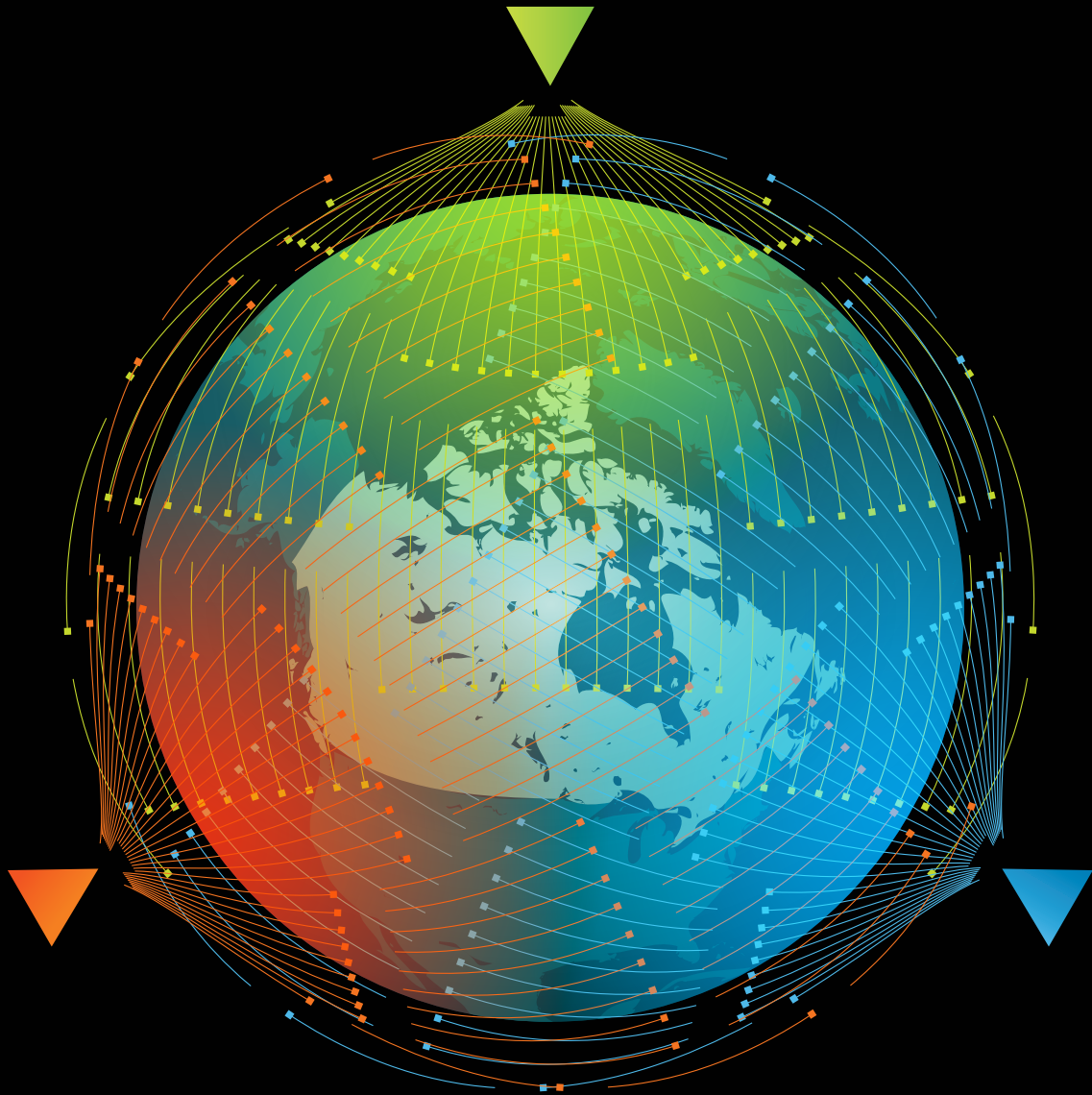


Deloitte.



Canada's most undervalued resource

The importance of capitalizing
on the data economy

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Introduction

Building a world-leading data economy

▶ Over the past few decades, our world has become increasingly digital, fundamentally shifting how people interact and how businesses create products and provide services. This increasing digitalization is producing ever-growing streams of data, which are continuously being collected, stored, processed, and shared. (See Figure 1: *So, what is data?*)

The world's most valuable companies today are technology companies.¹ And their most valuable assets are their troves of proprietary customer data, which they use to inform operational strategies, improve business competitiveness, and increase profitability.

In fact, companies in all sectors—from automakers to pharmaceutical manufacturers to natural resource producers—now view data as a business priority, and governments around the world, including those in Canada, have begun to recognize the value of data and are creating legislation and policies to ensure the security and fair use of data. In 2018, Canadian businesses invested approximately \$40 billion in gathering, processing, and utilizing data, and the value of Canadian data assets is now estimated at over \$200 billion.² (See Figure 2: *Key milestones in Canada's data journey.*)

Data is crucial for the economy, as it forms the foundation for artificial intelligence (AI) and the development of new technology. Our previous series, *Canada's AI imperative*, explored the implications of data for Canadian citizens, businesses, and policymakers. In that series, we found from our surveys that the 39 percent of Canadian

businesses that were early adopters of AI rated data as their top challenge, and that 65 percent of Canadian residents had serious privacy concerns about how companies were using their data.^{3,4} Clearly, getting the right approach to data will be important for Canadian businesses and, ultimately, the country as a whole.

In this report, we explore what it will take for Canada—businesses, governments, and citizens alike—to become front-runners in this new, data-based economy. We start by setting out the data opportunities, then we examine how businesses are perceiving the country's current performance in the data economy. Finally, we explore three possible future scenarios in which Canada can lead in the evolving data economy, including recommendations about how to get there.

With our country's highly skilled and diverse workforce and unique industry experience, we believe that Canada can set a collective vision to support Canadians in building a world-leading data economy. Whether Canada can fulfill this vision will depend on how we embrace the value of data, for both commercial and government applications, while remaining accountable to all our country's citizens.

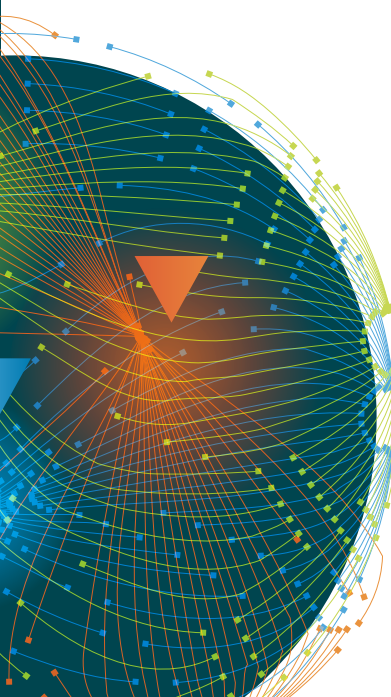


Figure 1
So, what is data?

- ▶ Although the terms *data* and *information* are often used interchangeably, they refer to very different things.

The term *data* generally refers to raw, unorganized facts, often delivered in a digital form, which can then be processed—analyzed, organized, structured, and presented—to transform it into useful *information*.

In this report, we delineate types of data based on its source, as well as who owns and controls it. This includes, for example, government, personal, and business data. (See Figure 4 for additional data concepts).

Derivatives of data:

Data that has been processed, transformed, or derived to a state where it cannot be re-identified to an individual. This includes truly anonymized data, aggregated data with no identifiers, predictions, or insights derived from data.

Open data and public data are also forms of data derivatives. They are both freely available for the public to access.

Open data can also be used and republished without restrictions, while public data might have some restrictions imposed on its distribution and use.

Business data:

Information collected, stored, processed, shared, and used to plan and operate businesses.

This includes operational and financial data, customer data, market research data, and any information that is proprietary.



Personal data:

Any information that can be identified to a specific individual.

De-identified, encrypted, or pseudonymized data that can be re-identified to a person is still defined as personal data.

Personal data does not have to be associated with the name of a person as long as it can be easily used to identify the habits and tastes of a specific person; for instance, "the owner of vehicle XYZ152 listens to such and such music" or "medical insurance beneficiary 2312357 sees the doctor more than once a month."

Data collaboration:

Information that is shared across organizations and industries. Data sharing can be between private sector businesses to create more robust datasets or between public and private organizations to enable cross-sector innovation.

Government data:

Information collected, produced, or shared by government agencies.

This includes census data, citizens' tax return data, transit data, and administrative data from different government agencies.

