Addressing the Intangibles Revolution: Strategic Policy Considerations for Canada

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Issue

Given the absence of a holistic strategy to guide Canada's technology sector, the country faces challenges in innovation, growth, and research and development, all of which continue to limit the sector's international competitiveness.

Overview

Leveraging opportunities and mitigating risks associated with the development of Canada's emerging technology[15] sector requires the support of a cross-government policy framework capable of navigating a profoundly changed world of data-driven and digitalized "intangibles."

Canada's current technology initiatives, such as the Strategic Innovation Fund, suggest that resources supporting the development of emerging technologies have been concentrated toward private corporations (Champagne 2023). Consequently, crucial sectors such as higher education, agriculture, oil and gas, transportation and health have been overlooked (Wayner et al. 2020). Evidently, there remains a need for a comprehensive strategy that addresses gaps in policies that neglect resources, research and development, and practical skill building within these sectors. A strategic approach taken to bolster Canada's global standing in innovation and technology competitiveness would require more comprehensive support for key industries and addressing technological challenges across the board. In this context, this policy brief proposes the following three areas of focus:

- Acknowledging that the lack of a comprehensive approach to Canada's global position in emerging technologies is hindering its competitiveness in the global economy and its capacity to foster the expansion of current technology ventures.
- Attracting talent acquisition and retention to support the development of emerging technologies poses an additional hurdle, particularly in the face of talent shortages. For instance, notable companies such as Google and Meta have expressed gratitude to Canada for supplying them with numerous senior leaders.
- Addressing how the current sector-specific approach to technology innovation underscores the necessity for a comprehensive strategy that harnesses the Canadian emerging technology sector's full potential across all domains.

Background

The transition to a digitally driven economy in Canada has gained prominence, with a recent parliamentary focus on bolstering public institution-building to enhance international competitiveness and capture wealth in the global knowledge-based economy (Piovesan et al. 2019). However, experts and innovators have expressed concerns over Canada's slow movement in this arena, attributing it to

15 Defined as critical and emerging innovations of products spanning across multiple industries within the public and private sector characterized for their rapid development and having lasting economic, social and political effects (Health Canada 2014).

the absence of a cohesive strategy to support the flourishing of a knowledge-based economy (Nicholson et al. 2009). The shift from a traditional production-based model to one driven by knowledge and digital advancements underscores a global trend toward prioritizing national technological developments over transnational collaboration. While initiatives such as the Canada National Quantum Strategy and Pan-Canadian Artificial Intelligence Strategy have been implemented to support technology businesses and research, they often focus on specific sectors or technologies, neglecting broader growth opportunities within the Canadian technology ecosystem (Trudeau 2024). Moreover, Canada continues to grapple with a talent shortage in technology, hindering the sector's growth and diminishing its global standing (Mahboubi 2022). Reports indicate significant challenges in attracting and retaining individuals with digital skills, particularly in critical areas such as artificial intelligence and cyber security (Canadian Centre for Cyber Security 2023). Addressing this talent gap is critical for federal and provincial initiatives aimed at technology growth and to support Canada's ability to innovate, scale and compete internationally.

Opportunities

A cursory examination of Canada's technology ecosystem exposes several opportunities. One notable shortfall is the presence of numerous sector-specific policies and regulations, but in the absence of any cohesive overarching policy or strategy to guide and promote innovations (Leroux 2020). Amid these circumstances, four opportunities are identified.

Higher Education

In higher education, policies appear to concentrate on external opportunities, which risks sidelining internal innovation and research initiatives crucial for propelling technological advancements (Statistics Canada 2022). This regulatory gap is further compounded by the insufficient bolstering of national IP (intellectual property) frameworks, which are imperative for incentivizing innovation and guaranteeing creator rights.

Strategic Alignment and Standard-setting

Strategic alignment ensures that all initiatives, goals and efforts towards overarching objectives and priorities are maximized across various stakeholders. This benefits Canada by efficiently allocating resources and promoting inter-agency collaboration among various Canadian ministries and international partners, all working towards shared visions and objectives.

Standard-setting must be incorporated into the alignment as the global economy becomes increasingly interconnected and reliant on digital technologies. It establishes a common baseline of expectations, guidelines and protocols within the technology sector for technical, data, security, ethics, compliance and industry or sector-specific standards. This effort promotes uniformity, interoperability, innovation, trade, collaboration and fair competitiveness. Moreover, it gives businesses the confidence to invest in new technologies and enter new markets, driving economic growth and competitiveness.

