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National Defence and the Tyranny of Time

by Ross Fetterly

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POLICY PERSPECTIVE

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"If in the long run we are the makers of our own fate, in the short run we are captives of the ideas we have created."[1]

Time is often a relentless tyrant. In national defence departments and military organizations, time is relentless, mechanical and unforgiving. In the present shifting international strategic environment, security risks to Canada do not evolve in a linear or predictable manner. Analogous to climate change, "the risk environment is becoming more dynamic, with patterns of change increasingly in speed, uncertainty and complexity."[2] Consequently, the concept of time in a defence framework is becoming increasingly important. Indeed, war is the most "complex, physically and morally demanding enterprise we undertake."[3] Past actions, or the lack thereof, heavily weigh on the present and future. As the coming decade offers "even less promise of stability or predictability,"[4] than recent decades did, the agility of national defence institutions to respond to change is increasingly essential to long-term success. What worked for Western military forces throughout the 1980s to the 2000s doesn't work today. Consequently, in 2021, we need to "recover a sensibility about time"[5] that we had prior to the information age.

The air traffic controller's role acts as an appropriate metaphor to illustrate the challenge of time in a defence context. The controller must first manage the aircraft on the ground – those preparing to depart and those in a numbered sequence waiting to depart, simultaneously authorizing an aircraft to depart while monitoring the aircraft that has just departed. A similar simultaneous process in arriving aircraft must also be managed by air traffic control for the distant, middle distant and a number of nearby aircraft approaching the airfield. Finally, the air traffic controller needs to anticipate the development of potential problems and have plans on how to resolve them. Throughout all these different actions, time is a preeminent factor.

This challenge for Canada is reflected in the changes in the international strategic environment, dominated by China and Russia, which "have invested in capabilities such as ballistic missiles, cruise missiles, hypersonic weapons, small unmanned aircraft systems, artificial intelligence, cyber capabilities, and delivery platforms to offset our strengths while exploiting our perceived weaknesses."[6] Consequently, a principal challenge facing defence planners and operators in Canada in 2021 is not speed, but the compression of time. That is the subject of this paper, and it will begin with the tragedy-of-the-horizon concept, which emphasizes the temporal asymmetry

[1] F. A. Hayek, *The Road to Serfdom: Text and Documents—The Definitive Edition*, 2007 edition, Bruce Caldwell, ed., (Chicago: University of Chicago Press, 1944), 58.
[2] Iain White and Graham Haughton, "Risky Times: Hazard Management and the Tyranny of the Present," *International Journal of Disaster Risk Reduction*, 412. 22:412–19, 2017. https://www.sciencedirect.com/science/article/pii/S2212420916305696.
[3] Cathal J. Nolan, "Wars Are Not Won by Military Genius or Decisive Battles," Aeon, 2017, https://aeon.co/ideas/wars-are-not-won-by-military-genius-or-decisive-battles.
[4] Doug Berenson, Chris Higgins and Jim Tinsley, "The U.S. Defense Industry in a New Era," War on the Rocks, 2021, https://warontherocks.com/2021/01/the-u-s-defense-industry-in-a-new-era/.
[5] Max Boot, *War Made New: Technology, Warfare, and the Course of History 1500 to Today*, (New York: Penguin Group, 2006), xix.
[6] NORAD and USNORTHCOM, "Strategy – Executive Summary," 2021: 4. https://www.northcom.mil/Portals/28/(U)%20NORAD-USNORTHCOM%20Strategy%20EXSUM%20- %20Signed.pdf.

between national politics and future capabilities. The second section provides an overview of the complexity and non-linearity of the international strategic environment. The final section will discuss the tyranny-of-the-present concept in defence, as developed in this publication.

