge and data regarding residents' digital needs and then developed a stakeholder map to identify where and who they could go to for information. In contrast, Saskatoon determined that it could learn and develop collaborative relationships by taking action on a pilot project to meet the connectivity needs of a specific neighbourhood. Broadly, each community aims to end up at the same place: meeting the needs of residents in an increasingly digital and online world. This requires the pursuit of broad community strategies like those in Trois-Rivières, targeted strategies like those in Calgary, and decisive action like those in Saskatoon.

The approach tradeoffs: There is no “right” approach to these challenges, as contexts and needs differ; ultimately, it is up to city staff to decide. Calgary is relying on the relationships of intermediary organizations to develop their initial strategy, which allows for quicker development, but does not contribute to the immediate development of relationships between the City and its residents. Saskatoon's commitment to action has suffered for the lack of an overarching strategy, but for one neighbourhood the solution will come sooner rather than later. Trois-Rivières has not begun to identify the specific challenges of its most vulnerable populations, but each public-facing institution is working to align their strategies and ensure that resource allocation is maximizing its potential impact and minimizing duplication. What is important across each community is that the emerging networks consistently review who is not present within the group and who as a result is not being represented (i.e., immigrants, unhoused persons, Indigenous people). Although all of the cities are looking to support their most vulnerable residents, vulnerability may be experienced by different demographics and/or neighbourhoods.

The community examples within this chapter demonstrate the interconnectedness of the challenges facing cities. For example, in taking decisive action to pilot a free Wi-Fi program for one neighbourhood, Saskatoon has encountered technology procurement challenges. When trying to determine where digital exclusion exists within Calgary, they recognized a lack of available data.

3. COLLECTIVELY MANAGING INFORMATION AND DATA

We observe that local governments are not making consistent and deliberate decisions about the collection, management, and sharing of data, thereby limiting their ability to use data to address complex challenges in their communities.

How are local governments working to improve their data governance practices so that data can more effectively be leveraged towards transparent and collaborative decisions?

WHY ARE LOCAL GOVERNMENTS CONCERNED ABOUT THIS ISSUE?

Municipalities are responsible for providing many of the services that residents rely upon — including road maintenance, public transit, water and waste management, emergency response, planning and development, and more. However, the resources available to local governments are increasingly insufficient for the range of responsibilities assigned to them.³⁵

Local governments seek solutions that will allow them to leverage their current capacities to be more efficient and effective in their work. Improved data practices are seen as one way for city administrators to gain insight into the complex challenges they face by exposing interconnections and gaps in existing problems, policies, and services.³⁶ Ultimately, it is hoped that better use of data will allow cities to make the best operational, programmatic, and policy decisions within their current capacities.³⁷

(35) Oulahen et al., “Barriers and Drivers of Planning for Climate Change Adaptation across Three Levels of Government in Canada”; Smith and Spicer, “The Local Autonomy of Canada’s Largest Cities.”

(36) Aitken, “Governance in the Digital Age.”

(37) Evans, Siesfeld, and Zapata Encinas, “Closing the Data Gap.”

WHAT CHALLENGES DO THEY FACE?

Although many local governments are making efforts to use data-informed approaches, they still struggle to implement the processes needed to realize the potential of their data and its impact on the lives of residents.³⁸ In part, this is due to the need for local government staff to balance the motives and values of different stakeholders at different levels (e.g., individual, team, organizational, and interorganizational) who make decisions about what data they collect, how it is collected, and for what reasons. These decisions are made based on the goals of their work as well as their values and resources for data collection and management and may lack in data quality, standardization, and sound methods for reuse.

As seen in the previous chapter, local governments also collaborate with many internal and external teams to solve local challenges, creating a large pool of organizations where it would be beneficial to source data. For example, we saw how a project team conducting a free Wi-Fi pilot project sought to understand internet access needs through

(38) Chatwin and Landry, “Making Cities Open by Default.”

a team of local partner organizations, such as the school board. However, if each organization makes its own decisions about data management, the data management procedures will likely differ between organizations and therefore be harder to integrate. The successful integration of systems, processes, and policies is frequently dependent on cooperation between numerous stakeholders, including across multiple departments, organizations, and other governments.

Access is particularly challenging in situations where municipalities are dependent on other governments or organizations:³⁹ “coordination and standardization of data has long been a challenge in Canada, particularly with its federated form of government and its multiple levels of jurisdiction.”⁴⁰

(39) Privy Council Office, “Report to the Clerk of the Privy Council.”

(40) Ferron and Landry, “COVID-19: The Challenges and Opportunities for Canadian Interoperability and Open Government,” 1.

This chapter discusses two examples of communities seeking to use data to support their strategic goals and community needs. In the first case, the District of Squamish, BC, seeks to facilitate consistent data management and sharing across departments as it rolls out its open data program to support more effective decision-making. The Town of Churchill, MB, is working to better manage and analyze data in order to act proactively towards climate resilience. In the case of Squamish, the driving factor is improved government transparency, whereas for Churchill, data is needed to address the immediate impact of climate change.

PROFILE 3.1: DISTRICT OF SQUAMISH, BC

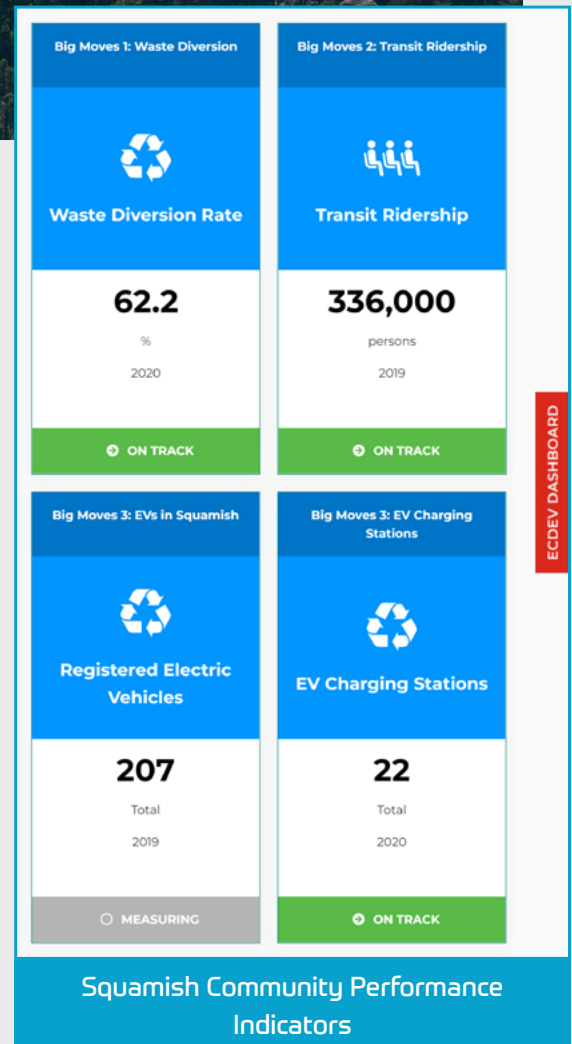


Context

The District of Squamish is located 45 minutes north of Vancouver and south of Whistler. Although its population has been growing rapidly, the District remains relatively small. The cost of living in Squamish has also increased in recent years, leading the District to prioritize measures to improve the community's affordability, such as increased affordable housing, access to childcare spaces, local and regional transportation networks, and local employment opportunities. In addition to these focus areas, the District has placed significant emphasis on addressing climate change.⁴¹ As the District continues work on these initiatives, data plays an integral role in helping staff understand the community's context and the need to make well-informed decisions.

In 2017, Squamish launched its open data portal to modernize the process of responding to requests for information, primarily for geospatial data, by external stakeholders. The portal made open data self-serve, improving the experience for those submitting the requests and for the staff responding to them.

⁽⁴¹⁾ The District's Council endorsed a Community Climate Emergency Resolution in 2019, and more recently, adopted a Community Climate Action Plan.