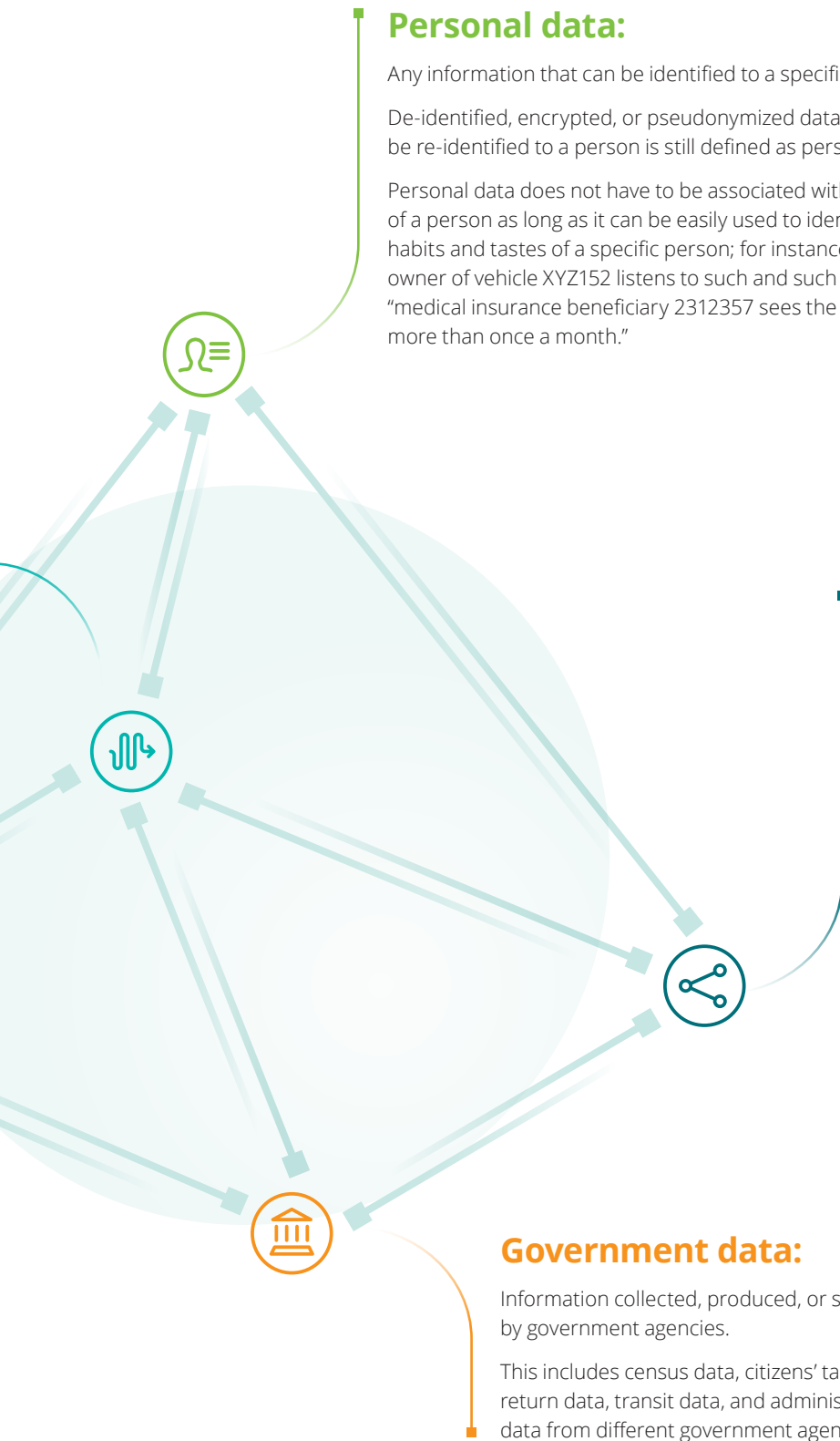
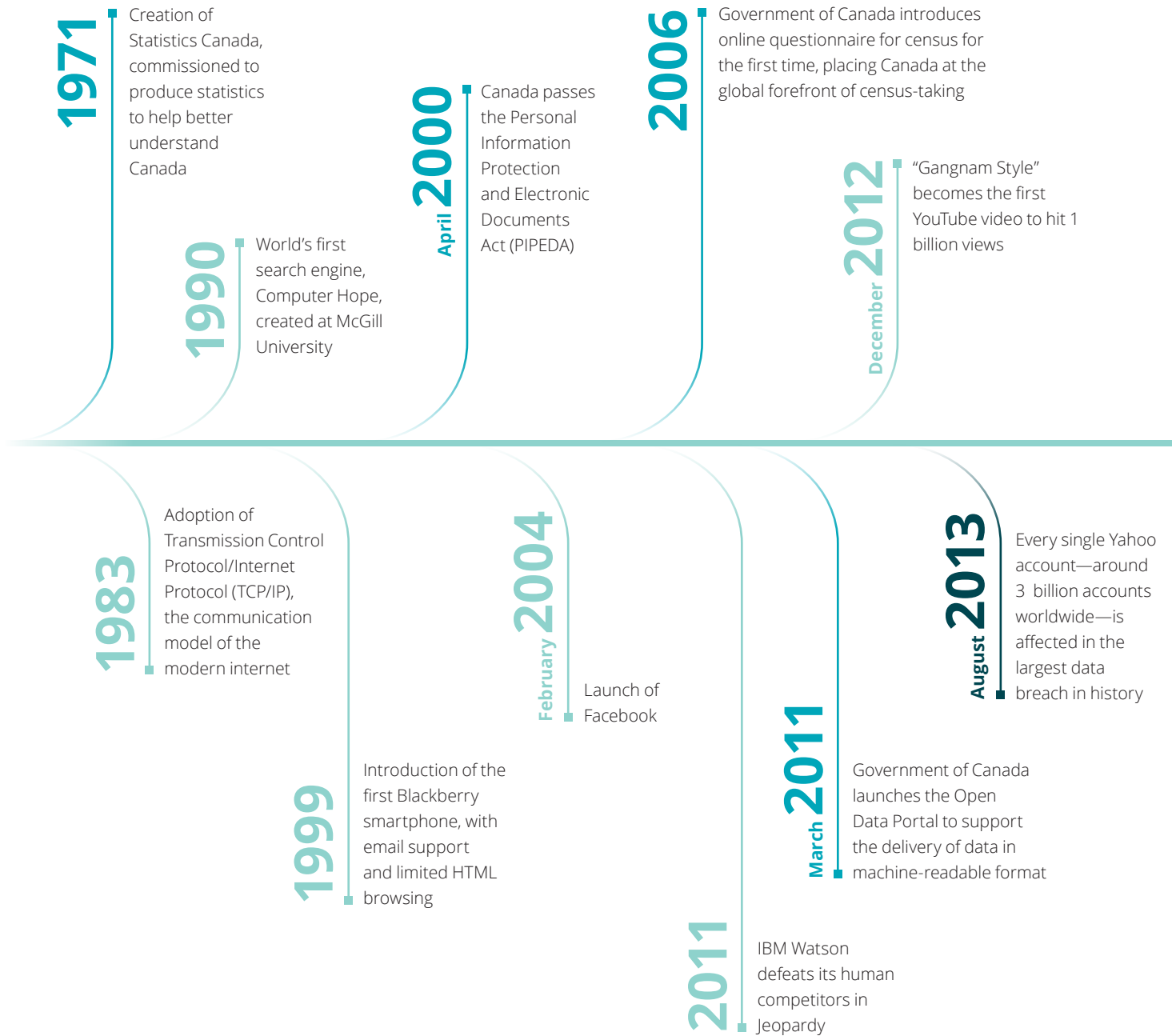


Figure 2
Key milestones in Canada's data journey



2014

Half of all Canadians own a tablet

2 in 3 Canadians own a smartphone

July 2017

Government of Canada establishes the Canada Digital Service to modernize the way the government designs and delivers digital services

May 2018

The European Union's General Data Protection Regulation (GDPR), the world's first substantial personal data rights law, comes into effect

2019

Hundreds of data breaches in Canadian financial service and health-care companies affect more than 28 million Canadians

2016

90% of Canadians own 2 or more mobile devices

2016

Google's artificial intelligence algorithm beats a professional player at the Chinese board game "Go"

2018

90% of Canadians use the internet

August 2018

32 million account details and logins of website Ashley Madison are posted to the dark web, including 7 years' worth of credit card data

April 2019

3.5 billion people use social media, 45% of the world's population

May 2019

Federal government announces Canada's Digital Charter, 10 principles that underpin the framework for modernizing PIPEDA

Technology milestones

Policy actions

Major data breaches

The data opportunity for Canada

- ▶ In light of its enormous potential value, data has been called “the oil of the 21st century”—a comparison that emphasizes data as the backbone of our new digital economy, just as oil was foundational for the industrial economy.⁵

The growing importance of data as a business asset is evident when we look at the changing composition of the world's most valuable companies over time. In 2004, three of the top 10 most valuable companies (by market capitalization) were in the oil and gas sector, with only one technology company on the list. By 2019, the top 10 included seven data-driven technology companies, while oil and gas had disappeared completely.⁶ (See Figure 3: *The rise of data-driven technology companies.*)

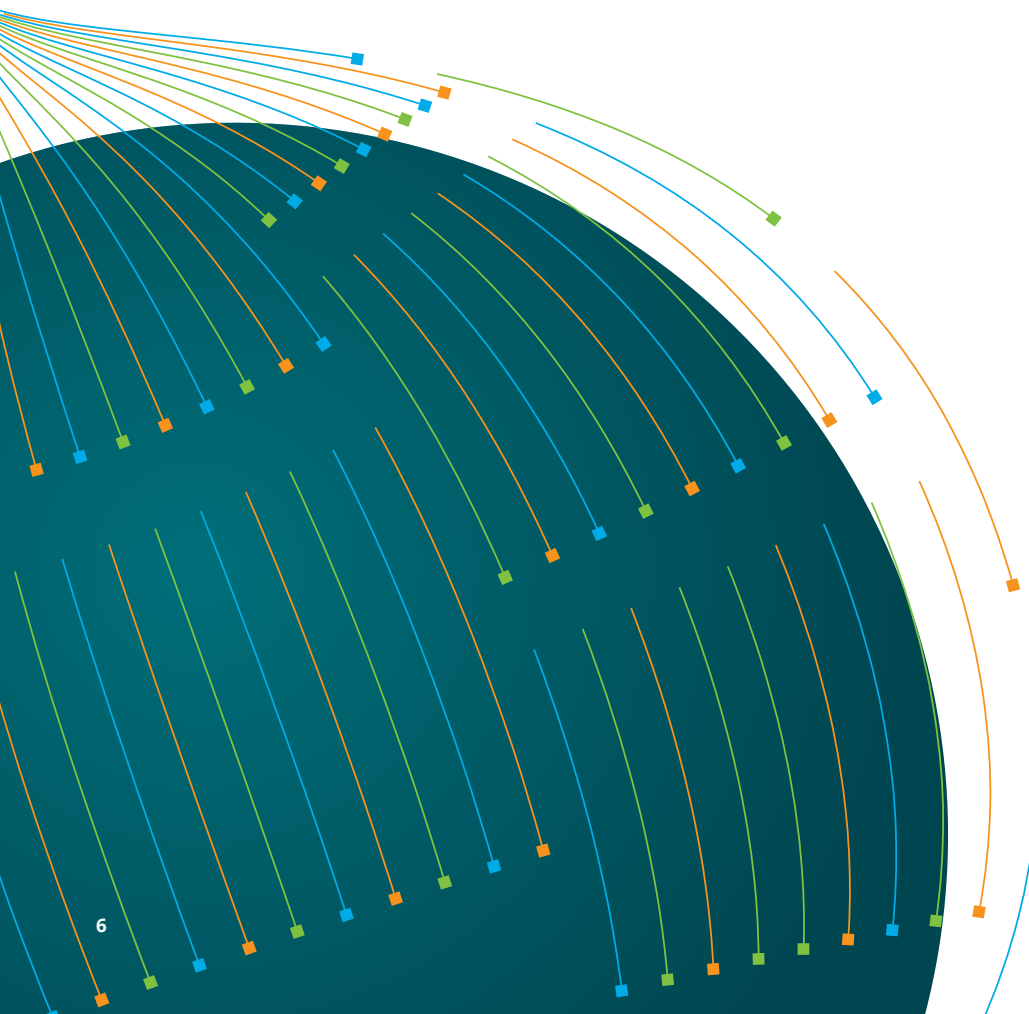
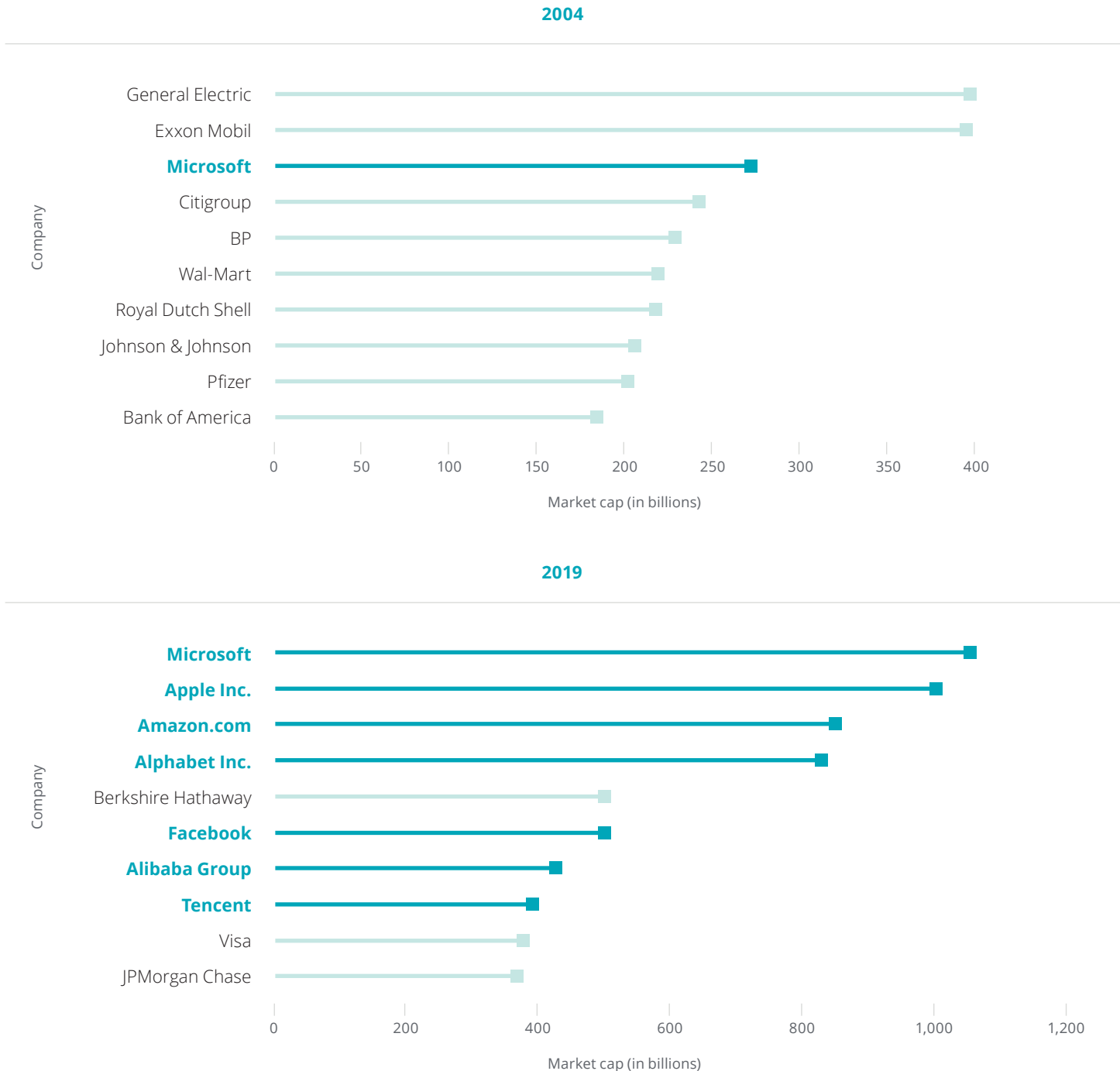


