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REVISITING CANADA'S INNOVATION AGENDA: ALIGNMENT WITH BEST PRACTICES FOR A BETTER OUTCOME

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JCSP 45

Exercise Solo Flight

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CANADIAN FORCES COLLEGE – COLLÈGE DES FORCES CANADIENNES

JCSP 45 – PCEMI 45
MAY 2019 – MAI 2019

EXERCISE *SOLO FLIGHT* – EXERCICE *SOLO FLIGHT*

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REVISITING CANADA'S INNOVATION AGENDA: ALIGNMENT WITH BEST PRACTICES FOR A BETTER OUTCOME

The story of David and Goliath is one of the most renowned characterizations of an unassuming underdog, rising up courageously to overthrow a powerful, seemingly tyrannical opponent.¹ The narrative describes a shepherd boy on an errand to deliver food to his brothers,² who upon seeing this seasoned, well-equipped professional soldier, insists he can defeat him³ – despite protests from his leader, Saul, and his fellow Israelites.⁴ Against what are perceived to be incredible odds, he succeeds in overcoming Goliath, not by outmatching him through superiority in established tools and tactics but by circumventing these norms altogether. In short, David wins because he *innovates*. He does not create anything new – use of sling and stone being commonplace – nor does he bring superior armour or a sharper sword to the fight. His success is derived from how he frames the problem in space and time; a perspective radically different from that of his terror-stricken compatriots. In doing so he generates a solution that would render the very nature of Goliath's power meaningless.

When unpacked in the context of *innovation* as the term is understood today, this tale yields important conceptual lessons beyond “brain over brawn” or “victory against the odds.” First, it demonstrates that generating competitive advantage is the key to achieving and maintaining the interests of a faction, be it an individual, organization or state. Goliath's ultimatum⁵ relays as much – the Philistines sought increased prosperity

¹ “David & Goliath,” *Oxford Learners Dictionaries*. Last accessed 4 May 2019.

https://www.oxfordlearnersdictionaries.com/definition/american_english/david-and-goliath

² “Tanakh: I Samuel,” Sefaria. Last accessed 12 May 2019. https://www.sefaria.org/I_Samuel.1?lang=bi

³ *Ibid.*

⁴ *Ibid.*

⁵ *Ibid.*

by capturing the nearby city and employed their military, foremost among their instruments of power, to achieve it. After having weighed the risks of bringing battle to the Israelites from the low ground, use of their champion was the best strategy they had at their disposal, knowing their opponents lacked the capability to match. On the other hand, it was certainly not in the best interest of the Israelites to submit to slavery. Aware of their limitations, Saul did not accept the challenge initially; he instead made use of his kingdom's economic power, specifically their ability to sustain and resupply.⁶ For an extended period, they opted to wait-out and pursue a tactical advantage if or when the opportunity arose – producing a stalemate plagued with doubt and uncertainty.

The second lesson is that opportunity can be found in uncertainty when the value of a proposition is understood, and the risks involved are accepted. David's decision to challenge Goliath was not his decision alone. Although he expressed the will to do so, it was Saul – the state's executive – that ultimately enabled the shepherd to take on the challenge. What made him opt to entrust the fate of his kingdom to a shepherd? After all, by sending a challenger to face the Philistine warrior, he was agreeing to the political terms of the ultimatum. The answer lies in David's value proposition. He confidently insisted that he had killed animals far more deadly than Goliath, and for whatever reason, this was enough to convince Saul. The king then mitigated potential risks by providing the boy with armour and weaponry – his own – to ensure he had the very best tools available and thereby increase chances of success.

⁶ *Ibid.*

Finally, the story The story of David and Goliath demonstrates that two key types of innovation, both *disruptive* and *incremental* are generally required for the achievement of objectives. Disruptive innovation typically refers to the introduction of a method or technology that significantly challenges the way an industry or competitor functions. David could not compete with Goliath’s combined strength, stature, years of experience or weaponry.⁷ By attacking a critical vulnerability from a distance⁸ he rendered all these resources, and the application thereof, completely futile. Goliath, in effect, was the product of a massive investment in time and resources, maintained through incremental innovation – small, regular improvements and upgrades to existing systems⁹ – like routine training, sword sharpening and advancements in armour plating.¹⁰ He was, after all, the epitome of power-in-being for the well-established Philistine army. However, his armour and heavy sword made him slow, and he lacked the agility to dodge a small stone cast from a leather sling by a boy.¹¹ In the aftermath, David could not use his sling to cut off the head of his defeated opponent. Having never wielded a sword, he adapts and uses the technology available, Goliath’s own, to this end.