Context (cont.)

The District further used its opened data in the process of updating the *Official Community Plan* (OCP) in 2016-2018, particularly to facilitate tracking progress using key indicators on strategic priorities. In 2018, the District's Economic Development team also set out to improve access to and the quality of local-level data.⁴² These two initiatives culminated in two public dashboards:⁴³ the [Economic Development Community Dashboard](#), and the [Community Performance Indicators Dashboard](#).⁴⁴

(42) This work was undertaken by the Economic Development team, with its partners Tourism Squamish and Squamish Chamber of Commerce, and using funds received via the BC Rural Dividend. Partners established a set of measurements with underlying methodology and collection methods and used that as a basis to collect primary business-related data, create the indicators dashboard, and identify data gaps to be filled.

(43) While dashboards have been a go-to tool for local governments seeking to put their data to use, they have not been without criticism. For example see: Bartlett and Tkacz, "Governance by Dashboard"; Kitchin, Lauriault, and McArdle, "Knowing and Governing Cities through Urban Indicators, City Benchmarking and Real-Time Dashboards."

(44) District of Squamish, "Squamish Community Performance Indicators."; District of Squamish, "Economic Development Community Dashboard."

*[We] needed one centralized place to go for data to track indicators. It used to be a lot of work to identify key indicators and develop a narrative around them - i.e. what they mean, what targets are, justifications for tracking them. [The dashboards provided] consistent reporting and consistent indicators that could be pointed to.*⁴⁵

(45) Interview with Dan Griffin, Manager of GIS and Data Services.

Challenge

The District's objective is to improve the governance of their internal data via consistent and systematic data collection, management, and reporting across government departments, to support better decision-making and policy making. Many datasets — such as population numbers from different sources — are still reported inconsistently. The District has achieved success with certain datasets on the portal, but aim to bring consistent data management to new datasets between departments. This would allow for improved internal collaboration and decision-making across the organization.

Approach

Squamish’s approach is to facilitate an organization-wide shift in data practices. The District’s internal *Open Data Working Group* played a pivotal role in driving this effort and ensuring that change is not limited to a single department. The team currently focuses on internal procedures, such as identifying internal data needs and designing a framework for publishing and sharing data between departments.

So far, internal work has resulted in a governance approach intended to guide the organization towards a staff-led process to consistently manage and maintain data.

- **Open Data Principles:** The District’s council adopted seven open data principles⁴⁶ based on principles from the [International Open Data Charter \(ODC\)](#).⁴⁷

(46) The seven principles include six from the ODC – Open by Default; Timely and Comprehensive; Accessible and Usable; Comparable and Interoperable; For Improved Governance and Citizen Engagement; For Inclusive Development and Innovation – and a seventh principle, Protected, which refers to protecting data for the safety and security of residents.

(47) International Open Data Charter, “International Open Data Charter”; District of Squamish, “Committee of the Whole – 09 Mar 2021.”

- **Policy:** Squamish is developing an Open Data Policy which outlines the District’s roles and responsibilities pertaining to the open data program, as well as the process for identifying, publishing, and maintaining open data in accordance with the principles.⁴⁸
- **Framework and Guidelines:** The team is also developing guidelines for District staff in the form of an internal framework of procedures. The guidelines operationalize the principles and guide staff on procedures to follow for open data publication, maintenance, and evaluation.⁴⁹

As the team continues with the implementation of the open data program, ongoing decisions are being made to steer the maintenance of the portal and dashboards. This includes refining the indicators and identifying additional datasets to add to the portal. Although work on these tools is still underway, the early versions of the portal and dashboards proved to be valuable for getting buy-in from senior leadership. By demonstrating the unmet potential of the tools to support government decision-making, the working group was able to get support to fund and staff the continuation of the program.

(48) Del Pino Injoque, “Incorporating Stakeholders in Policy Assessment.”

(49) Del Pino Injoque



Leveraged Capacity

The *Open Data Working Group* drives Squamish's open data program. The group was created to develop the Open Data Portal, which was initially an initiative without a budget, orchestrated solely to meet an internal need. The cross-departmental nature of the working group⁵⁰ facilitates the organization-wide change that is needed to create an internal culture to value and steward data.

(50) The Open Data Working Group, which continues to operate on an ad-hoc basis, is composed of the District's GIS Supervisor, Senior Community Planner, Economic Development Officer, and Senior Business Analyst.

Box 3.1: Open data supporting childcare access

Squamish's planning department is advancing childcare access with Vancouver Coastal Health and local service partners. As this is part of the District's community plan, Squamish is conducting data analysis on the topic of early childhood development and reporting on childcare access in the community publicly via the Community Performance Indicators Dashboard. This has enabled community stakeholders to monitor progress on this local challenge.

Future Directions

As its data systems and processes are modernized, Squamish needs to accompany their work on data policies, procedures, and principles with data literacy training and resources. As a first step, internal data literacy will play a key role in ensuring that staff use the developed principles, policies, and procedures to produce and maintain open data. It will also help to ensure that staff understand the value of data in their own work and when communicating their work to the community.

In the future work, the Open Data team aims to engage with the public to learn from external users of the portal and dashboards. This would help the team understand how the tools are being used, where there are additional data needs, what value is being derived from the data, and how the tools can be improved.

The *Open Data Working Group* values using data as a tool to support decision-making. The aim is ultimately to go beyond internal data stewardship, and towards using data to drive research and decision making across the

organization, community, and within the greater region. A recent example of further success is the [Howe Sound/Átl'ka7tsem Marine Reference Guide](#),⁵¹ a regional collaboration with government and non-government partners to create an integrated resource for decision making. This recent success provides a motivating example on how the data-informed work can continue to support addressing complex local challenges in the District.

The District of Squamish has taken great strides to leverage open data for effective collaboration and decision-making. As it functions under the reality of competing priorities, the team maximizes its impact through a strategic and incremental approach to expand its open data program, giving priority to efforts that best support the District's programs and service delivery.

(51) MakeWay, "Átl'ka7tsem/Howe Sound Marine Stewardship Initiative."

PROFILE 3.2: TOWN OF CHURCHILL, MB

Context

The Town of Churchill is a small, remote community located in the far north of Manitoba. In 2017, extreme flooding washed out sections of the railway corridor linking the town to Winnipeg, disconnecting Churchill's only land connection to southern Canada for 18 months.⁵² Such crises are symptomatic of the challenges facing northern communities with the progression of climate change. As Churchill recovers from the rail outage, it plans for the future and, in 2020, the Town of Churchill released its [Climate Change Adaptation Strategy](#).⁵³

The strategy emphasizes long-term and proactive adaptation practices to increase community resilience amid a changing climate. The plan is structured around seven goals, several of which emphasize the use of data to support decision-making. For example, Goal #3: Strengthening buildings and key infrastructure:

In this profile, we focus on the Town of Churchill's ongoing efforts to adopt data-informed practices as it works towards a safe, healthy, and prosperous future for the community.

(52) Donald, "Plans Are Just the Start — Sub-Arctic Communities Need a Whole-of-Society Approach to Carry Them Out."

(53) Town of Churchill, "Climate Change Adaptation Strategy."

*A place that follows the best practices to adapt proactively, focusing on municipal infrastructure, assets, operations and service levels to minimize risk for residents, businesses, community organizations and municipal staff.*⁵⁴

(54) Town of Churchill, "Climate Change Adaptation Strategy," 11.

Action 3.1: Integrate climate change adaptation and asset management:

- Collect data to accurately identify climate change-related infrastructure vulnerabilities;
- Institutional knowledge needed for maintenance needs to be documented and there needs to be a move away from focusing on short-term goals.

Action 3.2: Adopt technologies for data driven decision making:

- There is a need for up-to-date mapping and Geographic Information Systems (GIS).⁵⁵

(55) Town of Churchill, "Climate Change Adaptation Strategy," 47.