The International Organization for Standardization (ISO) and the Institute of Electrical and Electronics Engineers (IEEE) are crucial for international standard-setting because they provide globally recognized frameworks and guidelines that ensure quality, safety, interoperability and efficiency across various industries. Within the ISO, Canada is represented by the Standards Council of Canada, which considers Canadian interests in developing international standards across various sectors, including technology and environmental management. IEEE Canada is part of Region 7 of the global IEEE organization. IEEE Canada supports the advancement of technology by organizing conferences, publishing research and providing professional development opportunities for Canadian engineers and technologists.

In alignment with the Indo-Pacific strategy, there is a heightened emphasis on bolstering supply chain resilience and fostering innovation in the digital economy. Canada's shift from being a net importer to a leader in IP is crucial for reinforcing its economic stability and competitiveness on the global stage.

Canadian IP Rights

Prioritizing IP is critical. In contrast to its international peers, Canada has a net balance of payments deficit (receipts minus payments) on charges for using IP that has grown over the last two decades (Government of Canada 2024). The lack of attention to IP rights poses a significant hurdle to innovation. A consequence of this is seen within the agricultural sector and the investment and development of biotechnologies, which could leverage Canada's global position in technology and agriculture.

Capital Investments

Canada could mitigate the "brain drain" and address skill shortages by creating a more appealing environment for

technology professionals. Strategic capital investment gains that foster innovation hubs provide competitive salaries and offer advanced training programs are needed. By supporting domestic firms and facilitating the growth of transitional Canadian companies, Canada can ensure these firms and sectors have the resources and infrastructure needed to thrive. Canada can also cultivate a robust ecosystem that not only attracts but also retains top-tier talent, thereby bolstering its overall technological competitiveness on the global stage.

In summary, Canada lacks an official all-encompassing national strategy to guide its technological advancements. Considering the importance of positioning the country within the global technology landscape and recognizing that technology will drive economic growth, foster innovation and catalyze job creation across diverse sectors, not filling this current strategic void poses significant risks to the Canadian economy's short and longer-term resilience.

Recommendations

Canada should adopt a strategy as a foundational framework to advance Canadian growth, address current issues and capitalize on opportunities. This strategy could address current shortfalls and encompass various vital areas for Canada to advance its technological innovations and collaborate on the global stage. The proposed strategic technology framework should include the following four key pillars to address vital areas crucial for Canada's advancements in the digital landscape.

Pillar 1: Fostering Innovation

This pillar emphasizes enhancing international collaboration by positioning the country as an appealing destination for innovators. This involves forging partnerships with the global research and investment communities and safeguarding Canada's IP rights. For example, Britain shares similar challenges with Canada in the post-Brexit era and significantly focuses on technology in its foreign and security policies. Given Canada and Britain's mutual trust and reliability, both countries can collectively leverage their strengths to enhance their global influence. Like-minded bilateral and coalition-based efforts like these could highlight progressive thinking regarding innovation governance and management.

Canada should promote a patent collective that fosters innovation and collaboration among businesses, researchers and institutions. A patent collective is a consortium of organizations that pool and share their patents to facilitate access to technology, reduce litigation risks and promote innovation within a specific industry or field.

The current federal budget does not address the failures of innovation policy and only addresses capital and inputs. Canada is missing out on the advantages of innovation; to harness these benefits, it is essential to strengthen and promote IP rights. By participating in a patent collective, Canadian companies can strengthen their domestic and international competitive position. Promoting a patent collective can drive economic growth by boosting the innovation ecosystem. It can help to commercialize new technologies rapidly and effectively, leading to job creation and economic activity.

Pillar 2: International Standard-Setting

To influence standards development, ensure active participation of national representatives in international standardization bodies such as the ISO and the IEEE. In addition, Canada must incorporate international digital standards into national regulatory frameworks to ensure compliance and interoperability. Standards will contribute to market expansion, allowing Canadian companies to easily enter new markets where these international standards are required, expanding their global footprint. By incorporating these standards, Canada fosters an environment that encourages innovation and technological growth.

Setting robust standards is integral to supporting supply chain resilience. With clear guidelines for data protection, cyber security, and IP rights, Canada can mitigate risks and vulnerabilities within its supply chains. This ensures continuity of operations and minimizes disruptions, particularly in times of crisis or uncertainty.

Pillar 3: Promotion and Protection of Technology

Canada should prioritize risk management, promote innovation, safeguard digital security, and protect current technology, especially cyber security. Canada can follow the United States and European Union approach and use policy tools such as monitoring supply chains, risk screening and stress tests. Current risk management fails to address critical sectors. Frameworks must be adopted that encourage regular risk assessments across all critical sectors, including cyber security, health care, energy and finance. A comprehensive framework for these sectors would integrate quantitative risk models and qualitative evaluations to assess vulnerabilities and threats accurately. Facilitating partnerships between the government and the

private sector to share threat intelligence is also crucial. This includes setting up centralized platforms, such as information sharing and analysis centres, where real-time data on emerging threats can be exchanged.

