



Digital Industries



The story of Canada has always involved supplying other countries with the raw materials of their success.

From the earliest days of our nation, we sent beaver pelts to Europe to be turned into garments. Later, we learned to extract oil from sand, but shipped it to Texas for refinement. Today, we export valuable research, intellectual property, and talent abroad.

We are exporting our most precious assets to the benefit of other countries. That's not necessarily a bad thing. We do, however, need to double down on our own inventiveness to capture more of that wealth here at home.

It's time to foster a homegrown advantage

by commercializing our own innovations. What could be more Canadian than using our ingenuity to create world-class products, and then sharing them with the world? It's time to encourage our top talent to build their careers right here, instead of seeking opportunities elsewhere. And it's time to become a fully digital nation to give ourselves the advantages we need to succeed in the future.

Canada has always been innovative. Our history and reputation provide us with a unique, once-in-a-lifetime

opportunity to become a global innovation leader; we have all the right ingredients to make it happen. Our digital innovation can be a lasting legacy and a valuable global export.

Not only are we capable of adapting digitally, but we have the moral and economic imperative to do so. More than 42% of Canadian jobs are likely to be affected by automation by 2036¹. This will impact many different industries, from truck drivers to welders to radiologists. The world is going to look very different, very soon.

We need to prepare. Right now is the formative period for the

digital institutions of the future. If we don't start to build and support them, our economy won't be able to sustain our current standard of living. The future Canada needs us to make these changes.

And so we invite you to picture Canada a decade from now.

What does it look like? How would our lives be improved if digital innovation was better integrated into our lives, businesses, and government? What if we owned our innovations instead of giving them away?

The recommendations outlined in this chapter are our roadmap to a digital future that will benefit the entire country. We invite our government, alongside each and every Canadian, to join us.

WHAT IS A DIGITAL FIRM?

The digital industries sector is made up of a combination of manufacturing and service industries that use creativity, talent, and digital skills to capture, transmit, and display data and information electronically. This includes information and communications technology and digital media industries.

Our goal is that all firms become digital firms.

‘Digital’ is not an industry. It isn’t a strategy. It’s an essential tactic that should be embedded into every industry. The competitive advantage of any Canadian company will be connected to its digital advantage.

Tobias Lütke

Table Chair

CEO and Founder of Shopify

¹ Brookfield Institute, (2016). *The Talented Mr. Robot: The impact of automation on Canada’s workforce*. http://brookfieldinstitute.ca/wp-content/uploads/2016/08/TalentedMrRobot_BIIE-1.pdf

WHAT WE NEED TO OVERCOME

- Canada lags behind other countries on commercializing innovation;
- There's a national scarcity of C-suite talent with experience scaling up businesses;
- Skilled STEM talent is severely limited, and competition is fierce and global;
- Canadian businesses and governments adopt technology too little and too slowly;
- Affordable, reliable, high-speed internet access is not universally available;
- Culturally, Canadians don't correctly acknowledge the impact of innovation on their everyday lives.

WHAT WE NEED TO BECOME

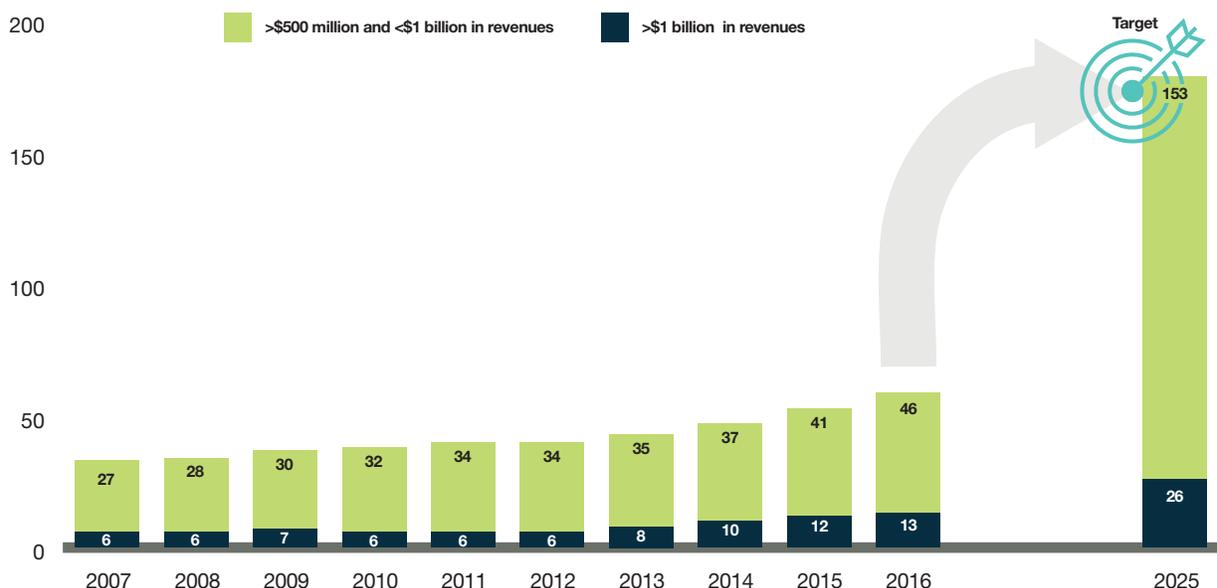
- Digital firms must have access to talent and the opportunity to scale up and stay in Canada;
- Canadian industry and post-secondary institutions must work together to train highly skilled workers for the future economy;
- Canada's leadership in artificial intelligence and digital creative content must be leveraged and brought to market;
- Canadians must be able to participate in, and benefit from, the digital economy;
- Canada's policy environment must support a comprehensive data and IP strategy.