Challenge

Staff face several hurdles pertaining to the use of data in their climate change adaptation planning. Currently, the majority of Churchill's data assets are not digitized. Additionally, the Town lacks access to many third-party datasets that are essential to making informed decisions with its climate change adaptation work. This is due in part to the fact that much of the infrastructure within Churchill is under provincial or federal jurisdiction (e.g., housing) or run by private-sector organizations. These organizations have datasets, such as LiDAR⁵⁶ and other geospatial data, which would enable Churchill to develop permafrost and flood-risk maps.⁵⁷

Upon identifying priority datasets, the Town has encountered challenges to gain access to data from third-party providers; requests for access have been met with delays or resistance.

(56) There is a precedent for using LiDAR to address climate change adaptation in Manitoba, i.e., a video training series developed by the Red River Basin Commission helps to highlight benefits from using LiDAR tools to create a climate adaptation plan for local governments. For more information, see [LiDAR and Climate Adaptation Series](#).

(57) Town of Churchill, "Climate Change Adaptation Strategy," 49.

Approach

A necessary first step in Churchill's approach was to access datasets currently held by third parties. Once they have access to these priority datasets, they plan to acquire GIS and asset management software to help manage and analyze the digital data as an asset for decision making. The team gained support from senior management for the software acquisition by presenting key use cases for how the software would be a valuable pilot project in the overall implementation of the adaptation strategy. The local government has set aside funding for software and training.

Box 3.2: Flooding driven by climate change

As the permafrost under Churchill thaws, the community struggles with flood management. Much of the town's housing stock sits on top of areas with poor drainage and is subject to severe flooding damage. A key challenge is that the local government does not currently hold the data necessary to monitor and track flooding and its impacts, and therefore is only able to reactively respond to the flood damage. Recognizing that this is an expensive and inefficient approach, the Town is trying to access key data which would enable it to make proactive plans — in collaboration with the Province — for mitigating the worst flooding impacts.

Leveraged Capacity

The acquisition of external capacity was integral to the development of the *Climate Change Adaptation Strategy*. Churchill hired a climate change adaptation coordinator, a role which was funded by the *Federation of Canadian Municipalities (FCM)*.⁵⁸

The Town is aligned on its strategic priorities, particularly on the need to become a more resilient community and to generate economic growth. This strategic alignment makes it easier for staff to seize any opportunities that arise and chip away at these long-term challenges.

(58) The role was occupied and funded for two years

Future Directions

Churchill's initiative to use data to inform climate change adaptation is ongoing. The team has a climate change adaptation strategy that integrates data-informed decision-making, as well as secured funding to acquire software to act on their plans. The team was able to demonstrate that working together to build a plan for the community works. The next steps include gaining access to essential external data.

For this Northern community, planning and decision-making on climate change is immediate and high stakes. Despite its priority to make data-informed decisions, the Churchill team has struggled to maintain internal capacity around climate change as well as to make strides on securing crucial data for their climate change planning. Their work highlights

- (a)** the potential value of data to support long-term decision making amid changing conditions; and
- (b)** the increasing need for governments and other organizations to effectively collaborate to ensure informed decision making.

This case is an example of competing priorities between organizations that ultimately impacts residents. Better alignment on goals could support collective action in the public interest.



SUMMARY

These ongoing efforts by the Town of Churchill and the District of Squamish demonstrate the value of data to support local government decision-making, particularly in response to complex challenges such as climate change. This chapter explored the numerous hurdles and decision points that governments face as they implement consistent and deliberate data practices, as well as how this work requires cooperation across departments as well as with other organizations and governments.

Comparing the community approaches:

Both communities seek to implement more consistent data practices in order to support informed, justified, and forward-thinking decisions. Squamish is pursuing this work by making data already held by the municipality more accessible — both internally and externally. Strong data governance practices, especially when paired with open data, result in: creating the potential for local governments to be more transparent and responsive to the needs of residents; supporting collaboration with other organizations and governments. Churchill has initiated this work by identifying datasets that will help staff make decisions more proactively, and ultimately support better service delivery in a changing environment. However, Churchill differs from Squamish as the data required for its climate adaptation

planning is held by external parties — requiring data sharing supported by inter-organizational cooperation. As Churchill pursues this work, the decisions it makes about data — both the data they already hold, and data shared by other organizations — will be critical in determining its potential value for the Town's climate change adaptation work.

The approach tradeoffs: These communities face challenges that are common to local governments pursuing data programs. Churchill faces dual challenges of gaining access to quality data and maintaining and/or acquiring staff capacity. Although limited resources, authority, and capacity pose a barrier to short-term progress, laying the groundwork for consistent data practices will ultimately help the Town make more impactful decisions, thus maximizing its limited capacity, in the long term. As a relatively larger organization, Squamish has access to more data and staff capacity, yet still faces the challenges of supporting systematic data practices across departments. As it continues to expand its open data program, Squamish may face considerations related to governing data sharing with neighbouring jurisdictions and how best to engage residents and other stakeholders to ensure that the open data portal and dashboards are meeting their needs.

4. RETHINKING THE PROCUREMENT OF DIGITAL TECHNOLOGIES

We observe that local government procurement of digital technologies requires public servants to adapt their procurement processes to increasingly dynamic and opaque digital technologies. Established procurement processes are not adapted to meet the needs of the government and solve community challenges.

How are local governments procuring digital technologies to meet their needs and the needs of their community?

WHY ARE LOCAL GOVERNMENTS CONCERNED ABOUT THIS ISSUE?

This chapter focuses on the government's acquisition — or procurement — of technology goods, services, and works from external providers.⁵⁹ Traditionally, procurement consists of the following steps: identifying a need; researching market options; announcing the call for solutions via a Request for Proposals; receiving and selecting options; and signing a contract.⁶⁰ However, the increasing adoption of digital technologies poses new challenges to acquiring goods and services.

Digital technologies are increasing in complexity and opacity at the same time as they are being deployed to support more local government operations and services. For example, technologies are becoming increasingly interconnected, both via networks and in their hardware. Because digital technologies

are rarely all procured from a single vendor, interoperability becomes an important consideration. For example, intelligent traffic management systems are composed of many discrete pieces of technology including cameras and sensors mounted on traffic lights or embedded in the roadway. These systems become roadside units which collect, process, and transmit information back to operations centres from moving vehicles, pedestrians, and other people using the road space. All of these technologies must be able to talk to each other for the system as a whole to function properly, even when procured separately.

This is further exacerbated by the rapid acceleration of digital procurement since the start of the COVID-19 pandemic. As stated in earlier chapters, COVID-19 public health measures made it increasingly necessary to depend on digital technologies to participate in all aspects of life as well as communicate between residents and local governments. For local governments, this meant an acceleration of acquiring digital alternatives with shorter "ramp up" periods to changing services.

(59) Governments generally develop some technologies in-house, although most of their technologies are acquired from external providers, such as "off-the-shelf" solutions, or because expertise does not exist within the government.

(60) Claudel and Wylie, "Technology Procurement: Shaping Future Public Value."

WHAT CHALLENGES DO THEY FACE?

One of the key challenges in procuring digital technologies is balancing the needs of users with the technical criteria for technologies to work together for local government staff. This requires a delicate balance between clearly understanding the need for the technical solution, meeting technical criteria for internal interoperability, and having a user-centred solution that is easy for city staff and residents to achieve their goals.

Although seemingly easy, it can be difficult for city staff to clearly understand and articulate the need for the technologies within the city.⁶¹ Problem identification and exploration can be swept up in technological solutionism. It is critical that city staff involved in the procurement process are aligned on the need for a solution from the beginning of the process.

Second, technical considerations are becoming more complex and specialized, requiring city staff with strong expertise in information and technology management. In small and medium-sized communities, hiring and retaining such staff can be a huge barrier. Even within large cities in Canada, the increased “stacking” of technologies as well as use of opaque algorithms can make it difficult to fully understand the technology being acquired and its ramifications on operations and service delivery.