Figure 3
The rise of data-driven technology companies as the most valuable businesses globally

■ Data-driven technology company



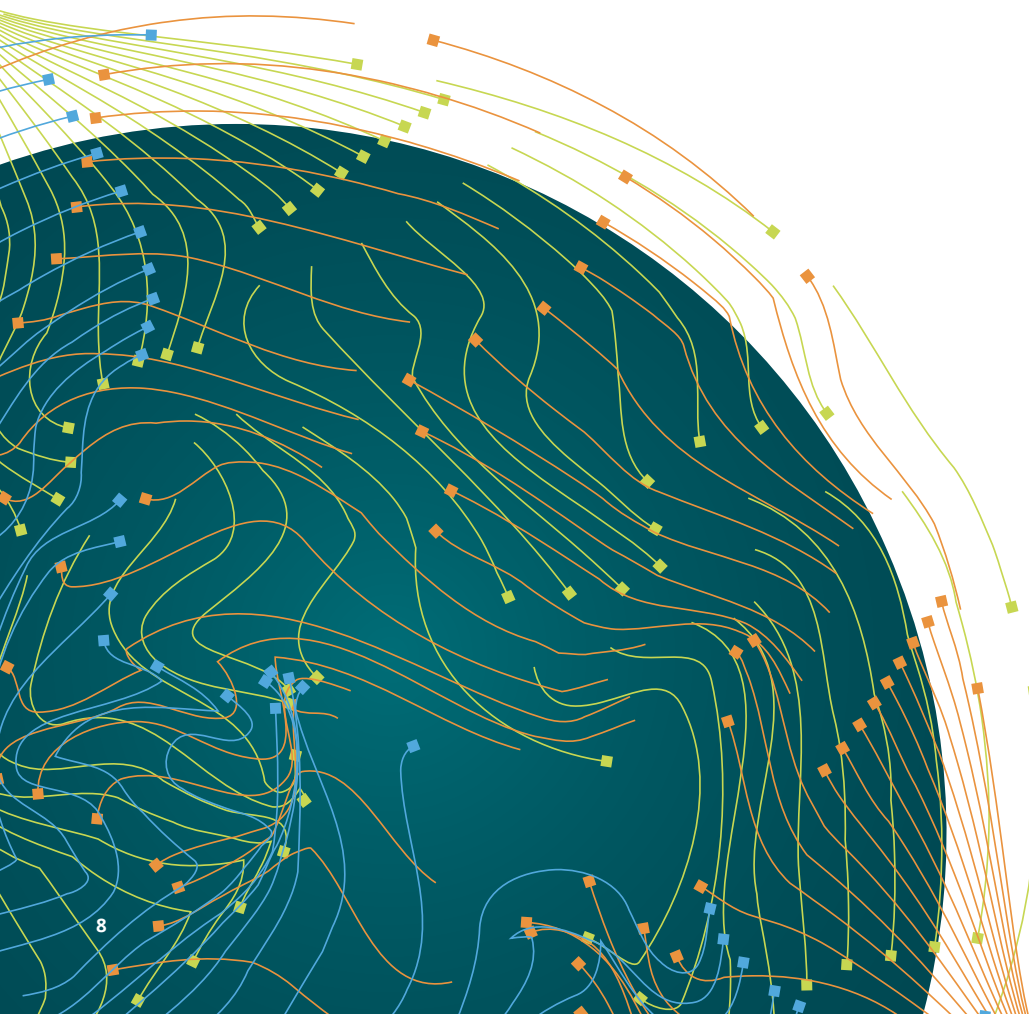
This shift has taken place as businesses realize that data holds vast potential in helping aggregate and analyze key insights about customers, markets, and operations. Deloitte research has found that businesses with a data- and analytics-focused culture were twice as likely to exceed their business goals as businesses that did not emphasize data and analytics.⁷

Canadian businesses are also realizing the importance of adopting a data-driven approach in ensuring innovation and global competitiveness in the new economy. Statistics Canada has estimated that Canadian investment in data has grown over 400 percent in the last 15 years, and that data-related assets in Canada were worth \$217 billion in 2018—equivalent to more than two-thirds the value of the country's crude oil reserves.⁸

But businesses aren't the only stakeholders that can derive value from data. Governments and citizens are also increasingly turning to data in efforts to improve various aspects of organized society, such as mobility, urban living, health, and overall quality of life.

For example, when Transport for London (the local government body responsible for the transport system in Greater London, United Kingdom) started regularly releasing data to the public, businesses such as Waze and Citymapper used the data to create apps that saved London commuters time—for an estimated economic value of up to £58 million per year, according to a Deloitte UK study.⁹ Similarly, at the Toronto Centre for Addiction and Mental Health, data analysis helped provide the business case for funding 23 acute-care beds to meet a previously unaddressed social need.¹⁰

Clearly, when used to its full capacity, data has the potential to both elevate business competitiveness and improve our standard of living.



Given the advantages we already occupy in this space, Canada is well positioned to benefit from the opportunities of a data-driven future:

- ▶ **Canada has one of the most highly trained workforces in the world, bolstered by a highly effective skills-based immigration policy.**
Canadian talent is positioned to maximize the opportunities presented by an increasingly digital- and data-driven world. In 2019, the International Institute of Management Development scored Canada third globally in digital knowledge, based on a multi-criteria measure that included a country's availability of talent and quality of education.¹¹ In addition, Canada's talent-friendly immigration policies further strengthen our workforce: in 2015, an expert panel at the Council of Canadian Academies reported that newcomers make up half of the nation's degree-holders in STEM (science, technology, engineering, and mathematics) fields, despite representing only 21 percent of the overall population.¹²
- ▶ **Canada is a global leader in resource industries, and can use data and technology to build on its competitive advantages.**
Canada is one of the world's largest suppliers of agricultural products. It has the third-largest crude oil reserves, and ranks among the top five countries in the production of 13 major minerals and metals.¹³ The country's resource industries are also recognized as among the most technologically advanced in the world, employing more than five million sensors to continuously collect operational data.¹⁴ When combined with advances in machine learning and the Internet of Things, this data can enable resource companies to make robust business decisions. For instance, when midstream oil and gas companies use a data-driven approach, they can reduce annual downtime by 70 percent and shrink unplanned costs by 28 percent.¹⁵ In another example, Canadian metals and mining company Teck reports that it saves nearly \$1 million annually by using big data and machine learning to predict truck tire maintenance needs.¹⁶
- ▶ **Canadian governments are world leaders in open data for accountability, innovation, and social impact.**
Canada already has the highest number of government-led open data initiatives in the world. In fact, the World Wide Web Foundation's Open Data Barometer ranked Canada in the top spot globally for availability and readiness to benefit from open data.¹⁷ All levels of government are taking actions to ensure their data is openly available, simple to access, and convenient to reuse. As of March 2019, eight provinces, one territory, and 66 municipalities have implemented open data portals,¹⁸ and more than 150 Canadian companies have used open data to launch new products and services, create commercial and non-profit ventures, and optimize their business processes.¹⁹
- ▶ **Canada's unique history, geography, and public policies present an advantage in a data-driven economy.**
Canada has unique strengths in health care, sustainability, and immigration that, if capitalized upon effectively, could position it as a leader on key global issues. However, more work needs to be done to turn these strengths into a competitive advantage. (See: *Canada's untapped data advantage*.)

Canada's untapped data advantage

Canada has the opportunity to gain a tremendous data advantage in the areas of health care, sustainability, and immigration. We will need to do more than we are to capitalize on its full potential.

Health-care

Canada's public-payer health-care system means that a significant amount of data is currently concentrated among publicly funded, provincial institutions. These data assets present an opportunity for these institutions to encourage and drive health-care innovation. Having made significant investments in generating large, targeted data assets, Canada has the potential to lead in this space. However, this data currently resides largely in fit-for-purpose silos in research, clinical, and local repositories across the country. But we're starting to see some early solutions to this problem. For instance, in November 2018, Canada's Digital Technology Supercluster (CDTS) officially launched with \$153 million in funding from the federal Department of Innovation, Science and Economic Development and funding commitments of over \$200 million from private sector members.²⁰ This supercluster facilitates and funds ambitious, collaborative technology leadership projects that develop products and platforms. One of these

innovative projects is the Secure Health and Genomics Platform, which will create a national digital-platform capabilities for using health and genomic data to improve the diagnosis and treatment of patients. The focus will start on cancer and rare diseases, then expand into other areas of clinical practice, health, and wellness.²¹ This platform will have two unique components, a data marketplace and an application marketplace to make data easier to find, share, and develop into insights that improve the health and wellness of patients.