TARGET

To foster digital innovation and excellence in Canada, we need to grow the number of large Canadian digital companies. These high-growth firms will anchor Canada's global leadership. Our goal is to double the number of businesses earning \$1 billion or more in annual revenue (from 13 to 26) by 2025.

26 firms
with over
\$1B
in revenues
by 2025

Digital Firm Growth



Source: Statistics Canada, Table 27-10-0333-01

* Includes Other professional, scientific and technical services [5419] and Accommodation and food services [72] due to aggregation of the source data

VISION QUESTION

Does this help create more billion-dollar digital Canadian companies?

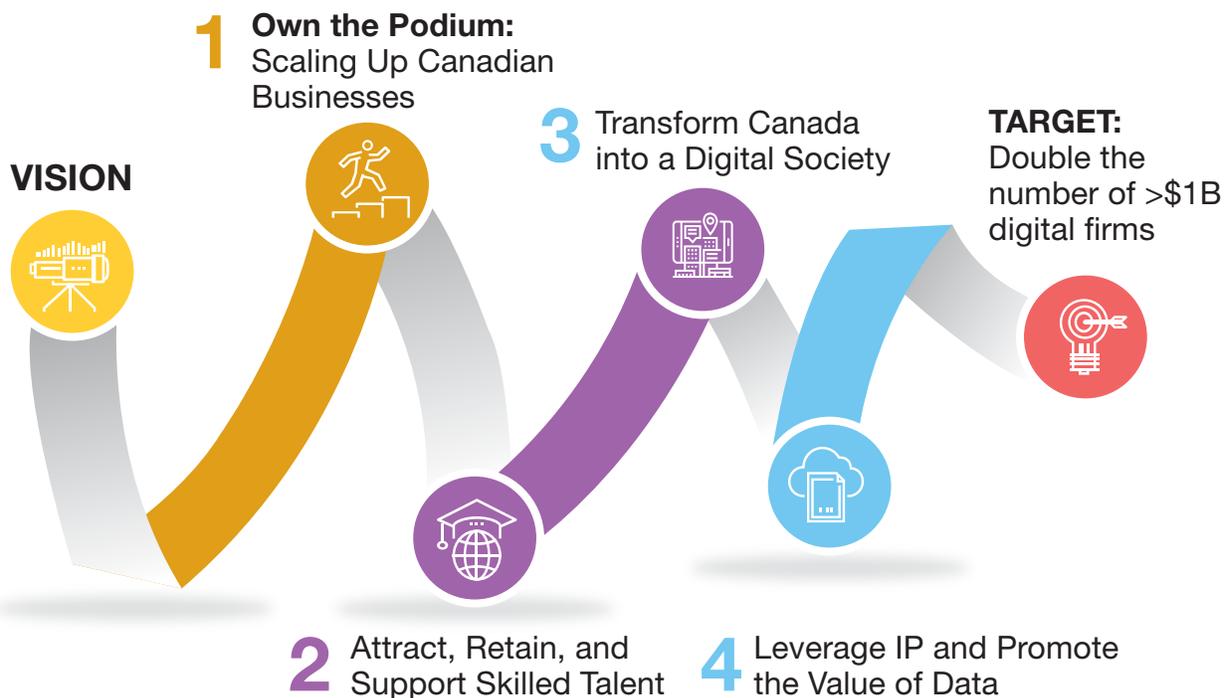
To ensure that each of our recommendations helps achieve our growth target, we've asked the following question for every individual goal:

For each proposal outlined below, we believe the answer is yes.

Each of our success targets should be achieved by 2025, unless specified otherwise.

OUR RECOMMENDATIONS

We are calling for action in four priority areas:



“A healthy community of scaled digital technology firms will create a ‘flywheel’ effect. These firms are the best source of high-potential founders and experienced go-to-market talent for Canada’s next generation of digital leaders.”

PROPOSAL

Own the Podium: Scale Up Canadian Businesses

Anchor firms (those with at least \$1 billion in annual revenue) support regional technology clusters and create a ripple effect of growth and prosperity.

We need to help more Canadian digital firms scale to \$100 million in annual revenue, and onto the trajectory of becoming anchor firms.

WHY THIS MATTERS

Canada has a strong entrepreneurial culture, startup capacity, and a culturally diverse and creative society. Yet despite a strong community of startups, Canada underperforms when it comes to scaling firms into large technology enterprises. Almost all of our 40,000 Information Communications Technology (ICT) firms are small and micro-sized (98.6%), and 85% of them have fewer than 10 employees.² It’s an extreme rarity to reach the billion-dollar benchmark in Canada, and this is something we need to change.