(61) Ferron, “Open and Ethical Procurement Guide on Engaging with the Private Sector.”

Finally, all of this should be balanced with operational and user experience of city staff who implement technologies in their daily work and/or residents using the service.⁶² This means working with program and project staff to ensure the technology will fit or adapt to existing processes and policies as well as making it easy for residents to access, use, and achieve what they desire from their local governments.

The combination of complexity in needs and the hyperintegration of digital technologies can make it difficult for teams to work together and balance the needs of city staff and the technical criteria of intelligent systems. This chapter introduces how the City of Fredericton and the Town of Bridgewater are using their procurement processes to better understand their needs in collaboration with external partners. The Town of Bridgewater is working closely with residents experiencing energy poverty whereas the City of Fredericton collaborates with local start-ups, creating opportunities for city staff to engage with problem-solvers and test solutions on a path to better understanding and solving challenges in the community.

(62) Claudel and Wylie, “Technology Procurement: Shaping Future Public Value.”

PROFILE 4.1: TOWN OF BRIDGEWATER, NS

Context

The Town of Bridgewater is a small community situated in the South Shore region of Nova Scotia. In 2019, Bridgewater won Canada's SCC with the project *Energize Bridgewater*. The town received \$5 million to reduce energy poverty by 20% by 2025. Energy poverty is when people spend more than 10% of their net income on energy costs, including transportation, electricity, and home heating.⁶³ As part of the program, the project team is trying to procure an Energy Management Information System (EMIS) to help reduce energy poverty by monitoring and reporting household energy use and emissions. It will also have a resident-facing interface to support household energy decision-making.⁶⁴

When COVID-19 hit in 2020, it impacted program priorities and approach. Within this new context, the team decided to temporarily set aside program work to focus on supporting essential needs.

(63) Town of Bridgewater, "Energy Poverty Reduction Program" 5.

(64) Town of Bridgewater.

*[We] started listening to what was urgent. [We] rapidly assembled a food delivery service for isolated seniors who were unable to access food. [The town] played a coordinating role and demonstrated what the coordinated access approach can achieve.*⁶⁵

— Leon de Vreede, Senior Policy & Program Planner

(65) Future Cities Canada, *Canada's Smart Cities Challenge: Catching Up with the Winners*.

Challenge

The *Energize Bridgewater* project team continues to prioritize its procurement of an EMIS, although there have been delays. The project team, which recently reconsidered their EMIS technology expectations due to internal capacity limitations, faces the following challenges:

- What procurement criteria should be prioritized to ensure that the technology supports the reduction of energy poverty and is financially and technically sustainable over time?
- How can they leverage their limited internal and external capacity to responsibly procure and set up the EMIS?
- How can they proactively consider and mitigate potential new challenges created by the technology, such as resident privacy concerns? This is a particular concern for the Town's legal and procurement staff.

*Things are shifting. How do we know that some technology that the utilities might bring in won't cover some of the needs of the project...what are the must-haves, what are the nice-to-haves. What's going on in the provincial landscape?*⁶⁶

(66) Interview with Jessica McDonald, Energize Bridgewater Project Director

Approach

The project team's priority is to ensure that the EMIS is accessible and helpful to Bridgewater households and property owners, that is, the work contributes to solving affordable energy needs. Initially, the project team tried to recruit technical staff to support procurement and deployment; however, after numerous efforts, they were unsuccessful.

The project team is now considering an alternative approach: outsourcing their need for additional research with external consultants who will review their connected technology innovation mechanism and prioritize key features. Their goal is to ensure that the connected technologies have as few user barriers as possible and are financially and technically sustainable.

Leveraged Capacity

The project team prioritized SCC funding to build strong internal relationships and skill sets to leverage their internal expertise and relationships. For example, they have kept their communications staff internal and organize all staff workshops to generate buy-in and co-create program features.

They also take advantage of external capacities to support the program's goals. The engagement of a core group of community members who are deeply involved in co-creating the program provides more diverse community perspectives.

Additional funding support has come with some key learnings, including that they had under-resourced staffing and program management needs within their SCC proposal, especially at the senior staff levels. As noted in Chapter 3, it is common for IT projects to turn into culture and change management projects that require more resources, time, energy, and buy-in.⁶⁷

⁽⁶⁷⁾ Aitken, "Governance in the Digital Age."



[We] run a session with people from across departments and with support from a professional facilitator... [this is to] make sure that every department and all staff are ambassadors... [and] they understand the project, its value, and can answer questions.⁶⁸

⁽⁶⁸⁾ Interview with Jessica McDonald, Energize Bridgewater Project Director and Coleen O'Neill, Energize Bridgewater Project Manager

Future Directions

In the next stages, the Bridgewater team is open to different possibilities within the procurement process, such as pilot funding before signing a full contract with a vendor. The City of Fredericton takes this approach and will be reviewed in the following section.

Although criteria development is the focus, the cost of the technology will continue to be a large factor in the procurement of the EMIS. Given that the project is supported by short-term SCC funding, how can the Town ensure that it can continue to support the technology after the funding ends?

The Town of Bridgewater highlights the importance of complementing subject matter expertise with internal technical capacities. Although the project is problem-led, with subject matter experts leading the definition of the criteria for procurement, the lack of technical expertise is creating delays in the project and an aversion to risk among procurement and legal staff. They lack the technical skills and are aiming to fill this gap via external consultants.

In the following profile, the City of Fredericton illustrates how they are taking a different approach to acquire technical skills to complement subject matter experts. The City takes an innovation approach, where they seek to use their procurement toolset to meet local economic development goals. *The BOOST Fredericton Lab*, the engine of the innovation approach, establishes formal city mechanisms to connect local technical experts (primarily start-ups and students) with subject matter experts within the city. The Lab also created internal governance mechanisms to nurture a culture of innovation (i.e., an overall culture shift) and reduce risk aversion.

*We all monitor our consumption a bit. But the target population: what MORE could they do if they had better information? What are the possibilities with engaging that population in the development of the product?*⁶⁹

(69) Interview with Jessica McDonald, Energize Bridgewater Project Director



PROFILE 4.2: CITY OF FREDERICTON, NB



Context

The City of Fredericton is a medium-sized city located in Atlantic Canada. Situated in central New Brunswick, it is the province's capital. Since the early 1990s, the city has collaborated with private, public, and non-profit partners to solve local challenges using technology.⁷⁰

In 2018, the city co-led an SCC proposal in partnership with St. Mary's First Nation. The SCC proposal was to identify the unique needs of residents and connect them with personalized services and resources.⁷¹ This would be achieved by focusing on marginalized groups, primarily youth, newcomers, those with mobility-related limitations, and the aging population. Although ultimately unsuccessful, the proposal brought together local stakeholders to imagine how technology might continue to support the city and its residents.

⁽⁷⁰⁾ Guthrie, "White Paper: Enabling Civic Innovation Through Technology."

⁽⁷¹⁾ City of Fredericton and St. Mary's First Nation, "Smart Cities Challenge: City of Fredericton & St. Mary's First Nation."

In 2019, city staff built upon their achievements to start a new phase of civic innovation known as *BOOST Fredericton*,⁷² which is a civic innovation lab led by the City's Information Technology and Innovation division (ITI). *BOOST Fredericton* is a suite of programs and initiatives designed to spur civic innovation in collaboration with internal and external stakeholders, to create public value, improve municipal service delivery/efficiencies, and generate community economic impact.

Unlike the Town of Bridgewater, the City of Fredericton is working with a centralized Innovation and Technology Division (ITI) to support internal staff across a variety of departments and topic areas. *The BOOST Fredericton Lab* ("the Lab") programs seek to innovate across the entire city, as opposed to within one program.

⁽⁷²⁾ Guthrie, "White Paper: Enabling Civic Innovation Through Technology"; Guthrie, "Living Lab for Civic Innovation."