The Tragedy of the Horizon

> *"Since the future is unpredictable, the goal of strategy is to enable tactical flexibility while sustaining a vision of desired futures. The goal is planning, not a plan."*[7]

In economics, the classic concept of "tragedy of the commons"[8] arises when people overuse and then deplete a shared resource, as a result of their collective action. Mark Carney, in a 2015 speech for the Bank of England, reframed that concept and focused on the tragedy of the horizon.[9] He viewed the potentially catastrophic impacts of future climate change as a classic and consequential issue, lying in wait beyond the traditional horizon of most people or organizations and resulting in massive costs to future generations. Similarly, a defence capital equipment procurement program that incurs recurrent, substantial slippage will lengthen the average time that aging equipment fleets remain in service, where costs of replacement equipment generally will be substantially more expensive than the existing equipment. If the defence procurement system in Canada cannot be more agile in acquiring "capabilities that are dependent on fast moving technological developments,"[10] Canada will risk falling increasingly behind both its allies and potential adversaries. The effect is the same in recruitment and internal training programs that do not meet annual intake and production requirements, and where trained and effective military personnel will be less than optimal.

The tragedy of the horizon in defence, as with climate change, results for example from the imposition of increased defence equipment procurement costs on future generations that the "current generation has no direct incentive to fix."[11] Yet, even with a specific incremental funding envelope for procurement of capital equipment, and existing institutional capacity limits, only a long-term sustained effort to develop the needed additional capacity to fully deliver the program can effect change. As risks in defence capital equipment procurement are partly a function of cumulative under-investments, timely action to increase procurement projects reduces subsequent procurement bow waves. In effect, the consequences of inaction from 2021 forward

[7] Robert L. Hutchings and Gregory F. Treverton, "Rebuilding Strategic Thinking," Center for Strategic & International Studies, 2018: 23, https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/181018_RebuildingStrategicThinking_WEB_v2.pdf?yIHLTmIujRLfZAFCMVqaz16a8EK_A_lC
[8] Garrett Hardin, "The Tragedy of the Commons," *Science* 162:1243–48; 1968, https://science.sciencemag.org/content/sci/162/3859/1243.full.pdf.
[9] Mark Carney, "Breaking the Tragedy of the Horizon – Climate Change and Financial Stability," Bank of England, London, 2015, https://www.bankofengland.co.uk/-/media/boe/files/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability.pdf?la=en&hash=7C67E785651862457D99511147C7424FF5EA0C1A.
[10] William Richardson, Kalen Bennett, Douglas Dempster, et al. "Toward Agile Procurement for National Defence: Matching the Pace of Technological Change," Canadian Global Affairs Institute, 2020, https://d3n8a8pro7vhmx.cloudfront.net/cdfai/pages/4436/attachments/original/1591036812/Toward_Agile_Procurement_for_National_Defence_Matching_the_Pace_of_Technological_Change.pdf?1591036812.
[11] Ibid., 4.

will establish the "scale of reaction"[12] for shortfalls in new-generation capital equipment availability, and in the level of trained and effective military personnel. Systemic delays in capital equipment programs and non-linear relationships in the lengthy timeframes to build infrastructure, and capacity limitations on personnel recruitment and training, all contribute to institutional capacity shortfalls. Subsequent institutional efforts to catch up in these areas create bow waves – similar to that of reducing a ship's speed by diverting energy.[13] They can then lead to both program instability and sub-optimal practices in procurement, recruitment and training, as well as infrastructure maintenance and construction. This illustrates the complexity of non-linear relationships in the management of defence resources.

Complexity and Non-Linearity of the International Strategic Environment

> *"The greatest challenges during past periods of revolutionary change had been primarily intellectual, not technical"*[14]

In the defence environment, the tactical and operational levels are both personal and institutional. Change in defence throughout history has been derived from intellectual contemplation, as articulated above by the American intellectual Andrew Krepinevich. With strategic thought very pragmatic and dependent on the "realities of geography, society, economics,"[15] as well as politics and other evolving factors related to conflict, critical thinking in defence is essential. The importance of intellectual thought as the precursor to technological development cannot be overstated, and needs to receive greater acknowledgment and support in the Canadian defence establishment.