Anchor firms are innovative, high-impact companies that play an important role in creating powerful business clusters and incubating other businesses. By virtue of their size and R&D spend, anchor firms help create new organizations and transform existing ones, fostering entrepreneurship and networking on local and global levels.

The problem is that government programs tend to focus on entrepreneurs and small- and medium-sized enterprises (SMEs). For example, under SR&ED, Canada’s largest innovation support program, Canadian SMEs can earn cash-refundable tax credits for 35% of eligible expenses. Provincial R&D tax credits raise that support from 35% to nearly 45%. Larger Canadian businesses, on the other hand, are eligible for tax credits on just 15% of their eligible expenses. An additional 7% from provincial R&D tax credits raises the total to 22%.³

Supporting SMEs is important, but the result is a multitude of small firms in a sector of global giants. Refocusing a percentage of federal growth-oriented programs to support high-performing scale-ups will help Canada grow its community of digital anchor firms. Additionally, it’ll help build out regional technology clusters that can keep the momentum going.

² Innovation, Science and Economic Development, 2016, https://www.ic.gc.ca/eic/site/ict-tic.nsf/eng/h_it07229.html

³ OECD, 2018, “R&D Tax Incentives: Canada, 2017,” <http://www.oecd.org/sti/rd-tax-stats-canada.pdf>

HOW DO WE CREATE MORE BILLION-DOLLAR DIGITAL CANADIAN COMPANIES?

Establish a Hypergrowth Passport pilot program

Easier access to government funding will help fast-growing digital firms scale even faster. We propose a five-year pilot project to concentrate key government efforts on helping Canada's most promising digital firms capitalize on growth opportunities faster, more easily, and with less risk. That way,



INTERNATIONAL SCALE-UP INITIATIVES

INNOVATE UK

This pilot program is an initiative of the Enterprise Europe Network. It identifies firms with the potential for rapid growth and provides them with a “scale-up manager.” The goal is to take the firm from £500,000 in annual revenue to £100 million.

AUSTRALIAN GROWTH SERVICE

Australian firms with high growth potential gain access to experienced advisers, as well as government programs, services, and funding. The Growth Service targets five key sectors: Advanced Manufacturing, Food and Agribusiness, Medical Technologies and Pharmaceuticals, Mining Equipment Technology and Services, and Oil, Gas, and Energy Resources.

we can help companies become world leaders in their fields while keeping ownership and profits in Canada.

The Hypergrowth Passport would be an accredited designation for digital firms headquartered in Canada with more than 40% year-over-year revenue growth (past \$1 million in one year). The Canada Revenue Agency (CRA) should automatically determine if companies meet these criteria as part of its tax assessment, similar to how it detects individual benefit eligibility automatically.

The pilot will include:

- A single and simple application with rapid processing available to all businesses that have been pre-qualified by the CRA;
- Set-asides in government programs for eligible firms;
- Support navigating domestic and international growth barriers;
- Access to an elite network of mentors;
- A best-in-class government seal of approval;
- The opportunity to showcase themselves to global investors, talent, partners, and customers.

Through this initiative, Canada will form a cohort of fast-growing Canadian companies that can serve as a network and support community for scaling firms and aspiring founders.

TRACKING SUCCESS

- *Triple the number of firms earning \$100 million in annual revenue from 58 to 172.*

Modernize SR&ED tax credits

Canada needs to refocus a share of its growth-oriented programs away from startups, and toward more high-performing scale-ups to increase our chances of building billion-dollar anchor firms. Our ability to compete in an increasingly complex global market depends on it. SR&ED is Canada's largest public investment supporting corporate R&D. But is it helping make Canadian firms globally competitive? An increasing community of “Walking SR&ED” firms (those that stay in business not because they're competitive but because they're surviving on SR&ED credits) tells us this tax incentive is not working. Low-performing firms must be allowed to fail in order to free up valuable talent and tax dollars.

For Canada to remain competitive, the government must modernize SR&ED to support both innovation *and* commercialization. We need to better monetize our research findings. We can achieve this by:

- Prioritizing credits for commercialization and not just the creation of research;
- Simplifying eligibility for hypergrowth companies;
- Establishing graduation criteria;
- Ensuring that the type of R&D done by digitally-based firms is eligible;
- Introducing transparency through published performance metrics.

PROPOSAL

Attract, Retain, and Support Skilled Talent

Canadian digital firms say the lack of skilled digital talent is a key barrier to growth. That's why we're proposing the creation of a Digital Skills and Talent Collaboration Hub – a venue for industry leaders and policymakers to tackle existing and future talent gaps in high-growth sectors. The only way to anticipate demand and deliver a supply of skilled talent in Canada is through collaboration between government, industry, academia, Indigenous communities, training organizations, and other stakeholders.

WHY THIS MATTERS

New and emerging technologies are transforming the workforce. More than 42% of Canadian jobs are likely to be impacted by automation by 2036⁴. Specialized technology skills, however, remain highly in demand.