Despite its archaic nature, the key lessons from this story informs the formulation of effective strategy in a manner that is no less relevant today. As the speculative Future Security Environment (FSE) draws nearer, an era understood to be fraught with uncertainty and complexity,¹² many states tend to be aligning their efforts with creating “Goliaths,” or mimicking “Sauls;” honing their best instruments of power to perfection or

⁷ *Ibid.*

⁸ *Ibid.*

⁹ *Ibid.*

¹⁰ George Roberts, “David and Goliath...A Story of Disruptive Innovation.” Last modified 12 August 2011. <https://www.businessinsider.com/david-and-goliath-a-story-of-disruptive-innovation-2011-8>

¹¹ *Ibid.*

¹² *Ibid.*

spreading their investments in an attempt to prepare for any inevitability. The Government of Canada (GoC) has opted instead to pursue their own figurative “Davids,” with stated aspirations to eventually become a world leader in innovation. While the budgetary reinforcement may be new,¹³ the prospect is not. In 2008, the GoC released “Compete to Win” – an assessment of the country’s ability to posture for future economic, political and security challenges. The document provides an assessment of the coming years that remains relatively accurate, and impresses on the importance of fostering an innovative capacity, with a focus on the private sector, to increase the rate of growth to maintain quality of life and prosperity.¹⁴ Yet between then and now, studies show that Canada has not become more innovative, but has descended and remained stagnant in the global rankings.¹⁵ In the private sector, the innovation phenomenon has been studied by academics and practitioners alike, rendering a sizeable compendium of strategies, typologies, trends and best practices. Many of these have been considered by the ministry of Innovation, Science and Economic Development (ISED) in shaping the extant Innovation agenda¹⁶ However, certain elements do not align and are not supported by credible metrics and observations. By examining how the worlds most innovative states have instituted their own systems and the key findings of recent studies, the GoC

¹³ Canada. *Budget 2017: Building a Strong Middle Class* (Ottawa: Canada, 2017)

¹⁴ “Home,” *Innovation, Science and Economic Development Canada*. Last modified 10 May 2019. <http://www.ic.gc.ca/eic/site/icgc.nsf/eng/home>

¹⁵ Steven Globerman, Emes, J. “Innovation in Canada: An Assessment of Recent Experience,” Fraser Institute. Last accessed 15 January 2019. <https://www.fraserinstitute.org/studies/innovation-in-canada-an-assessment-of-recent-experience>

¹⁶ “Home,” *Innovation, Science and Economic Development Canada*. Last modified 10 May 2019. <http://www.ic.gc.ca/eic/site/icgc.nsf/eng/home>

may be able to exercise increasingly robust and viable options towards becoming an innovation powerhouse.

UNDERSTANDING INNOVATION

There is little doubt that the GoC considers innovation, in concept and application, to be vitally important, especially as it appears 261 times in the 2017 federal budget.¹⁷ Despite the impression, the document offers a comparatively underwhelming definition of the term. In the section entitled *The Case for Innovation*, it is defined as follows: “Innovation is, simply put, the understanding that better is always possible.”¹⁸ This characterisation is problematic: the word “understanding” does not necessarily equate to a subsequent action – it simply implies the comprehension of a given subject.¹⁹ For example, the understanding of long division does not imply that long division will be done; perhaps no action will be taken, or maybe a calculator will be used instead? Likewise, the perception that circumstances can be improved across a whole gamut of situations does not signify any move to alter the status quo.

In many ways this is forgivable, as innovation is a term that is often misused, defined too loosely and poorly understood.²⁰ Adding to the confusion, even the terminology that surrounds the concept of innovation is somewhat evasive: it is *embraced* rather than incorporated and is said to comprise *values* rather than metrics.²¹ This odd

¹⁷ Canada. *Budget 2017: Building a Strong Middle Class* (Ottawa: Canada, 2017).

¹⁸ *Ibid.*, 17.

¹⁹ “Understanding,” *Merriam-Webster Canada*. Last accessed 9 May 2019. <https://www.merriam-webster.com/dictionary/understanding>

²⁰ Larry Keely, *Ten Types of Innovation: The Discipline of Building Breakthroughs*. (New Jersey, US: 2013)

²¹ Bob House, “Embracing Innovation to Sustain a Competitive Edge.” *Inc.com*. Last accessed 7 May 2019. <https://www.inc.com/bob-house/embracing-innovation-to-sustain-a-competitive-edge.html>

choice of words delivers an impression that innovation is somehow a “mysterious art” and open to a flexible degree of interpretation.²² Yes, there may be a “creative thinking” aspect to it,²³ but the process itself can be analyzed, measured, quantified and replicated.²⁴ The most concrete definition is found when going back to the etymological roots of the word, *innovationem* (n.) and *innovare* (v.), meaning “renewal; alteration”²⁵ and “to reform; to change”²⁶ respectively. Both the process and action required for innovation to occur are made clear – there are no allusions to “understanding” or “bettering” anything according to the original sense of the word, whether in noun or verb form.