Challenge

Fredericton city staff and leaders recognized that to build upon their brand as a smart city and continue to provide value to community partners and citizens, they needed to continue to invest in their digital and innovation programs. In their new phase of civic innovation, they recognize four main challenges:

- Increasing the number of local jobs and boosting the local economy;
- Building internal capacity and local workforce expertise;
- Finding solutions to local community and city administrative challenges;
- Improving the quality of life for residents and creating public value using technology.⁷³

(73) Guthrie, "White Paper: Enabling Civic Innovation Through Technology"; Guthrie, "Living Lab for Civic Innovation."

Approach

The approach is to increase collaboration between city staff, local community stakeholders such as the University of New Brunswick, and the start-up community, in a "living lab" environment.⁷⁴ A core principle of the program's approach is **experimentation**.

BOOST Fredericton will also catalyze collaboration in areas where there are overlapping interests and complementary skill sets between collaborators. Staff proactively find the kind of smart city challenges that can be pursued in collaboration with internal and external partners and then connect city staff and problem-solvers (typically students, researchers, or entrepreneurs) with opportunities to solve local challenges with city staff.

(74) A "living lab" is generally defined as "... user-centred, open innovation ecosystems based on systematic user co-creation approach, integrating research and innovation processes in real life communities and settings" European Network of Living Labs, "About Us."; Guthrie, "Living Lab for Civic Innovation."

*Fail fast and fail cheap, before you go too far down the road. [it's] better to know when something isn't working early in the experimentation journey, learn from it and then pivot if need be.*⁷⁵

(75) Interview with Laurie Guthrie, Civic Innovation Strategist

*It's like "creating a giant venn diagram [where there are four circles] (1) problems in the community, (2) opportunities to innovate on the problems, (3) someone, a community partner, who is excited about solving the problem... and (4) and internal staff champions."*⁷⁶

(76) Interview with Adam Bell, Chief Information Officer & Assistant Director of Corporate Services

Approach (cont.)

This approach is operationalized through six stages: Innovation Events, *Idea Hopper*, PSE Partnership, *Booster Early Adopter Program*, Commercialization/Referrals, and Digital Infrastructure.⁷⁷ For example, the *Idea Hopper* proactively collects an inventory of municipal challenges. This ensures that potential partners are proposing projects that align with the city priorities. The *Booster Early Adopter Program* enables people to connect with the City as an early adopter of new technologies and applications. The City provides an intake process and supportive services to internal staff engaging with entrepreneurs and students through this program.⁷⁸

Boost Fredericton also organizes innovation events in collaboration with partners/stakeholders that bring people together to solve problems in the civic *Idea Hopper*. The City makes its digital infrastructure and open data available to help formulate prototype ideas and new projects during the events.⁷⁹

An important element of success is the City's support of high-potential projects. The Lab focuses on projects that strategically align with corporate priorities, solves a municipal challenge, and has available resources (financial and departmental driver/city staff) to support a civic innovation pilot project.⁸⁰ The City's existing policies enable funding to develop or pilot solutions if they do not currently exist.⁸¹

The Lab team has also learned to leave space for problem definitions to evolve when working with external partners.

(77) Guthrie, "White Paper: Enabling Civic Innovation Through Technology."

(78) Guthrie, "Living Lab for Civic Innovation."

(79) Additional programs not highlighted here include the Post Secondary Education (PSE) Partnership Program and the Digital Infrastructure and Enablement program; Guthrie, "White Paper: Enabling Civic Innovation Through Technology."

(80) The City of Fredericton will provide some seed funding to co-create and test solutions in its living lab.

(81) The use of existing procurement processes and policies is supported by internal staff in the procurement department who believe in the vision of the *BOOST Fredericton* program.

Stages of the *Boost Fredericton* approach



Innovation Events



Idea Hopper



PSE Partnership



Booster Program



Commercialization / Referrals



Digital Infrastructure

[It's good to] give space for entrepreneurs and students to make proposals about the problem definitions, what kind of problems they see and how they can be solved. You don't want to restrict the creative process in this regard but to be open to new ideas and possibilities that were not originally considered.⁸²

(82) Interview with Adam Bell, Chief Information Officer & Assistant Director of Corporate Services

Box 4.1: Gray Wolf — cryptocurrency analytics to fight cybercrime

In 2021, the Fredericton's Tourism Instagram account was cyber-attacked and held for ransom.⁸³ The Lab engaged one of its adoptees hatched by the UNB-Technology Management & Entrepreneurship program, Gray Wolf, who recently developed a cryptocurrency analytics platform. The city was able to provide an actual cybercrime for the Gray Wolf team to test their solution, and the partnership was mutually beneficial:

- Gray Wolf gained experience solving a challenge and received critical validation of their service offering. The City of Fredericton was their first and beta customer. This allowed them to gain investment financing.
- The City of Fredericton received access to a cryptocurrency analytics platform and gained valuable insights for its police force and IT staff. The City was also able to resecure the Instagram account.⁸⁴

(83) Mullen, "When Hackers Hit the City of Fredericton, These Crypto Sleuths' Pilot Project Became a Trial by Fire."

(84) Interview with Adam Bell, CIO & Assistant Director of Corporate Services, City of Fredericton

Leveraged Capacity

A cornerstone of *BOOST Fredericton* is its commitment to support innovation among internal staff via an "innovation roundtable" group, started in 2021. This informal group comprises departmental champions who participate in "internal hacks" where they discuss and identify ideas for the civic *Idea Hopper*.⁸⁵ For staff, the group provides a safe space to ask questions, brainstorm on problems and potential solutions, and learn from each other by embracing experimentation. This has helped increase support and confidence for civic innovation pilot projects, as well as reduce risk aversion to new ideas internally. The "champions" are supporting an internal shift towards a culture of innovation.⁸⁶

Through *BOOST* initiatives, the City has noticed one high-priority challenge: internal staff capacity. Due to the highly collaborative, co-creation nature of innovation projects with external partners, they can take significant staff time and the expertise of subject matter experts in particular areas of city administration. For projects to succeed, staff spend time coaching and supporting external innovation project partners. The innovation roundtable group will continue to explore this challenge as the City seeks innovative ways to identify support and resources to enable successful innovation projects.

(85) Guthrie, "White Paper: Enabling Civic Innovation Through Technology."

(86) The champions roundtable itself was an experiment led by the ITI. After testing the program through 2021, leaders in the ITI division found that it increased interest and engagement by city staff.

*[it] can be challenging when innovators are out on their own. We try to support them through involving them in innovation programs, pilots and problem-solving solutions. At a certain point when we develop a better understanding of the problem and solution it can be defined, and written down. Once a successful solution has been implemented, we wrap up the pilot stage as we have a duty to regularly check the market to ensure conditions haven't changed and that we have the best solution for the budget available.*⁸⁷

(87) Interview with Kyle Rostad, Manager Purchasing & Customer Services



Future Directions

Over the past two years, the ITI division produced a research white paper, *Enabling Civic Innovation Through Technology*, as well as a subsequent strategy and workplan to define and refine the *BOOST Fredericton Lab*.⁸⁸

The City of Fredericton has shown how to partner with the local entrepreneurial and university ecosystem, to share knowledge and solve problems together. So far, BOOST Fredericton has grown an internal culture change towards experimentation and prototyping. Municipal innovation champions are thinking outside of the box, as well as sharing lessons and continuous learning as an administration. The program gives insight into how medium-sized cities can use existing capacities to discover and obtain new solutions and better understand city challenges — by co-creating with students, entrepreneurs, and community partners.

(88) Guthrie, “White Paper: Enabling Civic Innovation Through Technology.”

The Lab is developing its key performance indicators, such as:

- Improving quality of life and public value;
- Improving municipal operations, service delivery, and efficiency;
- Creating a culture of innovation within government;
- Developing collaborative and strong innovation ecosystem partners.

SUMMARY

Both the City of Fredericton and the Town of Bridgewater recognized that in order to meet the needs of the city and its residents they needed to adapt procurement processes to the new challenges of digital technologies. This chapter has focused on the early stages of procurement (primarily needs identification) and illustrated how two communities are working alongside partners to validate these needs as well as bring staff and user experiences of city operations and service and technical expertise together to solve local challenges.