In 2017, the average vacancy rate for Canadian ICT workers was 2.3%. Software engineers' vacancy rate was 48% greater than that (at 3.4%). Computer programmers and interactive media developers weren't far behind, with a 35% greater vacancy rate than ICT (at 3.1%).⁵ This highlights the growing demand for highly skilled digital talent, and the urgency to increase our supply of it.

Competition for tech graduates is fierce. The best and brightest digital talent from top Canadian universities are often recruited by U.S. tech firms. In

2015 and 2016, "brain drain" from tech programs at the universities of Waterloo, Toronto, and Vancouver were as high as 42%, 25%, and 41% respectively.⁶ This means Canada's most promising firms don't have access to the talent they need to create jobs and prosperity for Canadians.

We need to take immediate action to remedy the shortage of elite software engineers, highly skilled C-suite executives, and go-to-market talent in the digital sector. Every level of government, as well as public-private partnerships, needs to do more to close Canada's growing skills gap. To better track our progress, the federal government needs to establish better data on Canadian post-secondary graduates, particularly those from STEM fields.



STREAMLINING FOREIGN TALENT HIRES

Halifax-based Squiggle Park provides online games that help children learn to read. During its first year of operations, the firm was seeking to hire a chief technology officer to help build the platform and grow the business. Squiggle Park tried to recruit a foreign skilled worker who qualified for the expedited application process for skilled immigrants. Because of lengthy processing delays to the worker's permanent residency status, they weren't able to retain the employee. As a result, Squiggle Park lost its investment in recruiting a top level C-suite employee, as well as the value of the expertise that person would have brought with them. Programs like the Global Skills Strategy can help companies hire foreign skilled workers faster, mitigating growth slowdowns like the one Squiggle Park experienced.

VACANCY RATE

The job vacancy rate is the number of vacant positions divided by the total labour demand.

The total labour demand is the number of occupied positions added to the number of vacant positions.

⁴ Brookfield Institute, (2016). *The Talented Mr. Robot: The impact of automation on Canada's workforce*. http://brookfieldinstitute.ca/wp-content/uploads/2016/08/TalentedMrRobot_BIIE-1.pdf

⁵ Statistics Canada, 2018, "Job Vacancy and Wage Survey" and "Labour Force Survey"

⁶ Zachary Spicer (University of Toronto), Nathan Olmstead (Brock University), Nicole Goodman (Brock University), 2018, "Reversing The Brain Drain: Where is Canadian STEM Talent Going?", 2018

“Indigenous communities are eager to create new economic opportunities and sustained prosperity for generations to come. Access to digital technology and skills training is critical for Indigenous youth and other underserved communities. As our economy continues to digitize, we cannot risk leaving anyone behind.”



GLOBAL TALENT STREAM

This two-year pilot was launched in June 2017 as part of the Global Skills Strategy to make it easier for highly skilled foreign tech workers to find jobs in Canada. The Global Skills Strategy reduces the amount of time it takes for a foreign worker to get a work permit, from months to weeks. The program also makes it easier for their family to join them in Canada.

HOW DO WE CREATE MORE BILLION-DOLLAR DIGITAL CANADIAN COMPANIES?

Launch the Digital Skills and Talent Collaboration Hub

To create the Hub, we need to assemble representatives from large firms, high-growth and high-potential SMEs, post-secondary institutions, and training organizations.

Hub activities could include:

- Increasing work-integrated learning opportunities;
- Introducing a national framework for digital skills for grades K–12;

- Promoting digital skills in Indigenous communities;
- Creating more opportunities for outcome-based skills training and mid-career reskilling and upskilling;
- Expanding access to reskilling and upskilling programs through employment insurance;
- Encouraging the expansion of software engineering programs at Canadian universities and colleges;
- Modernizing the collection of real-time labour market data for industry and government.

The Hub would be designed to attract and benefit all participants in multiple ways, including:

- Giving key industry leaders the opportunity to provide a timely, influential voice on current and imminent skill and talent pressures;
- Allowing academia and other training institutions to access practical and real-time skills and talent data that they can apply to curriculum design and redevelopment.

Expand the Global Talent Stream

Wider promotion of the Global Skills Strategy is another way we can help Canada’s digital firms find the talent they need to grow. The government needs to better

communicate the benefits of the Global Skills Strategy, expand the Global Talent Stream beyond the two-year pilot, and focus on attracting and retaining global talent.

The initiative should work alongside the Trade Commissioner Service to find world-class talent, and develop a “pitch book” to convince candidates to come to Canada. This would include country- and culture-specific value propositions highlighting Canada’s many advantageous attributes.

TRACKING SUCCESS

- Increase graduation from computer and software engineering programs by 300% (in 2015, there were 9,756 graduates, so our target is 29,268);
- Move Canada into the top 10 countries for number of ICT graduates per capita (in 2015, Canada ranked 18th of 33);
- Expose all students from K–12 to progressive computational and design thinking;
- Offer work-integrated learning opportunities to all digitally-focused post-secondary programs;
- Double the number of women enrolled in post-secondary ICT programs, from 17.7% to above 30%.

PROPOSAL

Transform Canada into a Digital Society

To inspire Canada to become a nation of innovators, we need to celebrate, reflect on, and reward Canadian achievements. We must evolve into a digital society where everyone has the means to use technology in their everyday lives.

