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LEADERSHIP REQUIREMENTS IN EMERGING DOMAINS OF OPERATIONS

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LIST OF ABBREVIATIONS

CAF	Canadian Armed Forces
DG	Director General
DG Cyber	Director General Cyberspace
DARPA	Defense Advanced Research Projects Agency
ARPANET	Advanced Research Projects Agency NETwork
TCP/IP	Transport Control Protocol/Internet Protocol
CERN	European Organization for Nuclear Research (English Translation)
GPS	Global Positioning System
CF	Canadian Forces
SIGS	Signals Officer
CELE	Communications and ELectronics Engineer Officer
CArmy	Canadian Army
RCN	Royal Canadian Navy
RCAF	Royal Canadian Air Force
SSE	Strong, Secure, Engaged (Name of Canada's 2017 defence policy)
CADSI	Canadian Association of Defence and Security Industries
NATO	North Atlantic Treaty Organization

IOC	Initial Operational Capability
FOC	Full Operational Capability
AAP	Allied Administrative Publication (from NATO)
LCDR	Lieutenant-Commander
OED	Oxford English Dictionary
UK	United Kingdom
US	United States
USA	United States of America
AUS	Australis
NZ	New Zealand
Cyber Op	Cyberspace Operator (military trade in the CAF)
NDA	National Defence Act
QR&O	Queens Regulations and Orders
DND	Department of National Defence
Col	Colonel
BGen	Brigadier-General
MGen	Major-General
CFIOG	Canadian Forces Information Operations Group
CISO	Chief Information Security Officer
MDS	Master of Defence Studies
OCO	Offensive Cyber Operations
CNA	Computer Network Attack
CNE	Computer Network Exploitation
CMA	Cyber Mission Assurance
IBM™	International Business Machines™ (corporation)
RBC™	Royal Bank of Canada™
MBA	Master of Business Administration
CISSP	Certified Information Systems Security Professional
ISC^2	International Information Systems Security Certification Consortium
JCSP	Joint Command and Staff Program
DDD	Difference-in-Difference-in Differences
TEL	Theory of Expert Leadership
CEO	Chief Executive Officer
DRDC	Defence Research and Development Canada
CORA	Centre for Operational Research and Analysis
MILPERSCOM	Military Personnel Command
CFD	Chief of Force Development

ABSTRACT

Effective leadership and professionalism are the pillars upon which the Canadian Armed Forces relies for its success in developing, generating and employing forces for military operations in support of the defence of Canada and her interests. Emerging domains of operations such as space and cyberspace are challenging the ability of the CAF to evolve rapidly enough to keep pace with its allies and adversaries in these domains. This study argues that this challenge will not be met unless traditional assumptions regarding the specialization and expertise required in the officer corps at more senior levels are set aside.

A review of the evolution of leadership research will reveal that certain leadership theories driving the assumption that at senior levels generalists *always* make better leaders than specialists are not valid. A study of CAF leadership doctrine will demonstrate that although it recognizes the need for leaders to broaden their knowledge as they progress in seniority, nowhere does it state that this means leaders can abdicate their responsibility to remain technically competent. Furthermore, the contemporary research on specialist leadership, also known as the theory of expert leadership, demonstrates with empirical accuracy that specialist leaders deliver better institutional results in highly technical or rapidly changing fields than generalists. Finally, a comparative analysis of expertise between DG Cyber appointees and private sector CISOs paints convincing and concerning picture.

In the final analysis the evidence is undeniable in concluding that the CAF must select military leaders in emerging domains of operations based on expertise, or it risks failure in achieving the ambitions for these domains laid out in *Strong, Secure, Engaged.*

INTRODUCTION

> *We must keep pace with the rapid evolution of technology to ensure continued operational relevance, both to address threats from potential adversaries and to maintain our ability to operate alongside key allies.*
>
> - Government of Canada, *Strong, Secure, Engaged*

What are the Canadian Armed Forces (CAF) military leadership's needs in emerging domains of warfare such as space and cyberspace? How can they ensure that the CAF is able to keep pace with adversaries and allies in operationalizing these domains? Is it sufficient to rely on extant leadership development and leader selection models, or is the need for specialist leadership great enough that different approaches must be used? This research paper will contribute to the body of knowledge in leadership theory by adding to the debate regarding the advantages and disadvantages of generalists versus specialists in leadership roles. The perspective will be unique because this question will be examined through the lens of emerging domains of operations.