Sustainability

Combined, Canada's geographical position and sustainability policies create natural data advantages. Yet, while our country has 20 percent of the world's total freshwater resources, we lack an integrated approach to collecting data on it, and we have fallen behind the United States in using freshwater data to guide sustainable policies.²²

Similarly, while the Arctic accounts for 40 percent of Canada's total land mass,²³ data about this massive area is mostly stored at universities. It's difficult to access and use.²⁴

Improving the collection and accessibility of data on both freshwater resources and the Arctic will enable quantitative insights, which in turn will give Canada greater authority to lead the global conversation on climate change and sustainability.

Immigration

In 2018, Canada resettled the largest number of the world's refugees and took in a greater percentage, in proportion to our total population, of economic immigrants than the United States.^{25, 26}

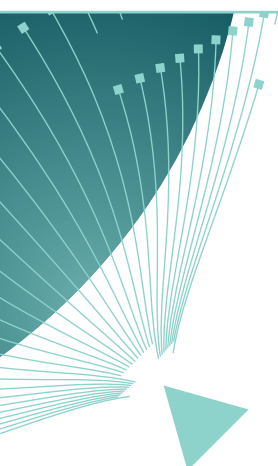
Despite our leadership in this area, the data currently collected—demographics, income, and resettlement location—tell us little about newcomer outcomes.²⁷ This means that Canada is missing the opportunity to leverage data insights to design better initiatives to support newcomers, including in areas like language training and workplace integration.

As global migration is projected to increase over the next few decades, including 200 million environmental migrants by 2050, Canada can demonstrate global leadership by establishing data-driven immigration policies and integration initiatives.²⁸

We believe that Canadian businesses have a crucial role to play in realizing the country's growing opportunities in the data economy.

Companies that have the deepest data sets and most extensive data infrastructures stand to surge ahead in the new economy, reaping the financial rewards of and, arguably, setting the rules for this new economy.

To deliver on this promising future, more Canadian businesses have to first understand how becoming data-driven can provide invaluable advantages in the globally competitive 21st century, and then act based on their understanding. In the next section, we explore how businesses perceive Canada's overall performance and readiness for the coming data economy.



Canadian businesses: "Canada is not data-ready"

► In July 2019, we conducted a survey of Canadian business leaders to gather their perspectives on Canada's current priorities and prospects for the data economy. (See: *Our research approach*.)

► **Businesses don't think Canada is well positioned for the data economy**

Our survey asked business leaders to rate Canada's current performance on key data capabilities such as increasing data literacy, preventing data misuse, building consumer trust, and improving data accessibility.

Over 70 percent of those surveyed rated Canada's performance as average or below average for all data capabilities. Dishearteningly, small and medium-sized enterprises, which make up over 99.8 percent of Canada's businesses,²⁹ responded more negatively than larger ones. This indicates that data may be more difficult for smaller companies to use in daily business activities. Additionally, it indicates low levels of confidence in the country's ability to become a front-runner in the data economy.

► **Businesses in Canada are likely to move more slowly in the data economy than those of other countries because they prioritize secure data usage**

Our survey also asked businesses to choose the top factors they felt the private sector should prioritize to ensure Canada maximizes the value of the data it generates.

The top three responses were: preventing data misuse by employees, suppliers, and subcontractors (80 percent); building trust in data usage (76 percent); and providing consumers with data rights and controls (69 percent).

The weight given to secure data use indicates Canadian businesses are less likely to be early adopters of new technology, and are less agile in changing their established data practices. Respondents also emphasized the importance of establishing relationships with consumers that safeguard their data and create trust between individuals and corporations. Businesses are also aware that strong foundations that provide consumers with data right and controls must exist.



► **Businesses support data policies that enforce security and improve accessibility**

To understand how Canadian policymakers can better support businesses, we asked business leaders what they believe the role of the government should be in the data economy.

We found they were most supportive of governments creating policies to ensure the security of digital data (83 percent), as well as initiatives that increase the availability and usage of public data (70 percent).

They gave top priority to building the proper structures for data protection and security. Additionally, their support for increasing the availability of public data suggests businesses want to establish a link between the public and private sectors for data sharing.

Overall, our survey results revealed Canadian businesses overwhelmingly believe the country is not yet well positioned to lead in the data economy. What does that look like, anyway? We explored how other forward-looking countries are meeting the challenge, in order to establish a framework of ideas that could serve as guidance for Canada.

Our research approach

We used a mixed-methods approach to conduct, collect, and analyze primary research. This consisted of a primarily quantitative online survey, a series of in-depth, semi-structured interviews, and future-scoping to set out probable future scenarios for Canada's data economy.

The sampling frame for the survey comprised a business panel of senior executives across Canada. The survey was in the field for 22 days, from July 8 to 29, 2019, and received 780 responses.

All percentages are rounded up to the nearest whole number. As a result, those used in the figures do not always add up to 100 percent. The margin of error for the survey sample is +/- 3.51 percent, 19 times out of 20.

Note: Our survey was in the field when the news broke that several major data breaches had occurred in Canada. We believe our survey results were not invalidated by this news, as both the data breaches and media coverage on data risks have become more common over the past few years. (This is illustrated by our data timeline earlier in this report.)

How can Canada be better positioned for the data economy?

► To understand how Canada could better prepare for the coming data economy, we completed a jurisdictional scan of 15 pioneering peer countries.³⁰ Our goal was to evaluate how these countries are aligning across three main stakeholder groups—government agencies, businesses, and citizens—to unlock the value of data.

After extracting the key takeaways from these countries' data strategies, we developed a three-pronged "front-runner framework" for succeeding in the data economy. They are:

1. A digitalized public service, with clear digital policies.

Governments need to ensure the public sector is keeping up with the data economy, rapid technological growth, and changing citizen expectations for data-enabled services. Leading countries are continually digitalizing their public services.³¹ Denmark, for example, enacted a progressive digital-first policy, setting the expectation for all public services to be delivered digitally, with non-digital delivery only used as a backup.³²

Pioneering countries have also introduced clear policies for data collection and sharing. For example, the European Union's General Data Protection Regulation (GDPR) established clear frameworks for third-party data sharing: companies cannot transfer an individual's personal data to third parties unless specified explicitly in

the contract for an identified reason, or if the company has obtained consent from the individual.³³

2. Businesses that never cease to innovate using data.

Businesses that continually improve their internal data practices, and are strategic in unlocking value from their data, can ensure their global competitiveness in the new economy. To encourage further innovation, many pioneering countries have also designed policies that expressly encourage data collaboration between businesses.³⁴ The European Commission has published a study on this topic, highlighting the importance of data sharing between businesses to enable innovation.³⁵

For businesses to get the data they need to innovate, collaborating to share data is key. This is especially true for companies in less-populated countries, such as Canada and smaller countries in the European Union, that often have fewer resources and smaller data sets than populous countries like the United States and China.

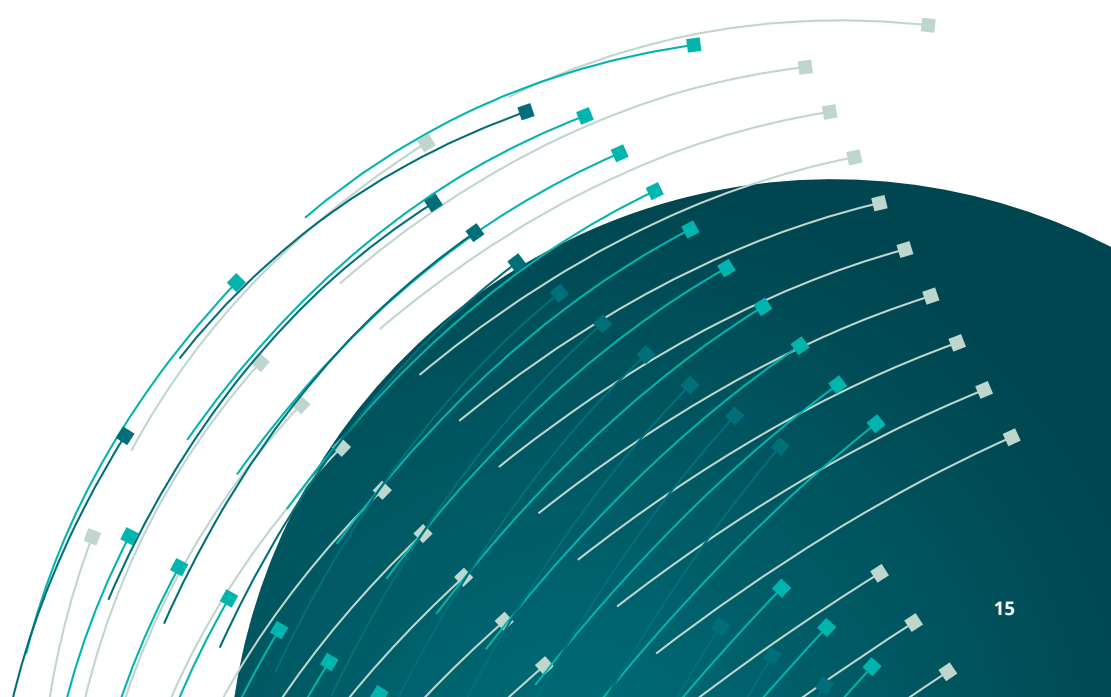
3. Engaged citizens who feel empowered to make decisions about their data.

Individuals are the cornerstone of the data economy. Citizens and consumers not only create the data used by businesses and governments, but also serve as the customer for actions originating from that data. In response, leading countries have implemented initiatives that ensure the data economy is engaging and empowering every citizen.

For example, Singapore's Smart Nation initiative outlines every citizen's right—and responsibility—to be digitally connected and included in the digital future. As part of this initiative, the Singapore government has been providing computers and tablets at subsidized rates to low-income households, as well as increasing fixed home broadband access, mobile broadband access, and wireless connectivity.³⁶

Denmark has also recently made several reforms to its education system to prepare its citizens for the digital workforce. One initiative is the adult and continuing education (ACE) system, which was developed to strengthen the digital skills of the Danish workforce and to ensure citizens can adapt to the fluctuating needs of the labour market.³⁷

For Canada to be a true leader in the data economy, we need an equal balance of all three pillars in the front-runner framework. As an exercise, we employed a future-scoping technique to imagine how focusing too much on one of the principles at the expense of the others could affect Canada's data future. Our results are discussed in the next section.



Future-scoping

Imagining the Canadian data economy in 2030

► To lead in the data economy, Canada needs to act on all three principles identified in the front-runner framework by *developing clear data policies, encouraging businesses to innovate, and empowering citizens to make informed data decisions.*

While action on all three is needed, any action we take that disproportionately prioritizes one principle will affect the other two. As a nation, we need to understand how interactions between these three separate principles will shape the future of our data economy. Only then can we make the choices today that will strengthen all three and position Canada as a relevant and competitive global player.

To become so, business leaders and policymakers must account for the critical uncertainties at play, and develop and plan for plausible future scenarios. Future-scoping helps them understand there are multiple possible outcomes in our current trajectory—and while these futures may not each have an equal chance of coming to fruition, all are possible to some degree.