In its 2018 innovation report card, the Conference Board of Canada ranks us 12th in a group of 16 peer countries.⁷ Those higher-ranked countries are spending more on research and development than we are. The consequence is that we're also being outpaced in areas like average income, productivity, and quality of social programs.

WHY THIS MATTERS

Canada has a robust science and technology infrastructure, a diverse population, and an abundance of young people—all traits of innovative countries. History has shown that Canada is a nation of innovators. However, the Edelman Trust Survey shows that 53% of Canadians feel the pace of change in business and industry is too fast. The loss of trust is felt strongest among millennial men and people aged 55 and older, which is concerning since more than half of our country's SME business owners are over 50.⁸

This resistance to innovation may be because **Canadians are generally unaware of our long and robust history of creativity and creation.** In the U.S.,

innovation features heavily in history curricula and the national psyche, where established science, technology, and business leaders are household names.⁹ Clearly, Canada needs more swagger!

Growing our country's profile as a global innovator will require a cultural shift

so that Canadians recognize themselves as a nation of innovators. We need to become a country where risk, creativity, and experimentation are applauded and rewarded.

This cultural shift will drive digital adoption and is crucial to a prosperous future economy. Right now, Canadian companies are slow to adopt digital products and solutions. A 2017 survey by the Canadian Chamber of Commerce found digital adoption is not a priority for many Canadian businesses. Respondents said they were being held back by the high cost to buy and implement technologies (24%), a lack of in-house technical expertise (21%), and low awareness of security and privacy (13%), among other things.

CANADA'S CREATIVE STRENGTHS

Our creative industries play a central role in digital innovation. The National Film Board of Canada is a global leader in animation. Canada is also a world-class leader in the video gaming sector. Additionally, we've shown early leadership in the development of virtual and augmented reality (VR/AR) content and technology, creating the conditions for further innovation. Together with data visualization solutions, VR/AR technologies are creating new value across industry sectors. This could become a massive competitive advantage for Canada.

“Why don't Canadians have more swagger? No one benefits from us not taking credit for our successes. There is no virtue in allowing kudos to go unclaimed or elsewhere. If someone waved a magic wand and rid Canadians of their inferiority complex, just imagine what would be possible”

Tobias Lütke
Table Chair
CEO and Founder of Shopify

⁷ Conference Board of Canada, 2018, <https://www.conferenceboard.ca/hcp/provincial/innovation.aspx>

⁸ Impact Centre, The University of Toronto, 2016, <http://www.impactcentre.ca/wp-content/uploads/2016/01/160208-Thinking-Inside-the-Box.pdf>

⁹ Ibid.

“We are a nation of innovators. Canada has given the world the light bulb, insulin, peanut butter, and machine learning. We just don’t own our many accomplishments. That has to change.”



DIGITAL TECHNOLOGY ADOPTION PILOT PROGRAM (DTAPP)

This three-year program was created to accelerate digital technology adoption in Canadian small- and medium-sized enterprises (SMEs). The program provided funding and advice to a select group of SMEs with the goal of boosting productivity and creating economic growth. The Industrial Research Assistance Program (IRAP) ran this pilot from November 14, 2011 to March 31, 2014. Participants reported benefits including the creation of new full-time jobs, lower cost of holding inventory, and lower production costs.

Canada invests less in digital technologies than leading trading partners like the U.S. and Japan (at 2.2% of our nominal GDP versus 3.1% and 3.4%, respectively). Our level of investment puts us below the OECD average of 2.7%. These trends have to change for Canadian businesses to stay relevant and competitive internationally.

HOW DO WE CREATE MORE BILLION-DOLLAR DIGITAL CANADIAN COMPANIES?

Prioritize and accelerate universal, equal, and affordable connectivity

All Canadians must be able to participate in the digital economy. Canada is a huge country, and providing connectivity to all of our citizens is a large challenge. If we accomplish it, however, we will become global leaders in telecommunications once more.

Not only do all Canadians need access to the internet, it needs to be affordable and fast. The global average (at minimum) for internet speed should become a fundamental right for all Canadians, and should cost no more than \$40 per month.

Connectivity speeds are a moving target, with the leading countries accelerating away from the pack. We need to be within this “peloton” of connectivity leaders. Right now, we’re far behind. Canada is currently ranked 33rd in the world for internet speeds. We must create a plan to reach and continuously remain in the top 10.

The government needs to sponsor a set of studies on the opportunity and feasibility of using next generation networks as they become available to ensure we stay in the race.

One such area is satellite technology. Right now, satellites delivering internet require an orbit that is a great distance from the earth, leading to high latency (delayed) connections that pose challenges for certain uses. Satellites do have potential though, and Low Earth Orbit (LEO) satellite constellations, currently at the prototype phase, show promise. This provided a natural opportunity for Canada to **lead the way with the development and adoption of this technology.**

Our success depends on a strong plan and commitment by the Government of Canada to invest in digital infrastructure. We need to create a national Digital Infrastructure Fund that treats this type of infrastructure the same way we treat other critical utilities like power and water.