This study will demonstrate that both contemporary leadership theory, and CAF leadership doctrine, recognize the importance of domain-specific expertise in leaders at all levels, refuting the notion that generalists make more effective senior leaders. Furthermore, empirical evidence from contemporary leadership research will be provided which shows that in a number of sectors specialist leaders are actually more effective than generalists and achieve superior organizational results.

Therefore, this study will argue that the CAF must select specialists for leadership positions in emerging domains of operations if it truly intends to operate successfully in these domains, while keeping pace with its adversaries and allies. This will require the CAF to adapt the way it currently identifies leadership requirements and selects leaders

for those domains in order to privilege the expertise element of the CAF leadership framework over other considerations.

The debate over whether generalists or specialists make better leaders has ebbed and flowed in both the leadership research and practitioner communities; however, this area of leadership research has regained momentum in recent years due in large part to the efforts of researchers such as Amanda H. Goodall amongst others.[1] Reasons for this resurgence are varied; however one is the ever-increasing importance of highly technical industries – such as computer security – to the growth and stability of the globalized economy, which has engendered interest from all fields of research including the social sciences.[2] Another is a return to prominence of the concept of an alternative form of "trait-based" leadership known as "individual differences" and its intersection with other leadership concepts such as leadership character and cognitive competence.[3]

In the CAF, there is a pervasive mindset that takes for granted that senior leaders must be generalists; however, in the contemporary security environment, and with the development of emerging domains such as space and cyberspace, this is no longer a leadership concept that should be adhered to without justification. To be fair, this was a

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[1] Amanda H. Goodall and Ganna Pogrebna, "Expert Leaders in a Fast-Moving Environment," *The Leadership Quarterly* 26, no. 2 (Spring 2015), https://www.sciencedirect.com/science/article/pii/S1048984314000794?via%3Dihub; Amanda H. Goodall, interview by Sarah Green Carmichael, 24 April 2018, transcript (Online: Harvard Business Review, April 2018), https://hbr.org/ideacast/2018/04/why-technical-experts-make-great-leaders; James K. Stoller, Amanda Goodall, and Agnes Baker, "Why the Best Hospitals are Managed by Doctors," Harvard Business Review Online (2016), https://hbr.org/2016/12/why-the-best-hospitals-are-managed-by-doctors; and, Mingxiang Li and Pankaj C. Patel, "Jack of All, Master of All? CEO Generalist Experience and Firm Performance," *The Leadership Quarterly*, In Press Corrected Proof (7 September 2018), https://www.sciencedirect.com/science/article/pii/S1048984317307130?via%3Dihub.

[2] Statista, "Size of the Cybersecurity Market Worldwide, from 2017 to 2023," last accessed 19 May 2019, https://www.statista.com/statistics/595182/worldwide-security-as-a-service-market-size/.

[3] John Antonakis, David V. Day, and Birgit Schyns, "Leadership and Individual Differences: At the Cusp of a Renaissance," *The Leadership Quarterly* 23, no. 4 (Summer 2012): 643-644, https://www.sciencedirect.com/science/article/pii/S1048984312000422?via%3Dihub.

reasonable approach for most of the highly industrialized but digitally disconnected Cold War era when technological innovation and adoption in militaries occurred over the course of years, and government funded research and development was the primary driver of change.[4] In that era most of the advances in warfighting technology occurred at the behest of military leadership, so they were not surprised when it became available. Additionally, there was time for generalist leaders to absorb and process technological advances, assess and internalize the implications (if not already done), and lead the institution to adapt. However, by the 1960s a significant change was afoot that would lead to an unpredictable seismic shift in the status-quo.