Comparing the community approaches: The Town of Bridgewater’s approach focused on one goal — reducing energy poverty. This goal encompasses more than its technical components, and the Energize Bridgewater team is working both with and without technologies to solve this challenge and meet their goal. In contrast, the City of Fredericton profile focused on their innovation division (ITI) that promotes cross-city innovation through this central department. This is a more scaled adoption of rethinking technology procurement, supporting more than one project at a time to share learnings across the city. The ITI team works closely with city staff who are assigned the task of solving community challenges, thereby enabling a bridge between the administration and external technical vendors.

To achieve their goals, both communities have looked outward for support in their procurement process to their communities. In both cases, the communities found local organizations to support the development of their projects, allowing for additional economic benefits to the communities. It must be noted that as communities work with private-sector partners, they should avoid outsourcing core municipal governance functions and ensure the needs of residents are put above corporate priorities.

The approach tradeoffs: As noted in the introduction to its profile, the Town of Bridgewater was awarded \$5 million to conduct its project to reduce energy poverty. This inflow of financial resources allowed the team to put a strong focus on this single problem. However, in order for the lessons from this single project’s procurement process to be useful to the Town in the future, as well as for communities looking to learn from the Energize Bridgewater team’s project, they will need to ensure the lessons are translated beyond this single initiative.

For the City of Fredericton, the ITI team is doing just that — focusing on learnings between projects within the city as a way to ensure pilots and one-off project learnings are shared and implemented in the future. Compared to the Town of Bridgewater, the pilots conducted in Fredericton are done on smaller budgets and shorter timeframes. This lower financial commitment to one initiative may limit project teams’ ability to adapt to needs and local conditions and ultimately show enough success to continue to operate. On the other hand, and as noted by City of Fredericton staff, it also allows the City to pivot and drop projects that are no longer promising before committing larger resources.

Communities need to ensure that procurement processes that include innovative approaches to sourcing technologies maintain transparency and accountability to the public. Actions such as adopting [Open Contracting](#)⁸⁹ tools could help communities mitigate any risks around favouritism and corruption in new and adapted processes.

(89) Open Contracting Partnership, “Guidance.”

5. CONCLUSIONS AND FUTURE DIRECTIONS

This chapter summarizes key lessons learned from the research conducted for this report. It compares the approaches taken by the local government staff to overcome the three problem areas and highlights the approaches taken to re-envision the smart city as an Open Smart City.

Communities have adopted their own open smart city approaches and, because cities are always a work in progress, there are many potential approaches to better govern our cities. This chapter closes by examining where local government staff might look to improve the great work they are doing using the resources at their disposal.

COMMUNITY APPROACHES: SIMILARITIES AND DIFFERENCES

What problems are local government staff encountering when adopting data and technology within their operations and what approaches are they taking to overcome those problems?

This report highlighted three problems encountered by local government staff when they adopt data and technology.

- Co-creating strategies with the community: The digital divide combined with the pandemic increased the need for the government to engage with harder-to-reach and digitally excluded residents.
- Collectively managing information and data: There is desire to use data to improve operational processes and decision making, yet data rests with a variety of organizations with different practices and motives. It is difficult to make use of data without establishing consistent internal and external decision making about data processes, policies, and skill sets.

- Rethinking the procurement of digital technologies: Advanced technologies pose new challenges to procurement processes, including how to upgrade and integrate newly procured technologies within legacy systems, especially when in-house technical knowledge is limited.

We examined “in-progress” initiatives in seven communities to address these three problems. What can we learn from these initiatives?

All seven communities worked with community partners. The SCC’s influence on public engagement was successful. Collaboration is a core characteristic of the Open Smart City that emphasizes the need for OSC initiatives to be participatory, collaborative, and responsive. Although several communities engaged with local vendors and community-based organizations, direct resident engagement was often not well integrated into initiatives. In the next section of this report, we suggest that meaningful engagement become a common practice and there be a commitment to engaging stakeholders — especially residents.

An Open Smart City is participatory, collaborative and responsive. It is a city where the government, civil society, private sector, the media, academia and residents meaningfully participate in the governance of the city and have shared rights and responsibilities...⁹⁰

Local government staff see the value in data; however, they **struggle with governing data acquisition and use**. Several communities stated that data is a key resource to overcome capacity deficits and respond to local community challenges. Communities sought to better govern their data by conducting activities such as increasing data literacy among its staff, creating smart city strategies, or opening data to the public. For example, the City of Saskatoon used data to inform residents where to locate its WiFi pilot project, while the Town of Bridgewater voiced data security concerns when working with an external vendor. Procurement is an opportunity for local governments to establish data-sharing procedures with external vendors. Communities need skills within the administration to negotiate data access with technology providers to ensure that access and security challenges are addressed early to mitigate problems that may arise later. This reaffirms the principle that in an Open Smart City:

(90) Lauriault, Bloom, and Landry, "Open Smart Cities Guide." 6.

Data management is the norm and custody and control over data generated by smart technologies is held and exercised in the public interest...[and] ... uses data and technologies that are fit for purpose, can be repaired and queried, their source code are open, adhere to open standards, are interoperable, durable, secure, and where possible locally procured and scalable...⁹¹

We saw that **communities struggled to adopt broad strategies and concurrently take concrete action**. Several communities prioritized strategic development from the start of an initiative, while others iteratively tested, learned, and aligned through action. By implementing strong monitoring and evaluation frameworks, communities can ensure that projects align with strategies and that learning is institutionalized at the outset to inform broader strategies.

There were also differences in reaching the desired impact. For several communities, the goal was to have an impact on internal processes to create a more effective, internal public service that better solves several local community challenges. Others dove deep into a single community challenge, such as climate change or energy poverty. Effective change

(91) Lauriault, Bloom, and Landry, "Open Smart Cities Guide." 6.

needs to encompass both kinds of impacts and needs to be monitored accordingly. There was a noticeable lack of frameworks to monitor and evaluate changes both internally as well as in the community. This is further elaborated upon in the *Monitor and evaluate goals and process* section.

Internal process change took different forms. Some local governments established central departments dedicated to internal digital transformation and innovation, where government resources and political will allowed staff to implement changes on a full-time basis. Other communities created intra- or inter-organizational working groups to maintain progress.

Importantly, several of the examined **local governments recognized that data and technology are just one set of tools to address local complex challenges**. Internal and external labour is required to succeed in initiatives that have data and technology components. In this way, digital is the means to an end, and not an end in and of itself. Staff

therefore stressed the importance of engagement, internal capacities, and non-digital pathways to success in the same way that:

In an Open Smart City, it is recognized that data and technology are not the solution to many of the systemic issues cities face, nor are there always quick fixes. These problems require innovative, sometimes long term, social, organizational, economic, and political processes and solutions.⁹²

In the next section, we ask: How can communities build upon this work and leverage their resources for greater impact?

(92) Lauriault, Bloom, and Landry, "Open Smart Cities Guide." 6.

RECOMMENDATIONS FOR MORE EFFECTIVE USE OF DATA AND TECHNOLOGY

Here we provide three recommendations and a set of guiding questions to help staff apply these practices in their local context.

COMMIT TO ENGAGING STAKEHOLDERS — ESPECIALLY RESIDENTS — EARLY AND OFTEN

In many of the communities we spoke with, staff valued relationships with community-based organizations that had varying levels of involvement in the communities they hoped to reach (i.e., residents). Although engagement with these organizations and groups can help to legitimize and validate a proposed initiative, staff should not assume that these organizations speak for all members of a given community and that their inclusion can replace direct resident engagement.

Ultimately, local government staff need to continually engage with members of their communities, beyond simply satisfying project requirements. Ongoing engagement helps build trust and social license, especially if followed with action related to that engagement. By doing so, in the long term, staff will earn some community trust that can be drawn upon when there is a need to act quickly.