Additionally, the CRTC needs to update the licensing policies that are slowing down Canada’s connectivity progress. Specifically, they should make it easier and more affordable to rapidly roll out microwave links to rural communities, and simplify the regulatory burden for fibre installation in low-density areas.

Encourage digital technology adoption by businesses

The Government of Canada needs to provide funding and expert advice to help businesses “go digital” and build digital skills among employees. A renewed Digital Technology Adoption Program will help firms adopt digital technology and gain access to skills and support networks. Additionally, the government should profile and promote Canadian digital products and services to drive domestic demand.

Establish end-to-end digital government services by 2025

The federal government must design a framework for mobile-compatible and accessible end-to-end government digital services for all Canadians. Every government service needs to be delivered online to eliminate the need for in-person visits to government offices and the printing, scanning, and mailing of government documents. The way our government is currently delivering services to Canadians is no longer appropriate for our times. This needs to change, and soon.

Increase funding for procurement programs

Increased funding for Innovative Solutions Canada and the Build in Canada Innovation Program will encourage Canadian innovators to collaborate with government to build made-in-Canada solutions. These

programs will further stimulate technological innovation and help commercialize federal R&D investments. The U.S. Small Business Innovation Research program serves as a model for funding levels.

Execute a multifaceted promotional campaign

We recommend a high-profile, professionally-driven media campaign that:

- Creates national awareness of Canadian innovation and successes using historical and current examples;
- Profiles Canadian innovators, with role models reflecting Canada’s multiculturalism;
- Provides opportunities for peer recognition, giving Canadian innovators the chance to celebrate one another;
- Engages partner organizations that share the same goals to build on the success of existing programs (including the Rideau Hall Foundation, which celebrates Canada’s history of innovation and promotes Canadian Innovation Week).

Successful campaigns like *Heritage Minutes*, Bell’s *Let’s Talk*, and *ParticipACTION* serve as models for this type of initiative. We need a lasting, memorable marketing campaign with the power to shift Canadian attitudes towards innovation.



INNOVATIVE SOLUTIONS CANADA

This program allows Canadian businesses to pitch a novel solution to a specific challenge facing a federal government department or agency. Selected businesses receive up to \$150,000 for proof of concept, and up to \$1M to develop a prototype if approved.

BUILD IN CANADA INNOVATION PROGRAM

Selected Canadian innovators are assisted by the government to sell their innovation (but keep the IP), and conduct market research to gain feedback. The program pays up to \$500,000 for non-military innovations and \$1M for military innovations. At the time of this writing, the program is no longer accepting proposals.

U.S. SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)

This program provides funding to U.S.-based businesses conducting R&D with commercialization potential. Various government departments are required to set aside 3.2% of their R&D budgets to fund this program.

TRACKING SUCCESS

- Move into the top 10% for global internet speeds. Canada is currently ranked 33rd in the world in the Worldwide broadband speed league.¹⁰

- Digitize all public-facing government services so they are accessible by web and mobile phone and available behind a unified login system by 2025;

- More than double the proportion of SMEs selling products and services online, from 27% to 60%¹¹;
- Move Canada into the top 10 of the world's most innovative countries on the Bloomberg Innovation Index, up from its current spot at 22.

TABLE TALK

“Canada has an incredible opportunity ahead. We are seen as leaders in AI. For us to succeed in this new data-driven economy, we need strategies in place to control and capitalize on the data and ideas we generate. In turn, we must be able to trust that our public sector investments are aligned to generate data and IP for the benefit of all Canadians.”

PROPOSAL

Leverage IP and Promote the Value of Data

Our country needs a national strategy that promotes, protects, and uses data to benefit its citizens, businesses, and democracy. We need to place a priority on incorporating industry advice into government policy and investment decisions. This will help create innovation-friendly regulations, build a modern data infrastructure, and leverage Canada's strengths in artificial intelligence (AI). We also need to ensure that companies and creators can monetize and protect their data and IP, to the benefit all Canadians.

WHY THIS MATTERS

Big data and data technologies are transforming our economy and society. The five most valuable publicly traded companies today (Apple, Amazon, Facebook, Microsoft, and Google [Alphabet]) have commoditized data, introducing sweeping changes across the globe. Big data is the most lucrative commodity of the new global economy, and data analytics and self-teaching algorithms will continue to disrupt every imaginable market. Countries and companies that do not harness the insights of

data and AI to boost productivity risk losing jobs and prosperity to global competitors.

Data and AI present tremendous opportunities, but come with poorly understood pitfalls and social impacts. Recent data breaches at Canadian banks and healthcare providers, as well as the misuse of private information by Cambridge Analytica, Facebook, and Google, have eroded Canadians' trust in public institutions, online engagements, and even democracy itself. In the absence of clear regulations

¹⁰ <https://www.cable.co.uk/broadband/research/worldwide-broadband-speed-league-2018/>

¹¹ Innovation, Science and Economic Development, 2017, Survey on Business Adoption of Digital Technologies, 2017

for data infrastructure and the way data is owned, collected, processed, stored, and used, firms (especially large multinationals) will make their own rules.

Canada must act now to backfill decade-old laws and regulations. New policies need to:

- Balance privacy and data protection with commercial value in international markets;
- Consider and protect data ethics;
- Promote equity and equality in the age of algorithms.