A recent Department of National Defence (DND) publication by the Canadian Special Operations Forces Command (CANSOFCOM), emphasizes that the emergence of "new forms of long-term strategic competition and a weakening of the international rules-based order are playing out on multiple fronts and across multiple dimensions of power."[16] Therefore, in the present defence environment, conflict cannot be viewed only on a linear spectrum, but one in which "threats emerge at all levels, simultaneously and non-linearly."[17] Similarly, the Canadian army in its Future Operating Concept document considers that the future land-operating environment will be "complex, dynamic, volatile and highly uncertain."[18] To support the army in facing future challenges at home and abroad, the 2021 Army Modernization Strategy will strive to balance the requirement to generate "readiness and conducting operations across an increasingly broad

[12] Ibid.
[13] Todd Harrison, "Defense Modernization Plans through the 2020s: Addressing the Bow Wave," Center for Strategic & International Studies, 2016: 5, https://csis-website-prod.s3.amazonaws.com/s3fs-public/legacy_files/files/publication/160126_Harrison_DefenseModernization_Web.pdf.
[14] Andrew Krepinevich and Barry Watts, *Andrew Marshall and the Shaping of Modern Defense Strategy* (New York: Basic Books, 2015), 212.
[15] Peter Paret, editor, *Makers of Modern Strategy from Machiavelli to the Nuclear Age* (Princeton, NJ: Princeton University Press, 1986), 3.
[16] CANSOFCOM, "Beyond the Horizon: A Strategy for Canada's Special Forces in an Evolving Security Environment," Department of National Defence, 2020: 10, https://www.canada.ca/content/dam/dnd-mdn/documents/reports/2020/dgm-19719-bm8_cansofcom_stratgicplan_en_v8.pdf.
[17] Ibid., 13.
[18] Canadian Army, "Close Engagement: Land Power in an Age of Uncertainty," Department of National Defence, 2018: 11, http://publications.gc.ca/collections/collection_2019/mdn-dnd/D2-406-2019-eng.pdf .

spectrum of operations."[19] These documents emphasize the shifting international strategic environment and the consequential nature of a timely response to security threats, which require trained and effective personnel staffed at authorized levels, trained with the required equipment. Yet, the military continues to struggle with a shortage of personnel,[20] and timely replacement of some major equipment fleets.

Complexity and Change

The complex, rapidly changing international environment, exacerbated by the emergence of space and cyber as new and increasingly important security domains, plus increased technology and lethality in the traditional land, sea and air domains, is forcing traditional, rule-based and structured organizations such as defence to examine longstanding practices, procedures and institutional business planning processes. Furthermore, the COVID-19 pandemic has rapidly accelerated global geopolitical and economic trends.[21] The outcome can visually appear like climate change on steroids. The consequence for Canada is that the traditional annual defence planning cycle in a previously relatively linear, although shifting world, has been upended.

The defence establishment in Canada does not generally have control over what challenges it will face, nor when it will have to face them. It knows the extent and rate at which its weapon systems wear out and become obsolete, and can adjust recruitment programs to shifting attrition rates. While the Canadian government has no influence over the international security or business environment, it does have control over how it can change and adapt core defence business processes to prepare for an evolving global defence and security environment.

The Tyranny of the Present

The Liberal government has emphasized the financial thoroughness of the 20-year funding model of the 2017 *Strong Secure Engaged* defence policy, and it closely echoes the previous Conservative government's 2008 *Canada First Defence Strategy*, in claiming that the policies – with "an unprecedented long-term, predictable funding framework"[22] – would provide the foundation for more effective long-term resource planning. With announced predictable funding for the 2008 defence strategy ending up being short-lived, the Liberal government's inability to fully execute the strategically important defence capital equipment program is having a similar impact. Given that both the Conservatives and Liberals have often historically under-delivered in defence procurement outcomes, repeated under-performance signals either structural problems or