How can staff engage residents in their initiatives?

- Know the intended policy outcome of the engagement. Will this inform new legislation or the design of a policy program?
- Consider the local organizations that are currently involved and those not being represented. Include those that will be most affected by the initiative and that may influence the project's uptake and buy-in.
- Ensure that participants have all the information they need to fully engage in the conversation. This includes information on the topic, benefits, and drawbacks during the consultation process.

- Ensure it is clear when and where in the process people can have an impact on the process and/or decision. Tailor the engagement based on the intended impact.
- What consultation format(s) will get the intended results? Will digital technologies help to reach those who should be engaged, or will it prevent the key audience from engaging? How else can this audience be reached?
- Stay in touch with participants. Inform them of the results and maintain relationships to build trust and two-way dialogue.

For example, the Town of Bridgewater has worked directly with residents in the implementation of their Energize Bridgewater project. To develop their smart city proposal, they conducted surveys and interviews, recognizing the importance of understanding the lived experience of energy poverty. For implementation, the project has an **Advisory Committee**, which includes two Bridgewater residents.⁹³ These established relationships enabled the Energize Bridgewater team to increase engagement and address other immediate needs in the community during the start of the COVID-19 pandemic, such as access to groceries.⁹⁴

GOVERN DATA AND TECHNOLOGY

Local governments sometimes lack overarching governance frameworks to support the consistent collection, management, and use of information and data internally as well as when working with external partners. This can create problems for the following reasons:

(93) Town of Bridgewater, "Energize Bridgewater Advisory Committee Terms of Reference."

(94) Future Cities Canada, *Canada's Smart Cities Challenge: Catching Up with the Winners*.

1. Different stakeholders may value data differently — and make different decisions based on their idea of its value.
2. Certain stakeholders may be, and often are, structurally excluded and under-represented from the process of making decisions about data, are absent in important datasets, and may have concerns with how data about them or issues are reported and shared — especially when it impacts them.
3. Decisions about data are made at different scales — individual, organizational (intra- and inter-organizational), as well as at the ecosystemic level — and different time horizons — short, medium, or long term — that are easier to navigate with a guiding framework.

Adopting principles, policies, and processes that encompass the entire digital data lifecycle can help better generate value from data.

How can local governments make deliberate and consistent data governance decisions?

- Define the common goal. What challenges in the community will be addressed through the use, creation, and dissemination of data? How does this use align with existing organizational values and strategic directions?
- Identify who is impacted, both directly and indirectly, by the use, creation, and dissemination of data. How are they being engaged? What processes need to be in place to build trust and mitigate harm at individual and/or community levels?
- Determine what data is needed to address the common goal. What is the legal context for the use of this data? Is the data of sufficient quality and organized in a format that makes it ready for use? Will additional data need to be created or acquired to better achieve the intended outcomes?
- Establish data-sharing and publication protocols. How can data be shared to foster transparency and opportunities for collaboration with the public and other stakeholders? Do these protocols respect collective and individual rights to privacy, security, and sovereignty?

For example, the City of Montréal's digital transformation strategy, [Montréal numérique](#), used **co-creation between residents and municipal staff** to ensure that decisions made about data and digital technologies reflect the perspectives and needs of Montréal residents and are governed to generate value for residents. During workshops, residents and representatives from different city departments shared their perspectives on topics such as the city's positioning in relation to data, internal digital services, and direct services to residents.⁹⁵ One outcome was the City's commitment to create a responsible digital strategy.⁹⁶ The City plans to ensure data and digital technologies are governed responsibly through the operationalization of the principles in the [Digital Data Charter](#),⁹⁷ as well as through data partnerships fostered through [Montréal en Commun](#)⁹⁸ (partners include Open North, which is leading the co-construction and implementation of data governance for the project).

MONITOR AND EVALUATE GOALS AND PROCESS

Many communities struggle to demonstrate the impact of their work and how individual projects and successes transform their local government operations and desired outcomes. Measuring change and the effect of individual initiatives is challenging for several reasons:

1. Change involves technology or process enhancements that require concurrent capacity building within local government staff. Attempts to assess progress must look at both the impact of the new capacities and the new technology or process.

(95) The City of Montreal, "Montréal Numérique: A Collective Initiative in Support of the Transformation of Montréal."

(96) The City of Montreal, 12.

(97) The City of Montreal, "Montréal's Digital Data Charter."

(98) The City of Montreal, "Montréal in Common."

2. Initiatives often have clear overarching goals, but the more granular changes evolve in response to new learning and a fluid context.⁹⁹
3. Local governments often do not have staff with the skills and experience to embed measurement into program design.

Monitoring and evaluation frameworks include tracking processes, results, and necessary conditions to determine the effectiveness of the implementation as well as the change to process, culture, and lived experience. By embedding this process in local government initiatives, several important questions can be answered such as: How well is the particular process or technology working? Are the results worth the amount of resources invested? Are there areas to improve before scaling the initiative more broadly?

Institutionalized monitoring and evaluation processes can lead to improved learnings and adoption of successful pilots and programs at a broader scale. This is critical because solutions and approaches are translated between very different operating contexts, with different policies, processes, and cultures within and between local governments.¹⁰⁰

How can staff adopt monitoring and evaluation frameworks?

- Build in problem-identification processes into the design of policy, programs, and services.
- Determine if initiatives are being designed based on anecdotes or on systematically collected data. Is there a clear understanding of the need, or are conclusions being made based on assumptions?
- Build a culture of trust and critical thinking, tolerance, and learning from mistakes. Is sufficient time built in for learning through experience?

- Determine key indicators of project progress as well as the contextual variables that make the indicators relevant. Design a process for data collection and analysis.
- Design data collection to inform how learnings from the project can be scaled and shared. Incorporate these processes into day-to-day workflows.
- Monitor successes and failures often, with accountable actors and transparently communicate results by way of a dashboard, a newsletter, or simply an email update to stakeholders.

For example, The City of Amsterdam's start-up in residence (SiR) program has **increased staff capacity to collaborate with local startups**. Through SiR, government staff procure an "innovation process" instead of a technology. For staff, the SiR process comprises the following steps: formulate challenges, select start-ups to partner with, and work closely through the development of an innovative tool.¹⁰¹ An analysis of the program by researchers found that a key success of the program was its systematic increase in staff capacity "through the accumulation of lessons (of innovation successes, frictions and failures), and the gradual embedding of new routines and sustainability values in the city administration".¹⁰² This was achieved through staff training programs and supportive spaces for staff to learn.¹⁰³

(101) van Winden and Carvalho, "Intermediation in Public Procurement of Innovation: How Amsterdam's Startup-in Residence Programme Connects Startups to Urban Challenges," 2.

(102) Carvalho, "Can Startups Solve Urban Sustainability Challenges?" 1.

(103) Carvalho.

(99) Kane et al., "Contribution Analysis in Policy Work Assessing Advocacy's Influence."

(100) Evans et al., "How Cities Learn."

FUTURE WORK

Despite the small sample size of projects we examined and the small number of communities we met with, we were nonetheless able to qualitatively assess the excellent work being done as well as provide recommendations to help staff elevate the work they are doing. Through this process, a number of topic areas emerged which Open North would like to explore in the future.

One example is sustainability in technology decisions: although some of the communities we met use data and technology to support climate action, the environmental implications of the use of data and technology are not explicitly considered. Future research might explore how local governments account for the environmental footprint of the data they store, the production cycle of the sensors they deploy to collect data, the supply chain of minerals for the production of chips and batteries, the energy consumption of blockchain and whether data minimization practices are being adopted, or whether sustainability is being integrated into the criteria for the procurement of new technologies.

The Open Smart City concept was developed from a long history of open source and open philosophies.¹⁰⁴ Further work can also be done

(104) Lauriault, "Looking Back Toward A 'Smarter' Open Data Future."

to explore how local governments can: (a) adopt open source code and open standards; and (b) design technical systems such as automation, artificial intelligence, and machine learning to be legible to non-technical experts while assessing the impacts of their use on communities and individuals.