Our global success hinges on how Canadian businesses apply data to drive innovation. We lead the world in AI research, but we face intense competition to capitalize on our innovations and ensure long-term prosperity and sovereignty. **Our AI leadership needs to focus on commercialization**, rather than just research, to overcome this challenge. The slow pace of policy-making in Canada can be sped up if government turns to industry experts. Those experts can help Canadian firms bring data research and AI technology to market.

And we can't forget about protecting IP, an important asset that leads to growth. Firms with a deliberate IP strategy are more innovative, export more, enjoy higher growth, and create better jobs. For example, Canada's creative firms and artists provide Canadians with culturally enriching experiences through exciting new media and immersive technology—but they face unique challenges in a globally competitive market. We need to help Canadian firms and artists promote, protect, and monetize their work.

In other realms, Canada's AI innovators, developers, and adopters are making significant breakthroughs at an ever-increasing pace. These breakthroughs present new technical and IP challenges, including copyright implications for human-generated software. An effective IP strategy will enable Canadian digital innovators and content creators to build and market these experiences together. It would also ensure that Canadian creators are fairly compensated for the use of their work.

HOW DO WE CREATE MORE BILLION-DOLLAR DIGITAL CANADIAN COMPANIES?

Create a national, industry-led advisory council (CanAI)

Industry leaders and policymakers need to focus on commercializing value from data and algorithms. Otherwise, we will squander public investments in AI research. The federal government must create an independent AI advisory council (CanAI) with a mandate to:

- Advance the commercialization of Canadian-owned applied AI and data analytics;
- Produce a biannual and public “state of the nation” report that assesses and benchmarks Canada's performance against peer countries, tracks trends, and identifies areas of strength and vulnerabilities;
- Provide timely, evidence-based, and strategic advice to government that advances the use of AI across the country;

DATA TRUST

A data trust is an organization formed to manage data on its members' behalf. Members pool their data and stipulate conditions around how that data can be shared.

- Collaborate on bilateral agreements with international bodies associated with data and AI.

The council will include industry leaders with experience developing and adopting applied AI from across the six sectors represented in this report, as well as other data-driven industries including financial services and cyber security.

Invest in the application of AI and a data-driven economy

Canada is recognized as a global leader in AI research. It's time to bring that research into the market to strengthen our economy. This can be done by:

- Expanding the Pan-Canadian AI Strategy, first announced in Budget 2017, to fund Canadian firms leading the path on data trusts, and break down commercialization barriers;
- Expanding the partnership network of the National Research Council's Data Analytics Centre to include more Canadian innovators and made-in-Canada AI technology developers.

A modernized privacy and data protection regime

Canada must harmonize its multi-jurisdictional privacy and data protection regulations. These regulations need to be compatible with the European Union's General Data Protection Regulation (GDPR) and global best practices. Trust and consumer confidence is the foundation of our success in the global economy, so the importance of these regulations cannot be overstated.

Create open big data libraries

The federal government must promote public-private collaboration to pool data assets and grow Canada's data-driven economy. The Government of Canada currently provides funding for research projects that generate significant amounts of data. Going forward, all data derived from publicly-funded research and investment must be open source, available to Canadian businesses and citizens. Additionally, businesses must be incentivized to donate private data for public good. The Open.Canada.ca platform could serve as a national, open, and interoperable data platform for hosting these digital assets.

Embed Canada's IP strategy into government funding programs

The federal government's \$85.3 million Intellectual Property Strategy needs to ensure that Canadian businesses, creators, entrepreneurs, and innovators have access to the best possible IP resources. These resources can be delivered through education, advice, strategic tools for growth, and legislation. They should help and encourage Canadian businesses to develop their own IP plans. An IP strategy should be a requirement for businesses that receive government funding, to ensure that public investments promote and protect Canadian innovation and IP creation.

TRACKING SUCCESS

- *Launch the CanAI Council (with terms of reference and appointed members) by the end of 2019;*
- *Require that 100% of Industrial Research Assistance Program (IRAP) recipients have an IP strategy (2016 had 786 IRAP recipients);*
- *Ensure that all new government-funded research includes open data requirements.*

A NOTE ON DIGITAL CREATIVE INDUSTRIES

Digital is a tactic, not an industry—one that is essential for every sector. However, as we met over the course of the past year, it became clear to us that digital creative companies deserve focused examination. We believe that the proposals contained in this report will help all digital firms grow, but to fully capture the potential of Canadian creative firms, we recommend the creation of a dedicated creative industries forum as a next step.

This forum should look at how Canada's firms and artists can monetize their IP programs and initiatives through Canada's Intellectual Property Strategy. It should also look at their unique skills needs. The video gaming and animation sectors, for example, combine creative and technical skills including visual design, writing, and music to build entirely new products, services, and experiences. The forum should also look at financing. The current funding environment is based on project-based financing schemes, and encourages digital creative firms to undertake individual projects rather than build a capital-based growth strategy that would generate long-term revenue. These, among other industry-specific barriers, should be addressed by this forum.