[19] Canadian Army, "Advancing with Purpose: The Canadian Army Modernization Strategy," Department of National Defence, 2021: 4, https://army.gc.ca/assets/ARMY_Internet/docs/en/national/2021-01-canadian-army-modernization-en.pdf.
[20] Department of National Defence, "Evaluation of CAF Bases and Wings Sustainment Programs," Assistant Deputy Minister (Review Services), 2020, https://www.canada.ca/content/dam/dnd-mdn/documents/reports/2020/report-1258-3-024-en.pdf.
[21] Mihir Mysore, Aditya Sanghvi, Navjot Singh and Bob Sternfels, "Speed and Resilience: Five Priorities for the Next Five Months," McKinsey & Company, https://www.mckinsey.com/business-functions/organization/our-insights/speed-and-resilience-five-priorities-for-the-next-five-months.
[22] Government of Canada, *Canada First Defence Strategy*, Department of National Defence, 2008, https://www.canada.ca/en/department-national-defence/cor2porate/policies-standards/canada-first-defence-strategy-complete-document.html.

disinterest by the political parties in the difficult and unrewarding task of making defence resource management work. This is complicated by the tyranny of the present in defence, which will be discussed in this section.

In economics, intertemporal choice concerns the trade-offs between the impact that current decisions have on the availability of future options. By not investing in strategies to increase investments in defence capabilities now, costs will be higher in the future. This section will focus on the pervasive issues in defence that include continual cost escalation in capital equipment procurement, the complexity of capital equipment procurement, the growing importance of science and technology, and finally, shortening timelines in defence.

Cost Escalation in Defence Capital Equipment Procurement

The cost of large defence capital equipment projects in Western nations has been escalating rapidly since the Second World War.[23] While the trend of increasing unit costs of weapon systems has continued, fixed costs of operating those systems are also now increasing.[24] The consequence of relentless cost increases in large new-generation weapon system fleets is that DND tends to purchase those modern replacement equipment fleets in smaller numbers. Furthermore, procurement delays, unpredictable inflation and scope increases can also further increase procurement costs.[25] Recent research has shown that defence inflation continues to exceed the gross domestic product deflator, and notwithstanding numerous reforms of defence procurement, defence cost escalation continues.[26] Ongoing cost escalation over decades in defence has been particularly consequential in capital equipment procurement.

Complexity of Capital Equipment Procurement in Defence

The complexity of capital equipment procurement in defence can be framed as a critical process "which must accommodate projects of vastly different scale and coordinate activities across several government departments."[27] Procurement of major capital equipment in defence is like a microcosm of the impact that time has on the defence enterprise in Canada. The challenge for complex systems related to both defence and climate change is a growing mismatch "at all levels between challenges and needs with the systems and organizations to deal with them."[28] In effect, the DND and Canadian Armed Forces (CAF) are facing similar circumstances to the climate change problem. The longstanding procurement, financial and personnel systems were largely designed for a previous era and need to shift towards systems better adapted to a time of

[23] David L. I. Kirkpatrick, "The Rising Unit Cost of Defence Equipment: The Reasons and the Results," *Defence and Peace Economics*. 263. 6:4:263–88; 1995.
[24] David L. I. Kirkpatrick, "Trends in the Costs of Weapon Systems and the Consequences," *Defence and Peace Economics*. 259. 15:3:259–73; 2004.
[25] Chief of Review Services, "Internal Audit of Capital Project Cost Estimation," DND, 2013: iv. https://www.canada.ca/content/dam/dnd-mdn/migration/assets/FORCES_Internet/docs/en/about-reports-pubs-audit-eval/p0972-eng.pdf.
[26] Keith Hartley, "UK Defence Inflation and Cost Escalation," *Defence and Peace Economics*. 27:2:1–24; 2015.
[27] Senate of Canada, "Interim Report of the Standing Committee on National Finance: First Interim Report on Defence Procurement – Summary of Evidence," 2019, https://www.defenceandsecurity.ca/UserFiles/Uploads/publications/reports/files/document-25.pdf.
[28] National Intelligence Council, "Global Trends 2040: A More Contested World," National Intelligence Council, 2021:2, https://www.dni.gov/files/ODNI/documents/assessments/GlobalTrends_2040.pdf.

significant change. In effect, defence personnel are working within the "constant tension between the urgent and the important,"[29] with the urgent often overwhelming the important issues.