Definitions are essential, quite literally as they constitute “a statement expressing the essential nature of something”²⁷ – arguably moreso when a national initiative is founded on it. For contemporary pundits, innovation has become a systematic approach that is rapidly evolving into a scientific discipline.²⁸ Specific, desirable effects have been produced as a result of the innovative process, and fruitful outcomes derived from these methodologies, across multiple sectors, has led to the compilation of both best practices and increasingly standardized language. Even so, seemingly commensurate with vague

²² Larry Keely, *Ten Types of Innovation: The Discipline of Building Breakthroughs*. (New Jersey, US: 2013)

²³ *Ibid.*

²⁴ Dylan Minor, “Quantifying a Culture of Innovation: A Rigorous, Quantitative Analysis of Corporate Innovation Cultures,” SPIGIT. Last accessed 5 May 2019. <http://go.spigit.com/rs/123-ABC-801/images/Quantifying-a-Culture-of-Innovation-Spigit.pdf>

²⁵ Jay Fraser, “Etymology of Innovation,” *Innovation Excellence*, Last accessed 30 Apr 2019. <https://www.innovationexcellence.com/blog/2014/04/29/etymology-of-innovation/>

²⁶ Jay Fraser, “Etymology of Innovation,” *Innovation Excellence*, Last accessed 30 Apr 2019. <https://www.innovationexcellence.com/blog/2014/04/29/etymology-of-innovation/>

²⁷ Glenn Whitfield, “The Importance of Proper Definition,” *Performance Improvement*. Last modified 13 June 2012. <https://piadvice.wordpress.com/2012/06/13/the-importance-of-proper-definition/>

²⁸ Larry Keely, *Ten Types of Innovation: The Discipline of Building Breakthroughs*. (New Jersey, US: 2013)

definitions of innovation is the regular conflation of the concept with other subjects and processes. Innovation is not *invention*, which constitutes “discovery,” or *improvement*, meaning “to make better, raise to a better quality or condition.”²⁹ Innovation, invention and improvement are not mutually exclusive and often contribute synergistically to achieving desired effects, although they are fundamentally different processes.³⁰

Tandem to a vacuous characterisation, there exists a significant tendency to associate innovation almost exclusively with technology, research & development (R&D). Once again, these are not the same thing, although at some points are interrelated. To understand them as such only reduces the potency of the concept and limits its application significantly. Innovation is not necessarily the product of a technology or its improvement. The process, and results thereof, may be non-technological in nature but no less ground-breaking or influential. Even in some tech-focused firms, non-technological innovations that impact business processes like scheduling, shareholder engagement and marketing, can deliver more value than the technology itself.³¹ Conversely, there are numerous examples of non-tech firms, with business lines completely removed from this sector, that end up generating new technologies.³² As an example, one of the most common non-technological innovations that has completely reshaped daily life is the creation, and subsequent sophistication of

²⁹ “improve (v.),” Etymology Online. Last accessed 11 May 2019.
<https://www.etymonline.com/word/improve>

³⁰ Larry Keely, *Ten Types of Innovation: The Discipline of Building Breakthroughs*. (New Jersey, US: 2013)

³¹ Cristina S. Pereira, “Non-Technological Innovation: Current Issues and Perspectives,” *Independent Journal of Management & Production*, 4 no 1 (2013): 362.
<file:///C:/Users/clark/Downloads/new%20&%20unfiled%20downloads/88-286-3-PB.pdf>

³² James O’Brien, “Innovation by Necessity: 3 Non-Tech Businesses and the Technology They Created,” Mashable. Last modified 10 June 2014. <https://mashable.com/2014/06/10/business-innovation-software/>

personal sanitation systems, beginning in the mid-19th century.³³ It wasn't until Japanese innovators at TOTO created the smart toilet – the music-playing, water-spraying automated latrine³⁴ – that a digitized system was introduced to the analog commode. Yet, Canada's innovation strategy has, almost exclusively, confined its programs and investment to technology-based sectors or towards the creation of new tech.³⁵ Nearly every initiative listed on the ISED webpage has an overt or underlying focus on technology: “Accessible Technology Program,” “CanCode,” “Clean Technology,” and “Industrial Technology Benefits.”³⁶ Keeping with the trend, the headings that include “Innovation” throughout the website are co-listed with “Science” and “R&D.” Poorly defining and applying the word innovation is in many ways self-defeating. A degree of renewal is required in every aspect of the human endeavour;³⁷ to idealize one sector or subset over the whole is to realistically potentiate falling short of the larger, strategic goals. The following section will demonstrate that the world's most innovative states, while varying in resources, populations and culture, have not gained this recognition through technology or R&D alone.