The Defense Advanced Research Projects Agency (DARPA) initiated development of a computer-based distributed communications network known as ARPANET. By the late 1970s, the first Transport Control Protocol/Internet Protocol (TCP/IP) packets were being transmitted and the first generation of the internet was born. Then, in March 1989, an information sharing concept that would become the world wide web was proposed at European Organization for Nuclear Research (CERN).[5] Fast-

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[4] National Research Council (US) Committee to Assess the Portfolio of The Division of Science Resources Studies of NSF, *Measuring the Science and Engineering Enterprise: Priorities for the Division of Science Resources Studies* (Washington (D.C.): National Academic Press (US), 2000), 79. Its been observed that in the internet-era, the pace of technological advancement is pushed by the private sector, whereas historically this was the role of government. Major military equipment capital projects still take years to deliver, however the speed with which technologies such as cell phones have become ubiquitous exceeds the militaries ability to keep pace and creates frustration within operational communities. This manifests itself in ways such as the use of personal GPS devices on exercises and operations because of their superior usability, despite the risk of jamming; the desire to replace tactical radio frequency communications with a single cellphone like device; or, the "need" to have "BlackBerry" access everywhere, all the time. These technologies are changing the military in many ways, not just in the use of "gadgets," but in how organizations operate as seen in how the RCN views the importance of having WiFi connectivity at the tactical edge for morale and welfare needs.

[5] World Wide Web Foundation, History of the Web, https://webfoundation.org/about/vision/history-of-the-web/. CERN is the common name for the organization, it is derived from the French translation of the name "Conseil Européen pour la Recherche Nucléaire," as per the CERN website: CERN, "About CERN," accessed 23 May 2019, https://home.cern/about.

forward 30 years and Cisco estimates that in 2019 there will be just over 25 billion devices will connect to the internet, resulting in approximately 201 exabytes of data transiting the globe each month through cyberspace in a blur of digitized ones and zeros.[6] Add to that the rapid development and deployment of space-based sensors and communications systems starting in the 1970s, which modern technologies such as the Global Positioning System (GPS) rely upon, and it is apparent the global transition to the Information Age is accelerating.[7] In this age, technological innovation and global adoption happen on the order of days or even hours, and the drivers of change range from small groups of software developers in a basement to massive information technology companies such as Microsoft, Apple and Alphabet.

How does any of this relate to CAF leadership requirements? CAF leadership doctrine can provide some guidance in this matter:

> The world has undergone a number of significant alterations since the end of the Cold War and these changes have, in turn, affected the role requirements and practice of leadership in the CF. New leader responsibilities, requiring new or enhanced competencies, have arisen as a result of globalization, changes in the security environment, a changing human resource environment, and a changing public environment.[8]

This quote demonstrates that even in 2005, the CAF recognized at an institutional level that not only was technology changing the way operations would be conducted; it was also going to affect the leaders of those operations. However, despite the authoritative and objective voice of CAF doctrine, the partiality for generalist leaders persists. Of note,

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[6] Cisco, Cisco Visual Networking Index: Forecast and Trends, 2017–2022 White Paper, https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-741490.html. A Exabyte = $1x10^{18}$ or 1,000,000,000,000,000,000 bytes. NIST, *The NIST Reference on Constants, Units, and Uncertainty – International System of Units – SI Prefixes*, https://physics.nist.gov/cuu/Units/prefixes.html

[7] David S. Alberts, *et al*., *Understanding Information Age Warfare* (Washington, D.C.: Department of Defense, 2001), 1-2.

[8] Department of National Defence, *Leadership in the Canadian Forces*: *Conceptual Foundations*, p. xi.

many of the leaders making this assertion – some of them at very senior levels and in positions of influence – are "operators" who beat this drum passionately while ignoring the fact that they belong to some of the most specialized trades in the world – those with the primary role of commanding the use of lethal force in defence of the country's interests. This perspective is, however, completely contradictory in nature.

The Fundamental Contradiction of the CAF Generalist vs. Specialist Debate

In the context of this paper but also for the CAF in general, the question of whether leaders need to be generalists or specialists is focused on the officer corps. The reason this is a point of contention is that there appear to be gaps and inconsistencies between what modern leadership theory is advocating and what the CAF is practicing.