Increasing Importance of Science and Technology

Science and technology contribute to national defence by "providing the technological and knowledge advantage necessary to develop the right military capabilities and prepare for an uncertain and potentially dangerous future."[30] The relevance of technological change to military innovation for Canada and the United States "may be faster and more consequential in the next 20 years than it has proven to be over the last 20."[31] This is particularly evident in defence procurement, where the scenario of the tragedy of the commons also plays out in the department. Defence procurement officials are all in competition for a relatively fixed defence capital equipment budget. Based on this common resource, the military services and various departmental organizations, such as infrastructure or information technology, are incentivized to select advanced performance requirements. This in turn drives them to immature technology[32] and creates a continuing cycle of increasing costs.[33] Artificial intelligence (AI) is rapidly emerging as a significant capability enabler for defence departments in Western nations, as well as Russia and China. In particular, with the pace of warfare rapidly increasing, AI is about the ability to "compress time and space to be more nimble."[34] It's not only about speed but also the precision and efficiency of military decision-making. With a further revolution in military affairs potentially on the horizon, the build-up of the Chinese economy and military, together with Russia's return, is likely to "supercharge the competition and raise the stakes."[35] While we cannot change the relentless passage of time, we can transform the way that we think about time as a primary element of all key activities in defence.

Shortening Timelines in Defence

The military theorist B. H. Liddell Hart observed that "the only thing harder than getting a new idea into the military mind is to get an old idea out"[36] and this also applies to defence departments. National military establishments are conservative institutions, due to the significant consequences of failure in combat. While the defence procurement system has undergone significant reform and improvement over the past decade in terms of process, Western defence departments struggle to bring down the lengthy timeframe of large capital equipment programs. Yet despite its development, the defence procurement process has been compared to a "legacy weapons system,"[37] one that needs to be better aligned to the shifting security and technological

[29] Charles E. Hummel, *The Tyranny of the Urgent* (Downers Grove, IL: InterVarsity Press, 1967), 2.
[30] DND, "Science and Technology in Action: Delivering Results for Canada's Defence and Security, (Assistant Deputy Minister Science & Technology), 2013: 3, https://www.canada.ca/en/defence-research-development/corporate/publica tions/defence-st-strategy.html.
[31] Michael O'Hanlon, "Forecasting Change in Military Technology 2020-2040," Brookings Institute, 2018: 4, https://www.brookings.edu/wp-content/uploads/2018/09/FP_20181218_defense_advances_pt2.pdf.
[32] Michael J. Pennock, "Defense Acquisition: A Tragedy of the Commons," *Systems Engineering*. 18.4. 349–64; 2015.
[33] Kirkpatrick, "Trends, 259–73.
[34] Scott Amyx, "The Technological Innovation Challenges in Defense," *Forbes*, 2020, https://www.forbes.com/sites/forbesbusinesscouncil/2020/07/14/the-technological-innovation-challenges-in-defense/?sh=56ba5e0d5a05.
[35] O'Hanlon, "Forecasting Change, 27.
[36] B. H. Liddell Hart, *Thoughts on War* (London: Faber & Faber, 1944), 115.
[37] Richardson, Bennett, Dempster et al., 6;

environment. The combination of size, culture and complexity in national defence organizations makes them resistant to change. This requires continuing to improve management capabilities in core procurement and project development processes. However, several structural issues inherent to government organizations inhibit institutional change.[38] This can include promotion of senior military officers into positions due to their performance in operations or support roles, not for their demonstrated ability to drive institutional change. Second, the relatively short tenure of military leaders in specific positions can result in the senior officer being rotated to another posting in the midst of the reform initiative. Finally, existing public-sector rules and regulations can limit reform and require amendment by the government and may need collaboration by both internal and external stakeholders.