■ CONCLUSION

When Canadians come together, we achieve great things for our country. Canadian athletes brought home a record number of gold medals at the 2010 Vancouver Winter Olympics, spurred on by the national “Own the Podium” campaign. The displays of national pride that ensued were remarkable—and warranted. We set a goal, we met it, and we were proud.

We can take the same approach to our digital revolution. It will take effort, years of training, and paradigm shifts. But we can make it happen if we come together. To implement these recommendations is to bolster our future economy. By following our framework, we can empower all Canadian citizens, businesses, and governments to fully participate in, and benefit from, the digital world before us. We’re still writing the story of Canada¹²; the story that began with us sharing our resources with the world. It is our sincere wish and belief that our all-time most valuable export will be the blueprint we used to become an international digital leader.

¹² (Only now it’s an ebook.)

DIGITAL INDUSTRIES KEY PERFORMANCE INDICATORS FOR 2025

Proposed target	Background	Rationale
Triple the number of firms earning \$100 million in annual revenue from 58 to 172.	In 2016, 58 Canadian ICT firms reached \$100 million in annual revenue. <i>Source: Branham Group, List of the top 250 Canadian ICT companies</i>	The more high-potential Canadian digital firms there are, the greater our odds are of producing more anchor firms. Anchor firms—those with at least \$1 billion in annual revenue—underpin regional technology clusters and promote future growth and prosperity.
Increase graduation from computer and software disciplines by 300%.	In 2015, the total number of computer and software engineering graduates from universities and colleges in all programs was 9,756. <i>Source: 2015 OECD data</i>	Commitment to addressing high vacancy rates that exist in software and computer disciplines to ensure that Canadian digital firms have access to skilled, homegrown talent.
Canada is among the top 10 countries for number of ICT graduates per capita.	Canada is below average among other OECD countries for share of ICT graduates per capita. In 2015, Canada ranked 18 th of 33 countries in number of ICT graduates per capita. <i>Source: Available 2015 OECD data</i>	Commitment to increasing our share of ICT graduates to fulfill industry needs and become more competitive among OECD countries.
Double the number of women enrolled in post-secondary ICT programs to above 30%.	In 2015–16, female students accounted for 18% of students enrolled in ICT-related fields. <i>Source: Statistics Canada, Postsecondary Student Information System (PSIS), 2018</i>	Commitment to addressing the gender gap that exists in post-secondary ICT programs. Reaching a critical mass could facilitate attraction and retention of women.

Proposed target	Background	Rationale
Canada moves into the top 10 of the world's most innovative countries on the Bloomberg Innovation Index.	<p>In 2018, Canada ranked 22nd among the world's 50 most innovative countries.</p> <p><i>Source: Bloomberg Innovation Index</i></p>	<p>The Bloomberg Innovation Index is globally recognized as the deciding factor on how innovative a country is. The index ranks countries annually based on seven equally-weighted metrics using data collected from the World Bank and International Monetary Fund (IMF):</p> <ul style="list-style-type: none"> ■ R&D intensity; ■ Manufacturing value added; ■ Productivity; ■ High-tech density; ■ Efficiency of tertiary education; ■ Researcher concentration; ■ Patent activity. <p>In 2018, Canada fell two places from its 2017 ranking in the top 20, down to 22nd place.</p>
More than double the proportion of SMEs selling products and services online, from 27% to 60%.	<p><i>In 2017, 27% of SMEs sold products and services online.</i></p> <p><i>Source: Statistics Canada, Survey of Digital Technologies, 2017</i></p>	<p>Commitment to transforming Canada into a digital society by encouraging digital technology adoption by businesses.</p> <p>Online sales have a broader reach and potential for increasing revenues.</p>
100% of Canadian homes, business, and public institutions are directly connected to internet services that hit global benchmarks for fast, low latency, unmetered wired and wireless connectivity, with universal access.	3.7 million Canadians currently do not have reliable, high-speed internet service.	This will enable 1.5 million homes and businesses, including 110,000 Indigenous households, to fully participate in the digital economy.
Canada is in the top 10% for global internet speeds.	Canada is currently ranked 33 rd in the world in the World-wide broadband speed league.	Ensuring that Canadians have adequate broadband speeds as compared to global averages will ensure their ability to compete globally.
100% of Industrial Research Assistance Program (IRAP) recipients have an IP strategy.	In 2016, 786 companies were IRAP recipients.	Working with emerging companies at an early stage would help them embed an IP strategy within their business plan. Regardless of whether a firm registers intellectual property, it is important for them to have a strategy for dealing with IP.

DIGITAL INDUSTRIES TABLE MEMBERS

Chair

Tobias Lütke, Shopify

Members

Allen Lau, Wattpad

Boris Wertz, Version One Ventures

Christian Dandeneau, ID Fusion Software

Ian Crosby, Bench

Ian Rae, CloudOps

Janet Bannister, Real Ventures

Jean-François Gagné, Element AI

Julia Rivard Dexter, Squiggle Park

Maithili Mavinkurve, Sightline Innovation

Melissa Sariffodeen, Canada Learning Code

Michael Litt, Vidyard

Noémie Dupuy, Budge Studios

Tea Nicola, WealthBar