³³ James Fallows, “The 50 Greatest Breakthroughs Since the Wheel,” *The Atlantic: Technology*. Last modified: November 2013. <https://www.theatlantic.com/magazine/archive/2013/11/innovations-list/309536/#list>

³⁴ Amanda Sealy, “How Japan's music-playing, water-spraying TOTO toilets took over the world,” *CNN*. Last modified 10 December 2018. <https://www.cnn.com/style/article/toto-on-japan/index.html>

³⁵ “Canada's Innovation Strengths and Priorities,” The Canadian Trade Commissioner Service. Last modified: 20 June 2018. <https://www.tradecommissioner.gc.ca/innovators-innovateurs/strategies.aspx?lang=eng>

³⁶ “Innovation for a Better Canada.” Innovation, Science and Economic Development Canada. Last accessed 12 May 2019. <http://www.ic.gc.ca/eic/site/062.nsf/eng/home>

³⁷ Ken Tencer, “Why Technology is Not a Synonym for Innovation,” *The Globe and Mail*. Last modified 15 May 2018. <https://www.theglobeandmail.com/report-on-business/small-business/sb-managing/four-great-innovation-opportunities-that-arent-technology/article25207445/>

THE WORLD'S MOST INNOVATIVE STATES

To become truly innovative country, knowing what characterizes it is essential – the veritable “recipe” of innovation’s structures and drivers. No doubt it is a desirable aim for many, as multiple indexes have emerged over the past decade in an attempt to measure what innovation looks like at the state level. The most erudite, based on their criteria of evaluation, are produced by Bloomberg L.P., the World Intellectual Property Organization, and the collaborative, multi-partner GII. While there is some variance in both focus and method, the findings are surprisingly similar. Bloomberg L.P. has published their Innovation Index for the past seven years³⁸ – throughout this period Canada has achieved variable results and sits at number 20 for 2019 (see Fig. 1). Indicatively, from 2015 to 2018 a select group of states have dominated the top ten positions – demonstrating the postulate that innovative entities need to keep innovating, or that successful innovation leads to further innovation. Bloomberg’s criteria for assessment include R&D intensity, manufacturing value-added, productivity, high-tech density, tertiary efficiency, researcher concentration and patent activity.³⁹

³⁸ Staff Writer, “The World’s Most Innovative Countries in 2019 – and 2 surprising areas where South Africa stands out.” *BusinessTech*, Last modified: 27 January 2019. <https://businesstech.co.za/news/technology/294614/the-worlds-most-innovative-countries-in-2019-and-2-surprising-areas-where-south-africa-stands-out/>

³⁹ *Ibid.*



Fig 1 – World’s Most Innovative Economies (2019) – Bloomberg LP.

The top countries are remarkably similar in terms of their proclivity for innovation, keeping relatively close score in their rankings according to each measure,⁴⁰ yet on the surface differ significantly in politics, economics, culture and societal norms.⁴¹ They also contrast in terms of resource entitlements, exports, imports – nearly every economic indicator.⁴² Where they fall into alignment, though, is in terms of two key quantitative factors: R&D investment and researcher concentration. This is not causation – innovative capacity is not predicated on the level of investment per scientist in a small

⁴⁰ *Ibid.*

⁴¹ Mark Z. Taylor, “The Politics of Innovation: Why Some Countries Are Better Than Others at Science and Technology,” Information Technology and Innovation Foundation. Last modified: 21 June 2018. <https://itif.org/events/2018/06/21/politics-innovation-why-some-countries-are-better-others-science-and-technology>

⁴² “Indicators,” *TradingEconomics*. Last accessed: 13 May 2019. <https://tradingeconomics.com/indicators>

area. Many states invest a relatively large portion of their domestic product into R&D yet have not reached Bloomberg's upper stratum. A more probable correlation is the type of research they invest in.⁴³ On point, UNESCO data reveals that the most innovative countries spend more of their GDP on business sector R&D than they do on government, universities or non-profit R&D. Proportionally, each spends an average of 3% GDP across sectors; with top performers hitting a maximum 80% of the total to business R&D.⁴⁴ Canada, by comparison, spends 1.7% total, half of which is dedicated to business with the remainder going to universities and government.⁴⁵ In terms of research personnel, Canada's concentration equates roughly to that of Germany, Switzerland, France and the United States (between 4-5,000 per million), while South Korea, Finland and Israel maintain double this amount.⁴⁶

Beyond the numbers, the US Information Technology & Innovation Foundation (ITIF) reveals further qualitative data that assists in corroborating and explaining these numbers. According to professor and ITIF contributor Mark Taylor, the value lays in the networks built within the countries themselves: "Countries that are able bring together the science labor force, provide it with resources, and then build links between it and the business sector are most likely to be successful at innovation."⁴⁷ He cites the case of Israel in particular, where beginning in the 1960s, individuals would depart from careers