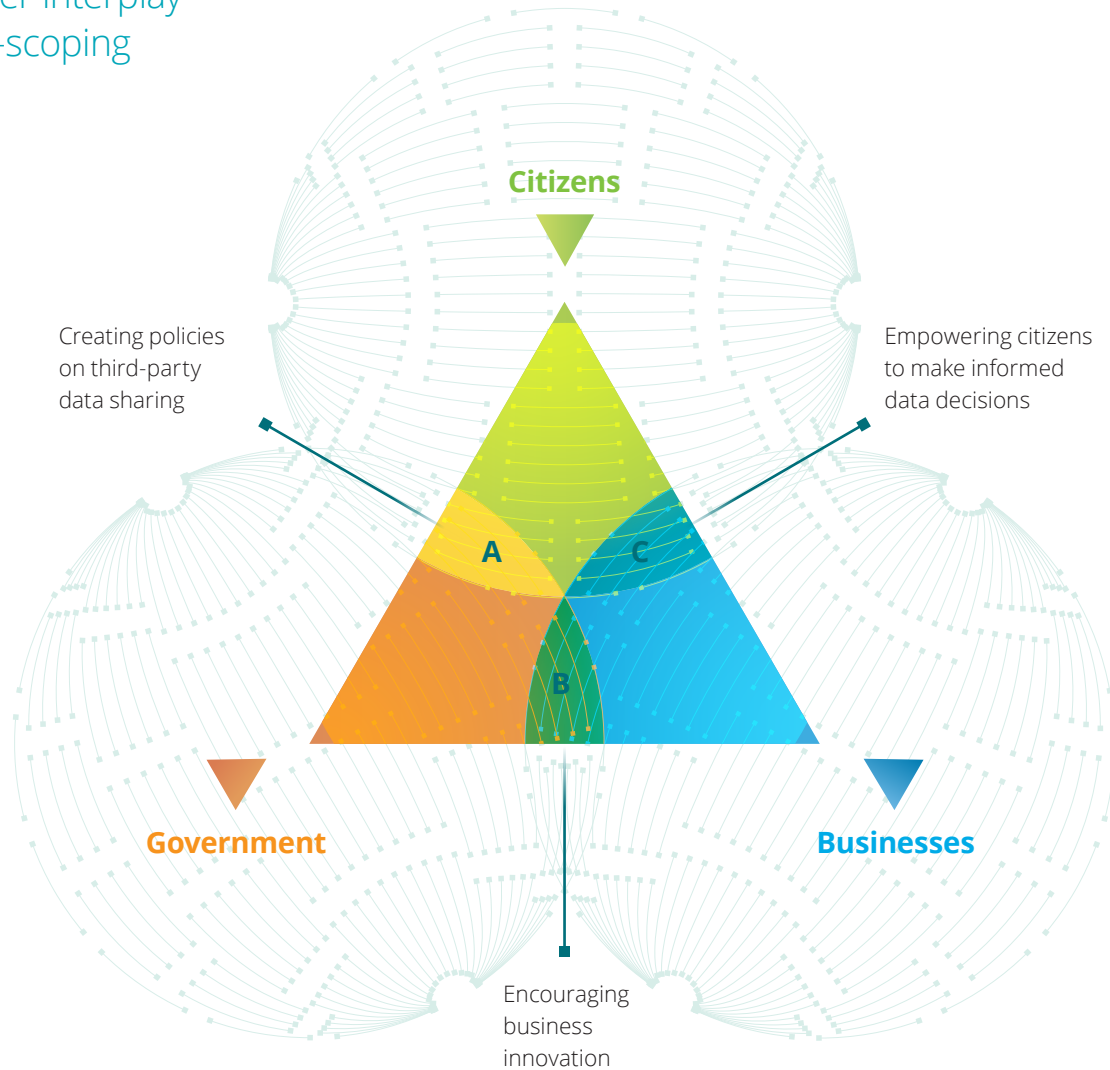
In an increasingly uncertain world, future-scoping is an invaluable exercise to conduct.

(Note: Future-scoping is not intended to be predictive. It is designed as a thought exercise to evaluate some plausible extremes.)

Establishing the future-scoping technique

Drawing from the three principles of our front-runner framework, we believe the interplay among three actors—citizens, businesses, and governments—will likely steer the fate of the data economy in Canada. In our future-scoping exercise, we have chosen to model three scenarios, each of which tilts the balance of power toward two of these three major actors. (See Figure 4: *Stakeholder interplay for future-scoping.*)

Figure 4
Stakeholder interplay
for future-scoping



Scenario A examines a future Canada focused on *developing clear policies for a data economy*. In this scenario, citizens and governments agree that the existing data climate has compromised citizens' privacy and digital rights, making it necessary to apply more stringent controls over how citizen data can be used and shared—and leaving businesses to search for alternative ways to innovate.

Scenario B examines a future focused on *encouraging businesses to innovate*, in which companies collaborate to improve their collective competitiveness at a global level and governments encourage data usage, but citizens remain largely apathetic to the usage of their own data.

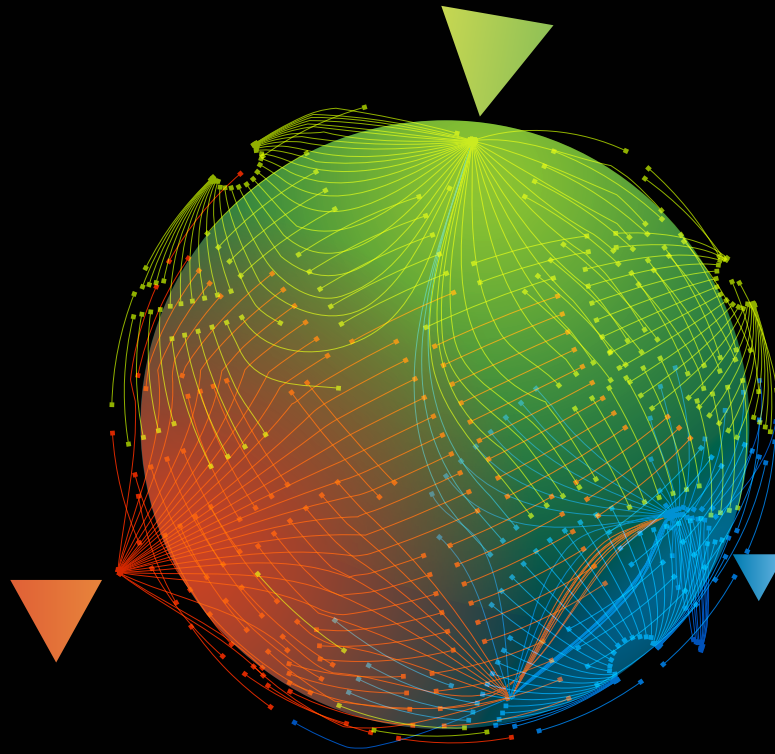
Lastly, **Scenario C** envisions a world focused on *empowering citizens to make informed data decisions*, in which citizens are sufficiently engaged and educated to assume control over their data.

Who are the major actors in this scenario?

Public sector

Citizens

Private sector



Scenario A

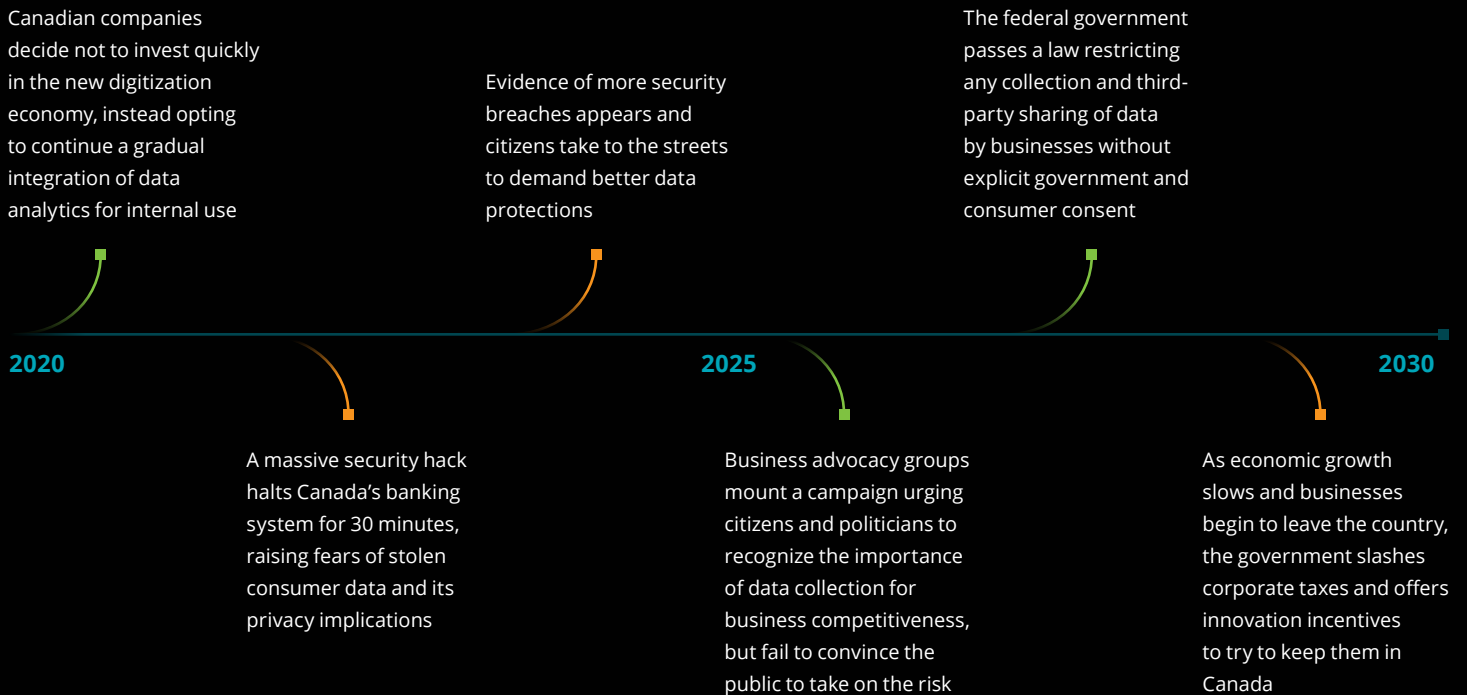
Regulating third-party data sharing

- ▶ **As scandals like Cambridge Analytica continue to emerge in the media, the public's anger over data being used as a tool to undermine democracy and privacy rises. Data sharing becomes an election issue, and the federal government issues a series of regulations that prohibit further involuntary disclosure of personal information to third parties and creates much stricter regulatory measures around data sharing.**

Starved of further data sharing avenues, Canadian businesses look for opportunities internally and among their own customers. Innovation and GDP grow at a slower pace compared to countries with open data regulations, like the United States. This causes some multinationals to look elsewhere, and concentrates data assets among the largest businesses in Canada, who use the assets to consolidate their market position. At the government level, the lack of political will for data sharing

slows down further interprovincial and federal-provincial data sharing, meaning that Canadians lose out on some of the potential benefits of digital government.

Canadian citizens enjoy the privacy and protection of a world without data sharing, and will happily exchange higher GDP growth for better societal values like public trust in institutions that some countries with more lenient data laws don't have.