Additionally, more work is needed to understand the history of current digital and non-digital infrastructures. As stated, digital technologies are often placed on existing hard infrastructure such as telephone polls or roadways. Local governments are struggling to maintain these hard infrastructures, with estimates for repair between \$50 billion to \$570 billion.¹⁰⁵ How can hard infrastructure, as well as existing digital infrastructure, be maintained and optimized before acquiring or to support the use of new technologies, and what is the right balance to achieve a specific goal?¹⁰⁶

We look forward to addressing these types of issues and others and continuing our work with local communities, to hear about the great work they are doing, as well as their challenges. By doing this work, we will get better together and become open smart cities.

(105) CanInfra, "Estimates of Canada's Infrastructure Deficit Vary Widely."

(106) Robinson, "The State of Good Repair."

CONCLUSION

Increasingly, local governments are faced with global challenges they must address locally. Often, the use of data and technology is heralded as being an easy technical solution. However, as demonstrated by the projects highlighted in this report, there are challenges when adopting these tools, such as how to: meaningfully engage with residents; ensure consistent and intentional data use; and acquire best-fit technologies that meet local and technical needs.

Technologies will not solve these challenges; instead, staff must adopt approaches that consider the long-term social, organizational, economic, and political changes to ensure that they mobilize “data and technologies when warranted in an ethical, accountable and transparent way to govern the city as a fair, viable and liveable commons and balance economic development, social progress and environmental responsibility.”¹⁰⁷

(107) Laurialt, Bloom, and Landry, “Open Smart Cities Guide.” 6.

The communities highlighted in this report, namely, the Town of Bridgewater, NS; The City of Calgary, AB; The Town of Churchill, MB; The City of Fredericton, NB; The City of Saskatoon, SK; The District of Squamish, BC; and the City of Trois-Rivières, QC, are a subset of the amazing work being done across Canada to adopt data and technologies that create healthy, equitable, and sustainable communities.

Governments need not address these challenges alone. The Community Solutions Network provides support and resources to those looking to learn more about relevant domain areas and strategize on how to overcome challenges. Working with community partners can help local government staff to reach outside of their regular network and adapt approaches and recommendations from other communities to the local context. Join Evergreen and Open North in the Community Solutions Network to work together to solve local problems and create healthy, equitable, and sustainable communities across Canada.

APPENDIX A: METHODOLOGY

This report was informed by the Open North team’s engagements with local government staff across Canada in its capacity as lead technical partner for the Community Solutions Network between 2018 and 2022. This involved online and in-person collaborative problem solving and strategic support. The research methods are driven by the role of the Open North team in this program.

PROBLEM SELECTION

We identified three common challenges that were supported during the Community Solutions Network program between 2020 and 2021. In order to identify these three challenges, we compiled a long list of eight problem statements. We then selected the three problem statements highlighted in this report that were the best fit with our research objectives. Problem statements were formulated using the Ontario Digital Service’s problem statement template:¹⁰⁸

“We have observed that [products, service, organization] isn’t meeting [goals or needs], which is causing [this adverse effect]. How might we improve so that our [products, service, team, organization] is more successful based on [measurable criteria]?”

(108) Government of Ontario, “Problem Statement.”

COMMUNITY SELECTION

All communities and their associated projects were all part of the Community Solutions Network program and received support from Open North, the lead technical partner. Through the Community Solutions Network program, the Open North staff worked with small teams and individuals seeking strategic support on their open, smart community projects.

We reviewed notes and documentation from all communities and assessed their fit with the selected problem statements. We then contacted the local governments whose cases had the best fit with the problem statements. All contacted teams participated in the report.

COMMUNITY PROFILES AND VALIDATION

We used a variety of data to inform the community profiles within this report. For one, this report includes public and privately shared community documentation, such as strategic reports, policies, meeting notes, and SCC proposals. Secondly, we conducted 45-minute to 1-hour long semi-structured interviews with the community staff. All public servants interviewed were the same staff who participated in the Community Solutions Network program. In one case we interviewed a former staff member.

For analysis, we used qualitative data analysis software (MAXQDA)¹⁰⁹ to analyze the document contents. We coded all documents according to the information sought for the community profiles (see Table B-1).

(109) VERBI Software, MAXQDA 2020, software, 2019, maxqda.com.

TABLE B-1. CODES USED FOR QUALITATIVE DATA ANALYSIS

Parent Code	Sub Code
What issue were they trying to solve?	How did they define the problem initially?
	What did they envision the outcome would be?
	Did they engage stakeholders/public to define the problem? How?
	Did engagement change the initial problem definition?
How did they approach trying to solve the issue?	What were the key activities they undertook?
	How did they assess and select a preferred solution?
	What were their key decision points?
	How did they continue to engage stakeholders?
	How did they get buy-in from senior management/politicians?
	What were the key outputs? (e.g. work plan, strategy, pilot)
What capacity were they able to leverage?	What existing capacities were they able to take advantage of?
	What capacity (if any) did they find they needed to acquire?
	What barriers did they encounter?
What were the outcomes?	Evidence of the outcome(s) of the initiative
	Approach to monitoring/evaluation? Success indicators adopted?
	Future directions/opportunities identified to scale impact?

After we drafted the community profiles, they were sent to the interviewees for validation. Community staff had influence on the positioning of their community profiles and their contents. We, the authors of the report, conducted all other general analysis and came to conclusions separate from community intervention.

LIMITATIONS IN OUR APPROACH

The challenges explored in this report are not a comprehensive representation of the challenges faced by local governments using data and technology in Canada. Likewise, this report is not a comprehensive survey of

communities in Canada. There are therefore gaps in experience and knowledge, especially from the Canadian north and large cities. This report also does not highlight any Indigenous communities.

Further, the focus was to understand general problem areas and approaches to overcoming them within individual teams and projects. We note that community context, resources, political and strategic goals, as well as additional structural factors within provinces and communities influence how communities approach overcoming the challenges. This was not the focus of the report and is an area for future examination.

APPENDIX B: ADDITIONAL RESOURCES

Sign up for Open North's free, online courses for local government staff and their partners, provided by the Community Solutions Network Program. Visit lms.opennorth.ca

OPEN SMART CITY SERIES:

- Lauriault, Tracey P, Rachel Bloom, and Jean-Noé Landry. 2018. "Open Smart Cities Guide V1.0." Open North. <https://doi.org/10.31235/osf.io/dzja9>.
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OPEN SMART CITY RESEARCH BRIEF SERIES:

- Qarri, Ana, and Lex Gill. 2022. "Smart Cities and Human Rights." Open North.
- The Firelight Group. 2021. "Open Smart City Initiatives as Tools for Indigenous Data Sovereignty." Open North.
- Faria, Olivia, and Tracey P Lauriault. 2021. "Smart Home Technology Facilitated Violence." Open North.
- Nitoslawski, Sophie. 2021. "Managing Urban Green Infrastructure for Climate Change Through an Open Smart City Lens." Open North.
- Biss, Danielle Lenarcic, and Pamela Robinson. 2021. "Parks and Open Spaces: Challenges and Opportunities of Smart Technologies." Open North.
- Robinson, Pamela. 2021. "The State of Good Repair: Maintenance & Innovation in Smart City Projects." Open North.
- Claudel, Matthew, and Bianca Wylie. 2021. "Technology Procurement: Shaping Future Public Value." Open North.
- Lauriault, Tracey P, Donato Leone, and Julie Ivanoff. 2021. "Shared Mobility in Canada: Considerations for Open Smart Cities." Open North.
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- Chatwin, Merlin, and Jean-Noé Landry. 2018. "Making Cities Open by Default: Lessons from Open Data Pioneers." Open Data Charter & Open North. https://opennorth.ca/publications/2ce88qelsh6m30thifiniy_en.
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