GAC should work alongside Canada's Advisory Council on AI to create and mandate training programs for cyber security and national security personnel. Promoting digital literacy and safe practices is essential, as the security of technology is intrinsically linked and depends on the security of its users. The Canadian Centre for Cyber Security (2023) Learning Hub is the source of cyber security and communications security training for Government of Canada employees.

GAC should expand the Learning Hub's training offerings to include digital literacy skills and internet safety. In addition, GAC is encouraged to promote public-private partnerships and dialogue so corporations can access and benefit from safe practices training. GAC should also express a commitment to continual oversight and framework adoption in training programs to address emerging technology trends and threats.

The standards established in Pillar 2 are foundational for achieving these objectives. This underscores the significance of effective risk management, necessitating understanding the elements requiring mitigation within an intangible marketplace.

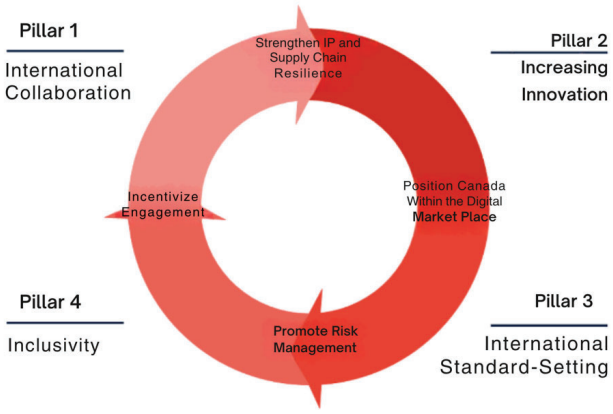
Pillar 4: Inclusivity

This pillar prioritizes those already within the technology sector and incoming talent. One example is investing in higher education programs focusing on technological skills and development opportunities to prepare students for jobs. A fundamental weakness for Canada is the lack of partnerships between the government and universities that are job-focused rather than academia-focused.

The federal government should support skill-building programs in the technology industry to improve students' job readiness by establishing bridging programs, innovation hubs and funding technical programs. Thus, the support for the sector should be more explicit and blatant, facilitating government-to-government and researcher-to-researcher exchanges, demonstrating faith in provincial governments and universities to drive progress. This investment assists incoming technology leaders in acquiring the necessary education and skills to contribute significantly to their fields and continue knowledge sharing and collaboration.

Recruitment and staffing practices must be improved for those already in the workforce to enhance expertise and representation in talent retention and attraction. This includes efforts to expand bilingualism services, ensuring that diverse voices are heard and represented. Government funding and grants should be allocated to organizations and institutions to develop and enhance language services. Funding can be used for hiring multilingual staff, training, and procuring translation and interpretation technologies.

This interconnected approach fosters growth and resilience, facilitated by the standards established in Pillar 2, which enable international collaboration and cooperation. By prioritizing inclusivity, Canada acknowledges its diverse population and ensures that talent and policy reach every corner of the country. This reinforces the strategy's overarching structure, linking inclusivity to Pillar 1 by incentivizing engagement and making Canada a more attractive destination for supporting new ideas and innovation.



Source: Image created by Jessica Stewart and Iman Abrahim.

In conclusion, the proposed technology strategy framework for Canada, encompassing the aforementioned four key pillars, offers a robust foundation for national growth and global collaboration. Each pillar is mutually reinforcing, creating a dynamic and interconnected system. Pillar 1 of international collaboration enhances Pillar 2 of increasing innovation by facilitating global partnerships and resource sharing, accelerating the development of new technologies and strengthening IP rights and supply chain resilience. Pillar 2 supports Pillar 3 of international standard-setting by enabling Canada to shape global standards, making Canadian innovations more competitive internationally and positioning Canada prominently within the digital marketplace. Pillar 3 boosts Pillar 4 of inclusivity by establishing clear guidelines and best practices, creating

a secure and reliable digital environment, and ensuring that all participants, including marginalized groups, can safely engage with and benefit from technological advancements. Pillar 4 strengthens Pillar 1 by positioning Canada as a leader in equitable development, attracting global partners and incentivizing their engagement. The proposed technology strategy offers Canada a clear pathway to address challenges, capitalize on opportunities and lead technological advancements, shaping the nation's innovative digital future.

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