Meet Sameer, *federal Minister of Data Innovation*

Sameer was appointed Minister of Data Innovation earlier in 2030. His most challenging task so far has been to help modernize Canada's data privacy regulations at a time when businesses are pleading for more open data access and citizens are demanding greater privacy protection.

Canadians are outraged as more data breaches make front-page news and tell Sameer they are troubled by the country's outdated data privacy laws. There is increasing public pressure for the government to step up protection efforts. Sameer's team at the Department of Data Innovation discuss the matter with the Office of Data Citizen Security. Both agree to quickly tighten measures.

As the stricter measures are rolled out and businesses start to adapt their process to be compliant, Sameer meets with several CEOs of small and medium-sized

enterprises (SME), who tell him the new data protection regulations have stalled their ability to collect data to innovate and they're concerned about large businesses having an advantage. In response to these conversations, the Department of Data Innovation starts working closely with businesses to find other opportunities and initiatives to encourage innovation in Canada without compromising citizen's privacy.

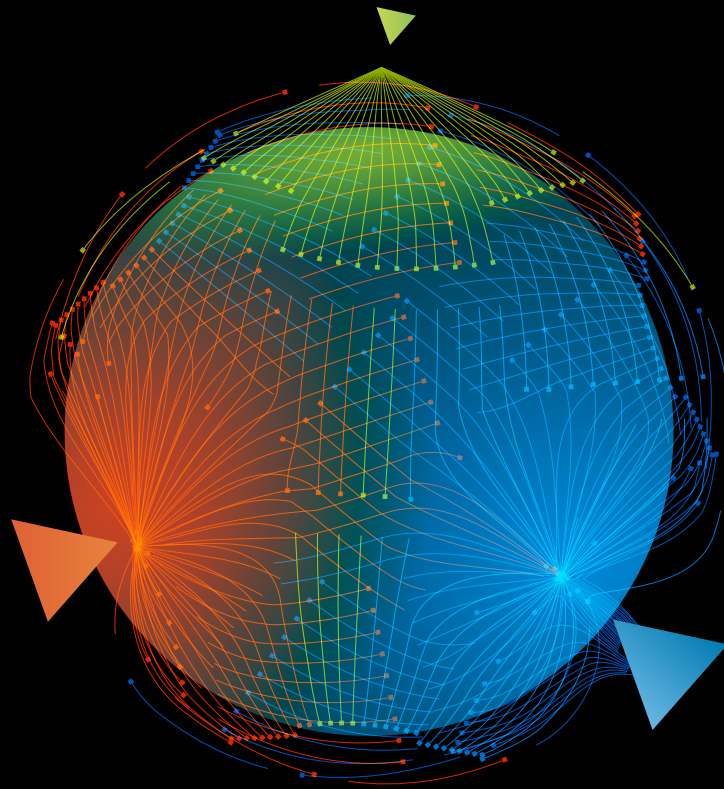
The international community takes note of Canada's strategy for strictly regulated data sharing. World leaders consider whether to implement similar measures to improve their citizens' trust in the data economy. They are closely monitoring the progress on Canada's pioneering data policy to understand long-term effects on the GDP and business competitiveness.

Who are the major actors in this scenario?

Public sector

Citizens

Private sector



Scenario B

Improving business competitiveness

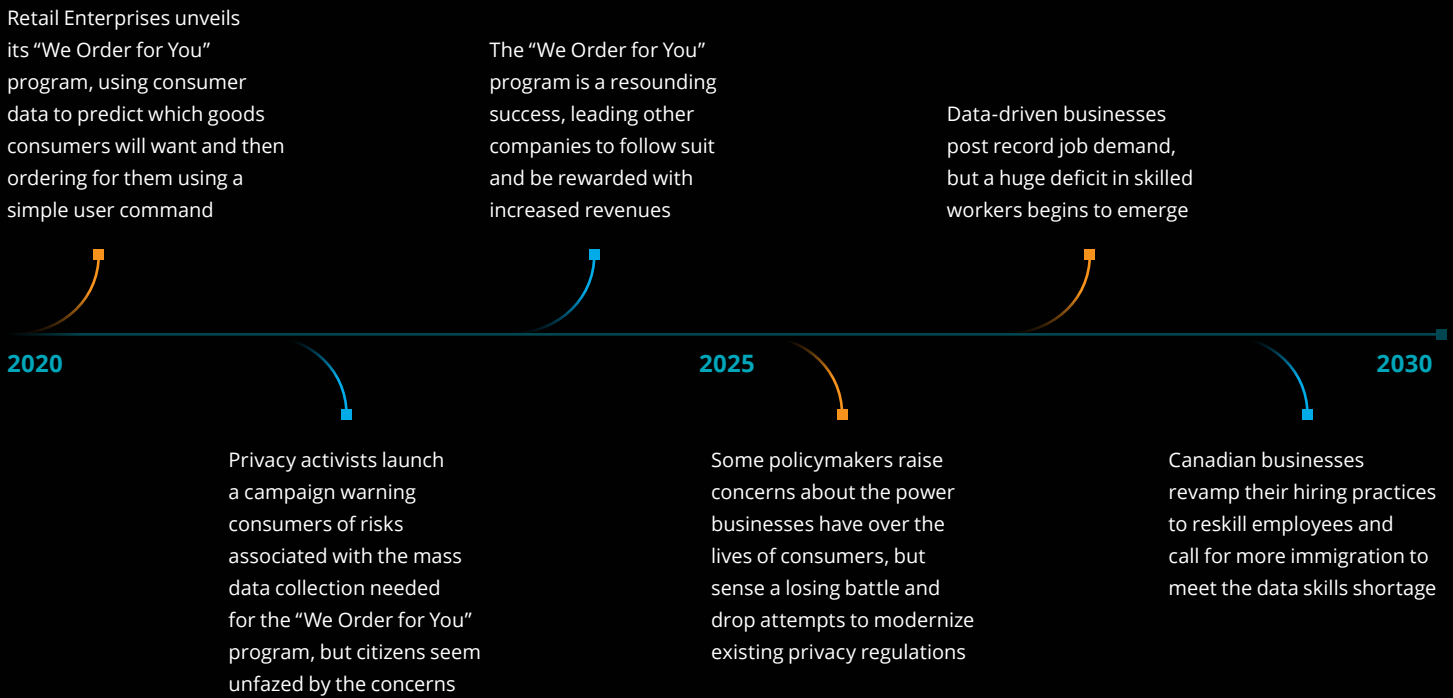
- ▶ **Governments and businesses agree that Canada's lack of economic growth, stunted by a string of deficit budgets and limited innovation, is a problem. They resolve to focus on data collaboration as a key economic driver and relax data-sharing regulations, hoping to position Canada as a global leader.**

With limited time and unlimited choice, consumers relish the convenience of

personalized services. Large data-sharing networks allow businesses to hyper-customize and target their offerings to customers. In collecting vast amounts of data, businesses generate a repository of information and insights that, at least in the short term, leads to innovation and economic growth.

However, the businesses accrue high costs trying to outcompete each other in the war for digital talent and investment

in seamless data infrastructure. And as the sheer amount of shared data dawns on citizens, some express concern that corporations know too much about them and are possibly using their data in malicious ways. Business leaders also have to contend with the lack of control over data-sharing, cybersecurity threats, and diminished public trust, which take significant time and energy to address.



Meet **Natalie**, *CEO of Retail Enterprises*

When Natalie became CEO of Retail Enterprises two years ago, she invested in the firm's research and development team, bought high-tech data integration software, reskilled her employees, and hired more digital talent. Thanks to a new public data-sharing strategy between Canadian businesses and governments at various levels, Natalie increased the firm's revenues by 45 percent this quarter by introducing "We Order for You"—a program that uses business and public data to produce a comprehensive profile of each customer and predict future transactions.

When Natalie's team searches for "Claudio Kim" in the firm's database, for example, it finds a single father of two in his 40s who lives in a mid-sized townhouse in Etobicoke. Claudio doesn't love his job. He's searching for a new role that aligns with his passion for the environment. Claudio has high blood pressure, a severe intolerance to gluten, and a history of allergic breakouts. Retail Enterprises uses Claudio's data to personalize everything it offers him, from job leads to new foods to try and groups to join.

While most Retail Enterprises customers reported satisfaction with their hyper-personalized experiences, the firm was recently in the news for inducing addictive shopping behaviour. A 29-year-old gig worker took to social media to voice how Retail Enterprises' predictive purchase algorithm was so accurate at forecasting purchases that he struggles to save any of his paycheques. The company's role in encouraging compulsive shopping is trending on all social media platforms, and Natalie's team is trying to figure out how to build fiscal responsibility features into its program to prevent negative press for the business.

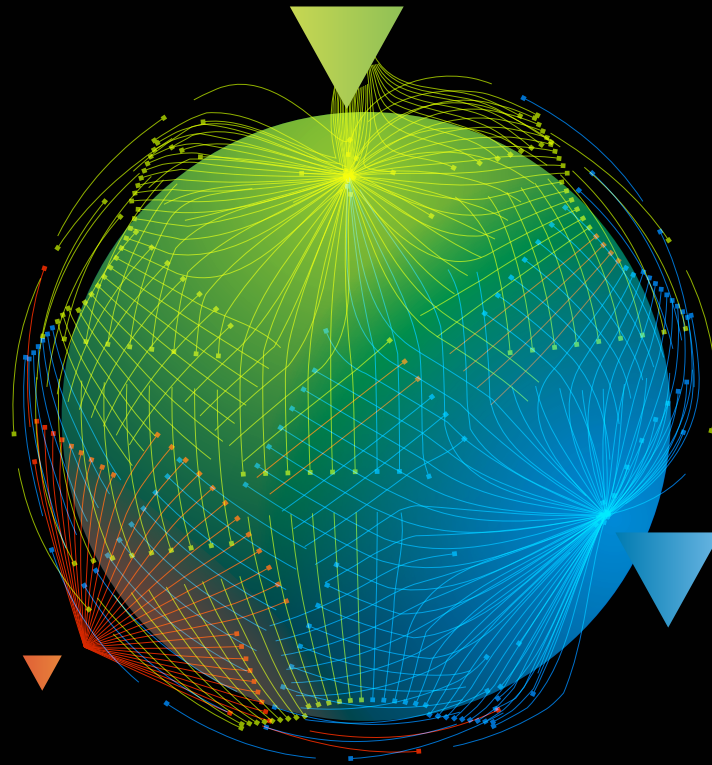
Retail Enterprises' stakeholders are happy with Natalie's leadership but warn her not to get complacent. They are mindful that as more Canadians balk at the idea of a privacy-free state, governments could likely respond by restricting access to personal data. Natalie has a meeting with her strategy team to discuss how the firm can use its 360-degree view of customers to stay ahead of the competition and offer a service Canadians won't want to turn down, while heeding customers' potential concerns.

Who are the major actors in this scenario?