First, it must be noted that there is a misconception that all officers in trades, such as Signals (SIGS) and Communication and Electronics Engineering (CELE), are actually expert specialists after completing trade-specific training. This is not always the case as it depends heavily on their choice of post-secondary education which, because of retention and recruiting issues for SIGS, can be any science degree even if it is completely unrelated to communications. Therefore, a key element of the debate for a number of technical officer trades, which one could argue are naturally aligned to space and cyberspace, is centred around a difficult choice. Throughout their careers they must often choose between doing what is necessary for career progression and doing what is necessary be truly competent in these emerging domains if that is where they want to be employed. The debate is fundamentally skewed towards the "operators" viewpoint – that senior leaders should be generalists – because they tend to advance to the highest levels of command and skew the debate either deliberately or inadvertently. This view permeates the officer professional development and drives officers in technical trades

towards generalist advanced education and positions outside of the emerging domains so that they have better chances for advancement.

The fundamental incongruity of the operators' advocacy for generalization is that of all trades in the CAF they are the most specialized. There is no true civilian equivalent to the combat arms officers of the Canadian Army (infantry, armoured, artillery and combat engineer), the naval warfare officers of the Royal Canadian Navy or the fighter pilots of the Royal Canadian Air Force.[9] This is because one of their primary responsibilities is to command military forces in the legal use of force to achieve military objectives.[10] Yet, they view themselves as generalists, and some even believe that officers in technical occupations do not need to be technically competent because they can rely on their subordinates for that; officers in these trades just need to be good leaders and allow their subordinates to manage the technical details.[11] Curiously, this is at odds with a CAF principle of leadership – "achieve professional competence and pursue self-improvement" – so its veracity is questionable.[12] So what does this mean for leadership in emerging domains?

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[9] Government of Canada, Canadian Armed Forces Recruiting Website, "Infantry Officer," "Armour Officer," "Artillery Officer," "Combat Engineer," https://www.canada.ca/en/department-national-defence/services/caf-jobs/career-options/fields-work/combat-specialists/infantry-officer.html There are related civilian occupations listed for Combat Engineer but they do not reflect the role of the Combat Engineer Officer which is to ensure battlefield mobility and survivability for land forces by enabling the Army to live, move and fight.

[10] Department of National Defence, A-PA-005-000/AP-001, *Duty with Honour: The Profession of Arms in Canada* (Ottawa: DND, 2009), 15. It is true that all CAF officers may be called upon to order the use of violence; however, for the majority this is not their primary role, whereas for the operator trades it is.

[11] During two presentations to JCSP45 by CAF General/Flag Officers (GOFO) who were from operator trades, the author asked if the CAF needed officers who were specialists in emerging domains to lead in those domains. On both occasions the GOFOs did not think this was necessary, they felt that officers needed to be generalists and that the technical details should reside with the NCO corps.

[12] Department of National Defence, A-PA-005-000/AP-005, *Leadership in the Canadian Forces: Leading People* (Ottawa: DND, 2007), 10.

As stated in the thesis of this study, for new and rapidly evolving domains of warfare it is essential to have military officers with sufficient expertise in leadership roles at all levels in order to gain tactical warfighting advantage over adversaries – or at least achieve parity with them – while simultaneously operationalizing and institutionalizing those domains in the CAF with minimal time and effort wasted. Once the knowledge underpinning those domains has matured on a national and global scale it will become normalized within military education, as with other domains of warfare such as air power.[13] This ensures key capabilities and limitations from these new domains are understood by leaders across the CAF and allows them to judiciously request and employ capabilities from those domains jointly with those of the traditional domains, ensuring CAF military objectives are achieved. However, until this level of institutionalization and normalization is achieved, assigning leadership responsibilities at any level to those without the necessary expertise is counterproductive to force development efforts in these domains, and exposes the CAF to great risk in terms of its ability to defend Canada and Canada's credibility with allies.[14] To ensure relevance, the arguments also will be placed in the context of the contemporary political and security environment affecting the CAF and will be linked to current Government of Canada defence policy.