Reorienting National Defence Institutions

Reorienting national defence institutions to address the challenge of time requires being pro-active in force development and in procurement initiatives, rather than being forced into a reactive response to shifts in the international strategic environment. However, the decision-making process in defence is a "complex process with elements of rationality interspersed with competition for scarce resources and negotiations that result in solutions, that while not always based on logic can be accepted by the major stakeholders."[39] Yet, decisions now need to be taken in defence within an overall theme of compressing the time that it takes to get things done in defence.

A deliberate process must be established to stop doing marginally valuable activities and to shift resources to developing or emerging priorities. Resource allocation in defence has traditionally focused on the triad of people, money and time, with priorities shifting over time. Time is now the key variable: all defence activities are bound by time. In the current international strategic environment, time has become more important than money. The international strategic context and operating environment are changing in a manner characterized by "complexity, instability, uncertainty, and pervasive information."[40]

Time is incorporated throughout defence departments' different systems, such as planning, training, procurement and financial resource management. Compressing planning and execution cycles to allow for a more frequent refresh of the capability and procurement plans is vital. This would refresh the state of strategic gaps in defence, and inform personnel force development planning and consideration of changes to operating concepts. It would identify emerging capability shortfalls, and respond quicker to restructure the institutional workforce. This is one foundation and building block upon which the defence establishment in Canada can begin to compress the time within processes institutionally.

[38] Frank Ostroff , "Change Management in Government," *Harvard Business Review*, 2006, https://hbr.org/2006/05/change-management-in-government.
[39] Joe Sharpe and Allan D. English, "Principles for Change in the Post-Cold War Command and Control of the Canadian Forces," Canadian Forces Leadership Institute, 2002: xiii.
[40] Ministry of Defence, United Kingdom, "Joint Concept Note 1/17: Future Force Concept," 2017, https://www.gov.uk/government/publications/future-force-concept-jcn-117.

Conclusion: Managing Through a Period of Strategic Ambiguity

The late U.S. Defense secretary Donald Rumsfeld commented on the subject of military preparedness by stating that "you go to war with the Army you have, not the Army you might want or wish to have at a later time."[41] His insight aptly frames the importance of ensuring that national military organizations are prepared for future conflicts and the consequences of entering into a conflict. In that case, American military personnel deploying to Iraq in 2004 felt that they were being deployed into a combat zone with aging equipment and insufficient protection. This illustrates the tragedy of the horizon in defence, where military units are deployed with capital equipment or training not fully suited for the battlefield they will face.

The COVID-19 pandemic and recent build-up of military capacity in China and Russia have made it increasingly apparent that we need to be more proactive in making decisions in defence. Indeed, the battleground for defence in Canada centres around the timeliness of responding to the declining and more fractious international strategic environment. In defence, military and departmental leaders, together with business planners, increase their value by developing better approaches to operate in the present ambiguous international security environment. During times of institutional change in defence, the focus tends to be overwhelmingly on equipment, at the expense of institutional reform. At this time, ensuring that the defence establishment in Canada has the agility and ability to respond to a rapidly developing and constantly changing environment is becoming at least as important as investing in new technology. While Canada's geostrategic position[42] has helped buffer the nation from the level of defence spending of some of our European allies in the past, the development of hypersonic weapons and cyber-threats among others shrinks the effect of time and distance in military conflicts.