Public sector

Citizens

Private sector



Scenario C

Empowering citizens to make informed data decisions

- ▶ **As Canada accelerates into the digital age, citizens take a more active role in controlling the use of their data while Canada is taking steps to become a world leader in data-rights management and data trusts, with different models appearing in the data marketplace. (See: *What is a data trust?*)**

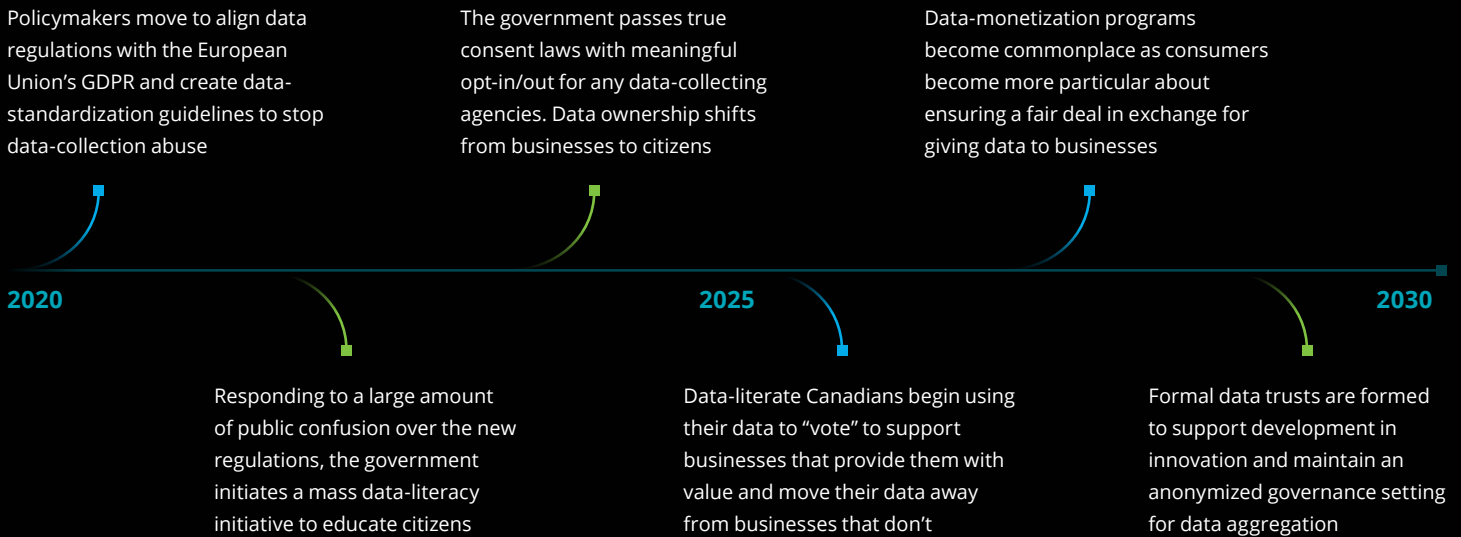
Citizens are equipped, through public data-literacy programs, to understand how data is collected and how regulations govern the usage of data. They are also equipped to give informed consent for sharing their data with data trusts they find valuable (though the extent to which they actually

take advantage of these programs varies by location and age). In response, businesses must invest in systems that store and manage massive sets of data that citizens have permitted, and businesses and governments must work closely together to standardize consent models.

Some Canadians are proactive about managing their data, but others are indifferent and find it a nuisance, as evidenced by their apathetic behaviour. Businesses dislike the data-trust model, arguing that the trustees have a lot of—and perhaps too much—power. Companies also argue that accessing data from these trusts

is overly time-consuming, and that existing access procedures should be optimized instead.

However, with data in the hands of citizens, businesses compete on their value propositions. As a result, an environment of increased creativity and innovation forms, as even small businesses can gain and use data from data trusts, and directly from citizens, if they can deliver more value than larger, more established businesses. At the same time, larger businesses are also using monetization techniques to get access to more data.



What is a data trust?

Data trusts are independent stewards of data that maintain and manage how data is used and shared, such as who is allowed access to the data they manage and under what terms.

Data trusts are used to enable health-care innovation, to improve urban mobility, and to build new consumer products, among other uses.

Meet Ian, *recent retiree in Thunder Bay*

Ian, a former professional squash player, recently discovered he can get deals in exchange for his personal data. His squash club, Atlas Racquet, has offered him a discount of \$2,000 on his membership this year in exchange for access to his private data, including information about his retail patterns, medical history, and physical characteristics such as bone density, muscle tone, and cognitive function. Atlas Racquet explains to Ian that his data will mainly be used to improve the club's services by feeding into its new sports development hub, which uses shared data to better understand the characteristics of elite sports players.

Ian consents to sharing his data with the club. He's excited by the idea of contributing to sports research. He also wants to increase his data literacy to understand how else he could share his data so he can have a greater impact. He therefore completes a government-sponsored, 40-hour

online course in which he is introduced to the basics of machine-learning algorithms. He also learns about how he can help sports research by consenting to share his data with a data trust specializing in improving athletics.

Atlas Racquet, which had been appealing to its customers directly for access to their data, is now considering applying to the athletics-focused data trust for access to additional data.

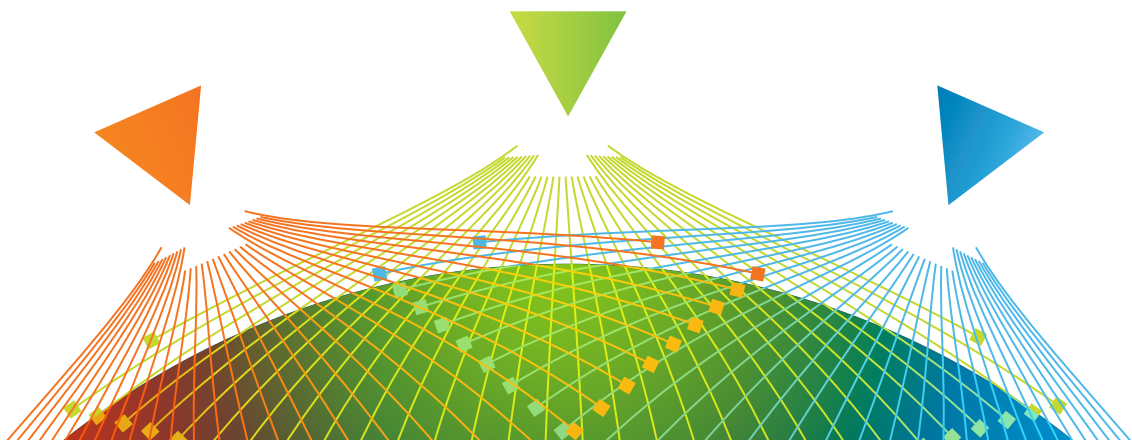
Meanwhile, Rhino Racers, a small sports retail and research business, also approaches the trust for access to its aggregated data in its efforts to develop new products and athletic programs. The process to access this data is extensive, as Rhino Racers has to establish a clear purpose and demonstrate good data protection and governance procedures.

Recommendations:

How Canada can lead in a data-driven economy

The previous section on future-scoping is designed not as a prediction, but as a thought exercise to develop extreme scenarios and highlight the key uncertainties associated with Canada's data future. It also showcases how action is needed from all three stakeholder groups—the private sector, the public sector, and citizens—to shape a well-rounded approach for the data economy. We must act now to ensure that Canadians can enjoy the benefits of data while building trust and encouraging collaboration along the way.

In the pages that follow, we offer recommendations for Canada to lead in a data-driven economy. This is not meant to be an exhaustive list, but outlines the actions we feel are table stakes for ensuring Canada's global competitiveness in the new economy.



1. Prioritizing data literacy to build a data-driven workforce

Canada must invest in increasing data literacy for its citizens. Even though not all careers in the future will be data- and AI-focused, a basic level of data literacy for every Canadian will be required to engage and protect one's data, as more and more businesses and institutions move toward digitized platforms.

► **Key action for public sector**

Making the Canadian population data-fluent:

Educating Canadians about data must start with public education: a K-12 curriculum that integrates data literacy in each grade, followed by a post-secondary curriculum that offers various data-literacy pathways for adults. Primary and secondary education curricula should provide young people with the building blocks of technical and non-technical data skills and equip them with a foundational understanding of using data in the 21st century. Beyond K-12, more publicly funded data-literacy programs and easily accessible MOOCs are needed to reach Canadians across the spectrum to give them a foundational understanding of data. (See *Data Literacy Exchange program*.)

► **Key action for private sector**

Equipping employees with opportunities to reskill:

Reskilling employees to create an adaptable and data-driven workforce is critical for every business. They should therefore provide employees with pathways for life-long learning and additional proficiency-building. To increase their digital and data-driven customer offerings, companies will need to build accessible training programs for their current workforce—such as offering work-integrated learning and courses, working in partnership with academia, or embedding regular educational workshops directly within their own organization. These accessible training programs should also focus on building awareness of cybersecurity at every level of the organization.

► **Key action for citizens**

Changing their mindset to be more proactive:

A data-literate population will make informed decisions about the value of their data and the risks associated with its misuse. Citizens must strive to be more proactive in increasing their understanding of data. They should feel empowered to demand better and more secure data practices from businesses and fit-for-purpose regulations from governments that allow Canadians to feel in using and sharing their data.

Data literacy exchange program

As part of its Innovation and Skills Plan, the Government of Canada will invest \$29.5 million in the Digital Literacy Exchange program. This will fund non-profit organizations across the country to teach fundamental digital literacy skills to Canadians.³⁸

The program is designed to target those who are still learning how to use digital technologies, including seniors,

people with disabilities, newcomers, low-income Canadians, Indigenous peoples, and those living in Northern and rural communities, among others. So far, 36 non-profit organizations have funding for their training initiatives.

The objective is to instill Canadians with greater confidence in using and sharing data safely, securely, and effectively by improving their data knowledge and skills.

2. Increase the transparency of data practices to build Canadians' trust in the data economy

Organizations in the private and public sectors should strive for greater transparency about how they intend to use data and be intentional about the impact—whether economic, societal, or political—of their objectives. This transition to a transparent, purpose-driven approach to data-handling will build trust among consumers and citizens, and enable Canadians to give truly informed consent about how their data should be managed.

► **Key action for public sector**

Accelerate progress on data policy development:

Governments have to balance the dual goals of protecting consumer data and encouraging business innovation. Federal and provincial policymakers have already made progress, such as with the creation of the federal Digital Charter (announced in May 2019) and the Ontario government's data strategy (announced as part of the 2019 provincial budget). However, more action is required to update Canada's outdated privacy and consumer protection laws to give businesses a clear set of guardrails to operate within (and consequences for stepping out of bounds) for the collection, storage, and sharing of data.