⁴³ UNESCO Institute for Statistics, "How much does your country invest in R&D?" *United Nations Educational, Scientific and Cultural Organization*. Last modified 10 May 2019. <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

⁴⁴ *Ibid.*

⁴⁵ *Ibid.*

⁴⁶ *Ibid.*

⁴⁷ Mark Z. Taylor, "The Politics of Innovation: Why Some Countries Are Better Than Others at Science and Technology," Information Technology and Innovation Foundation. Last modified: 21 June 2018. <https://itif.org/events/2018/06/21/politics-innovation-why-some-countries-are-better-others-science-and-technology>

in business to government, then back to business again. Taylor assesses that this generated a high degree of trust between the private sector and the public service.⁴⁸ This lateral mobility and mutual assurance likely yielded increased willingness to share risk, ultimately creating today's Israeli entrepreneurial environment. Another interesting factor amongst Bloomberg's top ten is that the majority of them have some form of mandatory national service – South Korea, Israel, Sweden, Singapore, Switzerland, and recently France – as it may contribute to this private-public interface and the appreciation of requirements across sectors. In short, there is ample evidence to suggest that these highly-networked, national innovation ecosystems may be the cornerstone of the macro-level process⁴⁹ and not solely the result of government investment in tech, R&D. Innovation is then, to an observable extent, a people-driven phenomenon – an important factor to consider in the context of GoC's Innovation Agenda.

FAILING TO LEVERAGE THE MOST VALUABLE RESOURCE

The GoC's overarching focus and funding of the science and technology facets of innovation poses an essential question – who are innovators? Scientists and researchers, naturally – although tracing the flow of public investment indicates a slightly broader pool. The Post-Secondary Institutions Strategic Investment Fund, or SIF, also under ISED, has been created to fund infrastructure projects at Canadian colleges and

⁴⁸ UNESCO Institute for Statistics, "How much does your country invest in R&D?" *United Nations Educational, Scientific and Cultural Organization*. Last modified 10 May 2019. <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

⁴⁹ Mark Z. Taylor, "The Politics of Innovation: Why Some Countries Are Better Than Others at Science and Technology," Information Technology and Innovation Foundation. Last modified: 21 June 2018. <https://itif.org/events/2018/06/21/politics-innovation-why-some-countries-are-better-others-science-and-technology>

universities.⁵⁰ The contribution is sizeable: upwards of \$2 billion over a three-year period.⁵¹ The GoC has instituted SIF to “reinvigorate Canada’s research and science base, address existing needs while contributing to Canada’s long-term innovation and sustainability objectives.”⁵² As an end unto itself, this is a good initiative that will certainly prolong the viability and enhance opportunities and many Canadian institutions. Regardless, in the context of the world’s most innovative countries who allocate the largest proportions to private sector R&D⁵³ – this investment could prove misplaced in achieving the larger, overarching goal. SIF also appears to be part of a larger build-up of organizations with similar mandates, including the federally funded Canadian Foundation for Innovation (CFI), that also provides investment in university-level research and infrastructure.⁵⁴ Additional commitments to science, R&D within universities are revealed under the heading “Canada’s Science Vision,”⁵⁵ where an additional \$2.8 billion are assured in 2019 beyond the \$10 billion allocated since 2016.⁵⁶ Therefore, insofar as public funds are concerned, the GoC considers students enrolled in R&D programs, in addition to the researchers and technologically-inclined themselves, to be the primary consortium for innovative excellence.

⁵⁰ “Post-Secondary Institutions Strategic Investment Fund,” Innovation, Science and Economic Development Canada. Last modified: 19 March 2019. <http://www.ic.gc.ca/eic/site/051.nsf/eng/home>

⁵¹ *Ibid.*

⁵² *Ibid.*

⁵³ *Ibid.*

⁵⁴ “Collaboration between Federal Research Funding Organizations,” Innovation, Science and Economic Development Canada. Last modified: 21 December 2016. https://www.ic.gc.ca/eic/site/063.nsf/eng/h_A0A2F2CB.html

⁵⁵ “Canada’s Science Vision,” Innovation, Science and Economic Development Canada. Last modified: 6 May 2019. http://www.ic.gc.ca/eic/site/131.nsf/eng/h_00000.html