The substantial challenges facing Canada in defence will require long-term thinking. With the international strategic environment changing, time is now the primary variable of importance in defence. Delivering capabilities a decade or longer into the future could result in sub-optimal outcomes for the CAF in future conflicts. This shortcoming is particularly evident in the limited modernization of NORAD to date – relying on 1980s technology to continue to operate the North Warning System (NWS), with construction and deployment of more modern technology "unlikely to be completed before the mid-2030s."[43] In essence, NORAD is facing the equivalent of the climate change problem in defence, illustrating that a number of military systems employed in the CAF were designed for a previous era, have decreasing utility and therefore increase Canada's vulnerability to attacks by foreign nations.

The impacts of under-investment in defence in an increasingly polarized international strategic environment indicate that defence too faces the tragedy of the horizon. The inability of the national political class in Canada, particularly the Liberals and the Conservatives, to put aside

[41] Eric Schmitt, "Iraq-Bound Troops Confront Rumsfeld over Lack of Armor," *New York Times*, 2004, https://www.nytimes.com/2004/12/08/international/middleeast/iraqbound-troops-confront-rumsfeld-over-lack-of.html.
[42] Jeffrey Collins, "Defence Procurement Won't Be so Easy to Cut in a Time of COVID-19," *Policy Options*, 2020, https://policyoptions.irpp.org/magazines/may-2020/defence-procurement-wont-be-so-easy-to-cut-in-a-time-of-covid-19/.
[43] Ernie Regehr, "Replacing the North Warning System: Strategic Competition or Arctic Confidence Building?" The Simons Foundation, 2018, https://thesimonsfoundation.ca/highlights/replacing-north-warning-system-strategic-competition-or-arctic-confidence-building.

their political differences to replace the CF-18s, which were purchased in 1980 and delivered in 1982, despite upgrades – as well as replacement of the NWS equipment of a similar vintage, reflects poorly on Canada. Time during a future crisis will be the most important commodity for the Canadian government. In order to prepare for the future operating environment, the timelines in defence need to be compressed. Ultimately, addressing the challenge of time requires the federal government and defence establishment to be proactive, rather than being forced into a reactive response to changes in the international strategic environment. Time has an economic value, and its impact can have an enduring effect on defence departments through the opportunity cost of delays in capital equipment procurement, recruiting and training programs. Finally, while national governments remain largely preoccupied with near-term events, defence departments need to continually emphasize a sensibility regarding "time and space that has been lost in the jet and information ages."[44]

[44] Robert D. Kaplan, *The Revenge of Geography: What the Map tells us About Coming Conflicts and the Battle against Fate* (New York: Random House, 2012), xix.

About the Author

Ross Fetterly *retired in 2017 from the Canadian Forces after a 34-year career as the Royal Canadian Air Force's director of air comptrollership and business management. He previously served as the military personnel command comptroller, and in other senior positions with the Department of National Defence Assistant Deputy Minister (Finance).*

Retired Col. Fetterly completed a tour in February 2009 as the chief CJ8 at the NATO base headquarters at Kandahar airfield, Afghanistan, where he was responsible for finance, contracting and procurement. While deployed he wrote a paper entitled Methodology for Estimating the Fiscal Impact of the Costs Incurred by the Government of Canada in Support of the Mission in Afghanistan with staff from the Parliamentary Budget Office. Col. Fetterly was employed as the deputy commanding officer of the Canadian contingent in the United Nations Disengagement Observer Force in the Golan Heights during the second intifada in 2000-2001. He has served as an air force squadron logistics officer and as a finance officer at military bases across Canada.

An adjunct professor at the Royal Military College of Canada (RMC) department of management and economics, and a Senior Fellow with the Centre for Security Governance, Dr. Fetterly has a B.Comm (McGill), M.Admin (University of Regina) and an MA and PhD in war studies from RMC. His PhD fields of study included defence economics, defence policy and defence cost analysis. His primary research focus is defence resource management. Dr. Fetterly also teaches courses in financial decision-making, defence resource management and government procurement at RMC. Through his company, Ross Fetterly Consulting Inc., he has taught a defence resource management course and a business planning course internationally for the Department of National Defence to senior military officers and defence executives in developing countries.

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