► **Key action for private sector**

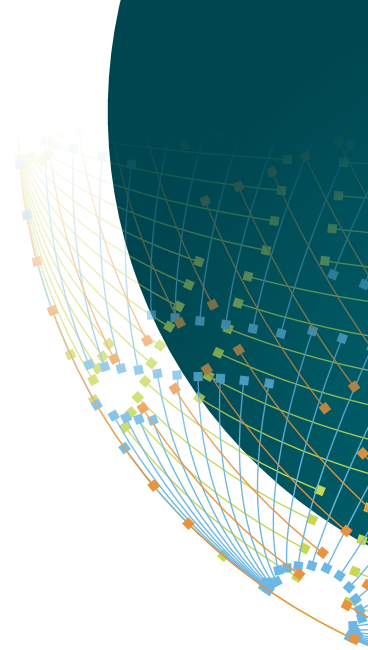
Offer consumers genuine consent options:

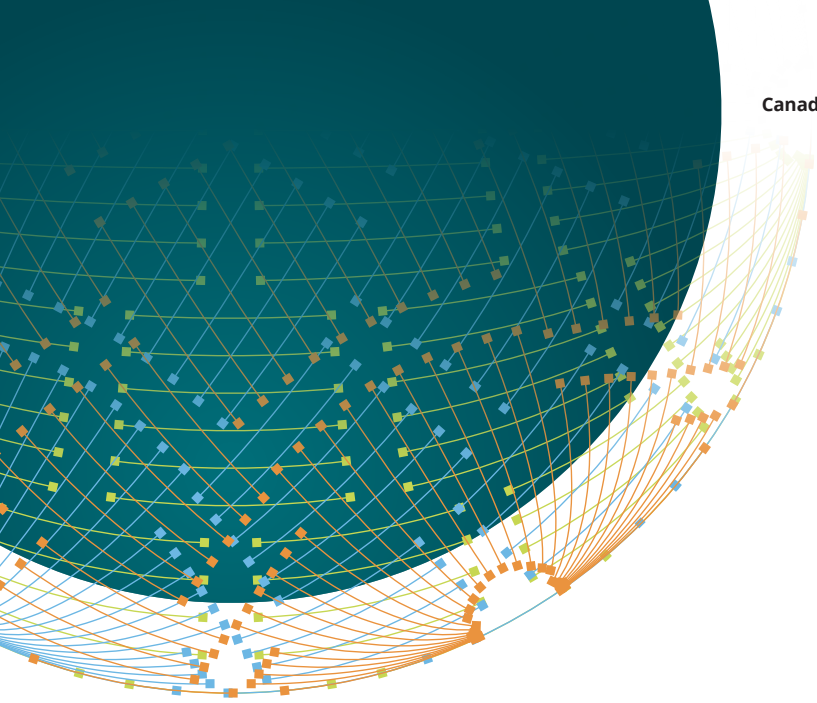
Businesses have to become more targeted and intentional in communicating to the public how they use consumer data in their decisions. They must also offer true alternatives—not simply deny all services—should consumers not want their data to be used. Businesses should move toward collecting expressed and informed consent for the collection and usage of consumer data for specific purposes, instead of the current model of complete opt-in or opt-out for all services. Easy-to-comprehend, purpose-driven consent agreements, including information on how collected data will be secured and protected, are crucial to building consumer trust. (See: *Loblaw: How can we meet the customers where they want to be met?*)

► **Key action for citizens**

Reward good data practices with responsive behaviour:

Canadians should become more cognizant of how businesses and policymakers are collecting and using their data. Citizens should ensure they understand the visions of political parties for the digital economy, and be proactive in asking their elected representatives for fit-for-purpose data. Consumers should also “vote with their wallets” and walk away from companies that don't meet their standards for consumer rights protections. Similarly, if a business is innovating through good data practices and offering results that improve consumers' lifestyles, people should consider being more open about sharing their data with them.





Loblaw: How can we meet the customers where they want to be met?

In the spring of 2019, Loblaw Companies Ltd. (Loblaw) launched a pilot project that gathers data from its PC Optimum loyalty members in exchange for loyalty reward points.³⁹ Members can consent to their data being used for targeted ads, and are incentivized with reward points. The pilot program marks Loblaw's latest effort to thoughtfully collect customer data by "meeting them where they want to be met."

As Canada's largest food retailer, Loblaw has a vast dataset from which to garner key insights that help the business

improve its operations and better the lives of its consumers. Loblaw Chief Data and Analytic Officer Paul Ballew told us that while the pilot project is meant to profit from customer data, the company is focused on making participating customers comfortable with the experience by maintaining transparency and providing the choice to opt in and out of specific data usage. Ballew believes that while companies need consumer data to innovate, they must also offer value in exchange for that data, and be good stewards by using it to make the lives of their consumers easier.

3. Encourage cross-sector collaboration for wider impact

The data ecosystem involves unavoidable interplay among multiple stakeholders in the private sector, in the public sector, and with citizens. Public-private partnerships will be key to Canada's leadership. At the industry level, companies should securely share data among themselves to achieve the scale needed to build better AI algorithms and analytics models.

► **Key action for public sector**

Encourage public-private

partnerships: The public sector must continue to create targeted plans to encourage private-sector involvement in innovation, like the Innovation Supercluster and the Smart Cities Challenge initiatives.^{40, 41}

Another example of cross-sector collaboration is the Government of Ontario's recent \$80-million investment in the Autonomous Vehicle Innovation Network (AVIN) project. This created six regional technology development sites (RTDS) to help small and medium-sized enterprises develop and test new autonomous vehicle technologies, obtain technical and business advice, and access equipment and data.⁴²

► **Key action for private sector**

Create purpose-driven, private-

private data collaborations: As small and medium-sized enterprises make up the overwhelming majority of Canada's businesses, private companies will need to cooperate more in their approach to data in order to reach scale.

They must become more open to working together to develop synergies, and should look into building more data trust-like entities to enable competitiveness and innovation in a secure manner. If this approach is implemented, more resources can be dedicated to solving industry-wide issues, and the amount of time spent trying to reinvent the wheel at each company can be reduced.

The private sector must also work toward supporting a more open-data environment in which all businesses can find, consolidate, and use the information they need to grow and to deliver the best products for their customers, while agreed standards help to keep customer data secure.

► **Key action for citizens**

Participate actively in civic life:

Canadians need to demand the government and private sectors work together to create data solutions, such as data trusts, that lead to greater positive outcomes for communities. Citizens must become more purposeful in holding businesses to account and influencing business plans to create a future that makes Canadians proud. (See: *Sidewalk Labs: Torontonians voice their needs and concerns.*)

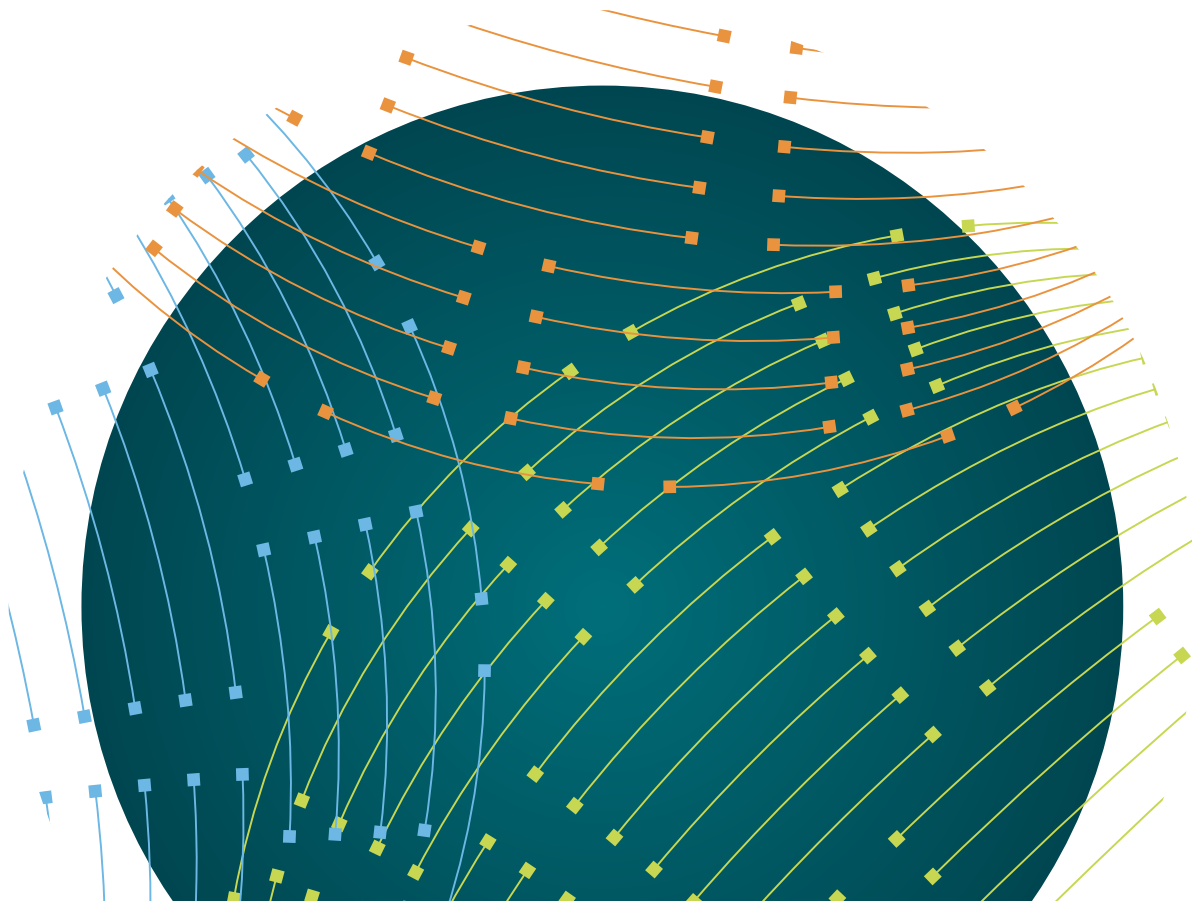
Sidewalk Labs: Torontonians voice their needs and concerns

Sidewalk Labs' planning process to transform a piece of Toronto's eastern waterfront into a data-driven smart city has been accompanied by vocal support from some Torontonians and vehement opposition from others.

In June 2019, Alphabet subsidiary Sidewalk Labs released its Master Innovation and Development Plan (MIDP), for which it claims to have engaged with more than 21,000 Torontonians,

all levels of government, local experts, non-profits, and community stakeholders.⁴³

The spirited opposition that met the plan included concerns about allotted land, data governance, and asset ownership.⁴⁴ No matter which side of the fence one stands on, however, everyone can agree that civic engagement made the development plan more robust and thoughtful.⁴⁵



Canada's time to lead in the data economy is now

- ▶ Data is the lifeblood of our digital 21st century, transforming the way we live and work. Governments around the world are using data to drive economic and social progress, while companies are using data to better understand their customers, reinvent their business models, and pave the way for greater innovation. But, data also has a dark side. For example, according to the Office of the Privacy Commissioner of Canada, more than 28 million Canadians have been affected by a data breach in the past year.⁴⁶





While Canada has the potential to lead in the data economy, our research shows that Canadian businesses believe we are lagging behind our global peers.

To ensure our nation becomes a front-runner in the new economy, we need citizens, businesses, and governments to align and recognize the value of being data-driven. Citizens must have baseline knowledge of the value of data, understand how it functions, and know their rights. Businesses must invest in their data infrastructure and capitalize on the country's highly skilled and diversified talent base to innovate and improve their offerings. Finally, governments at all levels must continue to modernize their services, build digital policies to prevent data misuse, and create smart regulations that benefit businesses and citizens alike.

Canada has an undeniable edge. Our people, businesses, and democratic values can make us competitive among other global pioneers in the data race. The time to act is now—Canada's digital potential is too big to waste.

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