⁵⁶ *Ibid.*

All levels of education are important, and equally so are the opportunities granted to Canadians to pursue valuable primary, secondary and post-secondary programs. The absorption of knowledge and generation of skills constitute foundational elements of human capital⁵⁷ – the economic value of a persons learning, training, intelligence and abilities.⁵⁸ To further this aim, the GoC has also allocated \$114 million to supporting masters and doctoral students to “keep Canada’s science ecosystem strong and competitive.”⁵⁹ Regrettably, the value of higher education is not necessarily reflected in the current job market. Dr. Mahmood Iqbal, scholar in Economics at Carlton University and author of “No PhDs Please: This is Canada” relays that the employment prospects for post-graduates in the country are significantly limited.⁶⁰ He explains that the “Private sector in Canada hires only 4 per cent PhDs compared to the 42 per cent hired in the United States. And when it comes to R&D activities, Canada’s private sector stands at the bottom among OECD countries...”⁶¹ This excerpt once again echoes the investment trends of the Bloomberg top ten, indicating that even in terms of people, Canada may not be making the best investments to generate a national innovative capacity in the near term. Iqbal echoes this thought in closing his article, stating that the “non-pecuniary benefits of PhDs to a society can hardly be minimized... Its advantages are multiplied in todays complicated, fast changing and globalized world.” Acknowledging that education

⁵⁷ “Estimates of Human Capital in Canada: The Lifetime Income Approach,” Statistics Canada. Last modified: 19 December 2012. <https://www150.statcan.gc.ca/n1/pub/11f0027m/2010062/aftertoc-aprestdm2-eng.htm>

⁵⁸ Will Kenton, “Human Capital,” *Investopedia*. Last modified: 19 April 2019. <https://www.investopedia.com/terms/h/humancapital.asp>

⁵⁹ “Canada’s Science Vision,” Innovation, Science and Economic Development Canada. Last modified: 6 May 2019. http://www.ic.gc.ca/eic/site/131.nsf/eng/h_00000.html

⁶⁰ Mahmood Iqbal, “In Canada You Can Get a PhD, But Maybe Not a Job,” *Huffington Post*. Last modified 26 November 2012. https://www.huffingtonpost.ca/mahmood-iqbal/phd-in-canada_b_1916146.html

⁶¹ *Ibid.*

and R&D play a vital, but still limited part in the establishment of an innovation ecosystem, who should be the target audience for these initiatives?

Potentially everyone. Recently, a comprehensive study ascertained that robust innovative culture is predicated on both the quality and quantity of ideas generated. The most relevant findings regarding innovation measures and contributing factors were discovered in 2017 by Dylan Minor, Professor of Managerial Economics at Northwestern University. The research involved analyzing five years of data from 154 public companies (totalling approximately 3.5 million employees) that use idea-management software⁶² – inferring that, to whatever degree, had adopted the innovative aim as a company-wide initiative.⁶³ His team discovered a definitive correlation between the *ideation rate*, a metric for the number of relevant, actionable ideas per 1,000 active users,⁶⁴ and profit growth.⁶⁵ In a nutshell, the data confirms their hypothesis: companies that innovated grew in value; the opposite being true for those that did not. In terms ideation itself, Minor found four key factors that contributed directly to higher rates overall: number of participants, number of projects, level of engagement in assessing ideas, and diversity – a wide swathe of individuals across all departments and occupations.⁶⁶

⁶² Dylan Minor, Brook, P, “Are Innovative Companies More Profitable?” *MIT Sloan Management Review*. Last modified: 28 December 2017.

⁶³ <https://sloanreview.mit.edu/article/are-innovative-companies-more-profitable/>

⁶⁴ Ibid.

⁶⁵ Steven Globerman, Emes, J. “Innovation in Canada: An Assessment of Recent Experience,” Fraser Institute. Last accessed 15 January 2019. <https://www.fraserinstitute.org/studies/innovation-in-canada-an-assessment-of-recent-experience>

⁶⁶ Dylan Minor, Brook, P, “Are Innovative Companies More Profitable?” *MIT Sloan Management Review*. Last modified: 28 December 2017.

Among the sample set, the companies that were successful in making innovation an accepted initiative generated upwards of 11% growth in only two years.⁶⁷ Comparatively, those that did not ultimately flatlined.⁶⁸ In addition to the quantitative outcomes alone, Minor made some important findings regarding key roles in the innovation process: “Managers know that ideas will come from the rank and file, while workers recognize that they have an important role to play in identifying problems and spreading solutions that may ultimately affect operations.”⁶⁹ This division of labour and the responsibilities assumed in each role contributed the internal effects of propagating the innovative aim; one of the companies ended up generating an ideation rate of 224 actionable ideas per 1,000 active users.⁷⁰ He concludes that there is a direct correlation between participation, ideation and growth – stemming from an inclusive organizational culture.⁷¹ As of 2019, nineteen million people are employed in Canada.⁷² The sample population of this study reflects the potential outcomes of one-fifth of the extant labour force. If the findings could be replicated by leadership at all levels, the GoC may advance considerably towards achieving their larger strategic goal.

The Canadian Armed Forces (CAF) has also been included in Canada’s innovation framework. While the initiative is praiseworthy – innovative capacity is undoubtedly a key to facing security challenges in the coming decades – the program itself keeps rank and file with the larger Innovation Agenda. As a result, it appears to

⁶⁷ *Ibid.*

⁶⁸ *Ibid.*

⁶⁹ *Ibid.*

⁷⁰ *Ibid.*

⁷¹ *Ibid.*

⁷² “Labour Force Participation Rate,” *TradingEconomics*. Last Modified 12 May 2019. <https://tradingeconomics.com/canada/labor-force-participation-rate>

manifest nearly all potential shortfalls previously observed under a single umbrella. The Innovation for Defence Excellence and Security (IDEaS) program was first conceived in *Strong, Secure, Engaged: Canada's Defence Policy* (SSE) and officially took shape in April 2018.⁷³ Backed by financial commitment of 1.6 billion⁷⁴ over a 20 year period, it focuses on engaging academics, scientists and industry in solving defence and security challenges.⁷⁵ Foremost among potential issues is the base of participation – the program does not actively engage the CAF membership as a whole – only the leadership; essentially sidestepping an ideation pool and key incubator that maintains a vested interest in defence. CAF members of all ranks comprise a relatively insular organization, and by nature are innately competitive. Limiting their participation in the process may cost the IDEaS program an incredible degree of critical mass.

GOVERNMENT AND THE INNOVATIVE PROCESS

Minor's study highlights a critical dynamic between managers of innovation and innovators themselves. Current theories assume three key roles essential to the innovative process. These are the innovators, champions, and leaders. While terminology often varies depending on the study, the descriptions thereof remain constant. The *innovator*, sometimes called the “genius”⁷⁶ or “maverick” is the individual that ultimately generates the critical insights that result in ideation. They do not need have extraordinary

⁷³ Department of National Defence, “Understanding IDEaS,” *Innovation for Defence Excellence and Security*, Last accessed 14 October 18. <https://www.canada.ca/en/department-national-defence/programs/defence-ideas/understanding-ideas.html>

<https://www.canada.ca/en/department-national-defence/programs/defence-ideas.html>

⁷⁴ *Ibid.*

⁷⁵ *Ibid.*

⁷⁶ Langdon Morris, “Creating the Innovation Culture,” *Innovation Labs White Paper*. Last modified: 2007 <http://www.innovationlabs.com/CreatingInnovationCulture.pdf>

intelligence, creative ability or even an expert skill set to fill this role.⁷⁷ Literally, anyone in an organization can be an innovator at one point or another. What is essential to their role, though, is that they perceive a problem and envision a solution.⁷⁸ It is important to note that, while the building of an innovative culture begins within the organization, the innovators themselves are not always employees – they may be customers or consultants. The value of the innovator is found less in what they come up with – many ideas are good, many are bad, but some bad ones also form the foundations for new insights.

The *champion*, on the other hand, is the institutional manifestation of an innovation initiative. They are the builders of systems and processes that support the efforts of the innovators themselves and are responsible for fostering the necessary competition, collaboration and trust environment for this to occur.⁷⁹ Additionally, these are the individuals who typically have the knowledge and experience to recognize a valuable idea and pave the way to the next level for prototyping, development and the final push to market. They provide this vital bridge between the frontline of a company or larger innovation framework, and the executives, strategists and decision makers.⁸⁰ The latter group constitutes the highest tier in the innovation system. It is the *leader* who influences the structures, policies and strategy of an organization in order to build innovative capacity.⁸¹ They provide the vision and budgetary focus, while removing functional and regulatory barriers that may impede the generation, proliferation or actionability of winning ideas.⁸² Similarly, their position and experience provide a wider

⁷⁷ *Ibid.*, 7.

⁷⁸ *Ibid.*, 7.

⁷⁹ *Ibid.*, 11.

⁸⁰ *Ibid.*, 11.

⁸¹ *Ibid.*, 14.

⁸² *Ibid.*, 14.

perspective of their surroundings, including potential competitors and opportunities. Most importantly, the innovation leader readily accepts and mitigates for the inherent risks involved in the process.

Situating this innovator/champion/leader dynamic at the national level, how should the GoC be involved in the country-wide innovation strategy? At what level should ideation take place? A recent study from the Fraser Institute concludes that, “While the federal government’s focus on improving the transition of Canadian companies from start-ups to successful anchor firms in international technology ecosystems seems well placed, public policy as it is directed towards improving innovation still remains what might be characterized as ‘top-down.’”⁸³ Top-down approaches have not proven successful, indicating that an alternate approach to innovation initiatives, namely as a bottom-up phenomenon, would be easier to incentivize, more productive and, in the end, largely self-propelling.⁸⁴

CANADA’S INNOVATION IMPERATIVE

There is a tendency to consider an innovation initiative as one would any other program: buy-in may generate better results but is not considered imperative. This notion is fundamentally false. No matter the sector or industry, “Failure to Innovate” has become a common epitaph on the headstones of once-mighty corporations.⁸⁵ Frankly, it is not optional but a matter of continued viability – survival. It only takes a cursory Google search to get a glimpse of the proverbial corporate graveyard – massive, worldwide

⁸³ *Ibid.*, 11

⁸⁴ *Ibid.*, 11

⁸⁵ *Ibid.*, 11

companies that have “failed to innovate.”⁸⁶ In each case, they did not implode in isolation but instead failed to meet or exceed the new supply, and subsequent demand for products, services and the delivery thereof – ultimately eroding the bottom line, and with it, investor confidence. States have suffered the similar consequences. No matter how well-established a state’s instruments of power are, a cursory review of recent history demonstrates the outstanding potential for compromise. There is an underlying requirement to keep improving and innovating, in addition to adopting and improving the innovations of competitors. Take the Soviet command economy, for example. In its early days, it was strong and boasted an ability to “rapidly mobilize resources and direct them in productive activities that emulated those of advanced economies.”⁸⁷ Despite considerable efforts in the later stages of the USSR, the Soviets ultimately failed to maintain their innovative capacity and ceased competing in the Cold War arena.⁸⁸

Empirical studies across a wide range of organizational bodies demonstrate the grim realities of innovation inertia. In their 2004 article, “Anticipating Disruptive Innovation,” Jay Paap and Ralph Katz argue that there is a typical pattern, referred to as the *tyranny of success*,⁸⁹ that describes why successful organizations lose their edge and falter when faced with the innovations of others. “The leadership, strategic focus...corporate culture that were all so critical in building the company’s growth and competitive advantage during one period can become its Achilles heel as technological

⁸⁶ Katrina Aslaid, “50 Examples of Corporations that Failed to Innovate,” Last modified: 22 November 2018. <https://valuer.ai/blog/50-examples-of-corporations-that-failed-to-innovate-and-missed-their-chance/>

⁸⁷ Matthew Johnston, “Why the USSR Collapsed Economically,” Investopedia. <https://www.investopedia.com/articles/investing/021716/why-ussr-collapsed-economically.asp>

⁸⁸ *Ibid.*

⁸⁹ Jay Paap, Katz R “Anticipating Disruptive Innovation,” *Research Technology Management* (47), no. 5 (2004): 13

and market conditions change over time.”⁹⁰ As if to make matters worse, they insist that most studies demonstrate that institutional leadership was aware of the emergent technologies that would eventually displace them, yet they did nothing.⁹¹ The antidote, they conclude, is the need to continuously improve and evolve, tandem-to and in advance of potential disruptors; a pursuit that requires a fundamental institutional understanding of innovation.⁹² New technologies emerge due to an unmet need – it is therefore valuable to pursue intelligence activities on what these needs entail and respond to them before a competitor can.⁹³ Valuable advice to consider in anticipating an increasingly connected, uncertain and complex global order.

Innovation has stood the test of time as one of the most prolific and pervasive corporate buzzwords, even after generations of others became obscure.⁹⁴ It has endured and formalized, because it is undoubtedly a valuable tool, having enabled businesses and states alike generate growth and prosperity to an unprecedented degree, while shaping the technologies and services that make life more convenient. Upon reviewing various facets of the GoC’s Innovation Agenda in the context of recent studies and metrics, it becomes apparent that the outcomes desired may not be achieved due to a strategic-level misalignment of resource allocations vs realities. To build a robust, country-wide innovation ecosystem, the GoC should expand their policy of Inclusive Innovation beyond specified disciplines, sectors and skill sets. There is no doubt that R&D contributes to the innovation process in part, using crowdsourcing and open innovation to

⁹⁰ *Ibid.* 14

⁹¹ *Ibid.* 14

⁹² *Ibid.* 22

⁹³ *Ibid.* 22

⁹⁴ “The difference between Invention and Innovation,” CPI. Last accessed: 9 May 2019. <https://www.uk-cpi.com/blog/the-difference-between-invention-and-innovation>

generate ideas has great potential to both solving problems and encouraging Canadians to be involved through active, direct participation. Generating competitive advantage in terms of economics and security is essential to navigating the coming years, something that a revision of Canada's innovation agenda may ultimately yield.

Further consideration should be given to how Canada defines innovation, ultimately to be more inclusive of sectors and industries beyond science, technology and R&D. The use of idea-management software has proven its efficacy as per the studies reviewed as it creates potential for virtual networking opportunities that would reinforce innovation ecosystems across Canada and should be explored. Recognizing that innovations have the capacity to be both positively and negatively disruptive, in some cases generating a devastating impact on both the environment and social wellbeing, it is recommended that the potential for these types of events be examined.