Canadian Defence Policy

In 2017 the Government of Canada released an ambitious new defence policy entitled "Strong, Secure, Engaged" (SSE). SSE is the first Canadian defence policy to officially acknowledge space and cyberspace as unique and independent operational

[13] Allan English, "Rethinking RCAF Senior Officer Professional Military Education in the 21st Century: Learning from the Past," *Royal Canadian Air Force Journal* 7, no. 1 (Winter 2018): 37, http://publications.gc.ca/collections/collection_2018/mdn-dnd/D12-16-7-1-eng.pdf.
[14] Department of National Defence, *Strong Secure Engaged: Canada's Defence Policy* (Ottawa: DND, 2017), 57.

domains.[15] It is also the only defence policy report explicitly stating the government's intent for the CAF to conduct operations in those domains in order to defend Canada and its interests, as well as those of its allies.[16]

In today's global security environment both state and non-state actors have identified western militaries' potential centre of gravity as being their use of, and reliance on, global connectivity to civilian and military information technology infrastructure.[17] It is therefore essential that Canada possess the means to prevent these actors from interfering with what is one of its greatest advantages, but also presents a significant vulnerability: the use of technology to partner with allies in order to conduct information enabled operations globally as an integrated and interoperable force.

Unfortunately, the CAF is already lagging behind both allies and adversaries, at least in the cyberspace domain. Although detailed information regarding the CAF's offensive and defensive cyberspace capabilities are classified, a 2019 report by the Canadian Association of Defence and Security Industries (CADSI) provides jarring insight into the state of affairs. It found that too much effort is focused on business continuity issues rather than on cyberspace operations, which "has left the CAF trailing allies and adversaries in certain cyber defence capabilities."[18] Although it is common knowledge that Russia and China are engaged in offensive cyber operations and cyber espionage, it is still concerning to hear that while they have been doing this successfully

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[15]Department of National Defence, *Strong Secure Engaged: Canada's Defence Policy* (Ottawa: DND, 2017), 56.
[16] *Ibid*., 56-57, 71-72.
[17] *Ibid.*, 56, 72; Max Boot, "The Paradox of Military Technology," *The New Atlantis*, no. 14 (Fall 2006): 14, https://www.thenewatlantis.com/docLib/TNA14-Boot.pdf.
[18] Canadian Association of Defence and Security Industries, *From Bullets to Bytes: Industry's Role in Preparing Canada for the Future of Cyber Defence* (Ottawa: CADSI, 2019), 4; Murray Brewster, "A Cyber War has Started and Canada Isn't Ready to Fight It, Says Report," Canadian Broadcasting Corporation, updated 8 April 2019, https://www.cbc.ca/news/politics/cyber-war-procurement-cadsi-1.5045950.

for years, "the CAF has only recently received approval to engage in active and offensive operations at scale…;" and, that "[a]dversaries and allies…deploy new cyber capabilities in months or weeks, while the CAF remains burdened by" procurement timelines that are years or decades long.[19]

As with all significant changes in the CAF, the ability to achieve the objectives of defence and deterrence in the emerging domains of space and cyberspace, as set out in SSE, depends heavily on having the right leaders in place at the operational and strategic levels to guide the CAF in achieving these goals. One of the critical questions becomes what level of expertise, or competency, does the CAF need in these leaders right now to ensure success in the future?

Emerging Domains

The "emerging domains" of warfare analyzed in this paper are space and cyberspace. However, the findings regarding leadership will be more broadly applicable to future emerging domains, if and when any emerge. Prior to engaging in a discussion about the leadership requirements for an emerging domain, it is first necessary to understand what constitutes a military domain and what qualifies a domain as emerging. Complicating this is the fact that at least in western military circles there is not an agreed upon definition of what constitutes an emerging domain.

The discussion of what defines a domain in the CAF (elaborated on in Chapter 1) is relatively immature. Many militaries have identified (outer) space and cyberspace as domains of warfare, which has led them to dedicate time, effort and resources to understand and gain superiority in them. The true impact these emerging domains will

[19] CADSI, *From Bullets to Bytes*…, 4.

have on the balance of global military power remains to be seen; however, by coupling the projected increases in investment in them with the role they already play in the traditional domains of operations, it is clear that their importance as separate domains will continue to grow as they mature.[20]

As a result of dedicated resource investment, these domains are experiencing a rapid evolution in their operationalization by many militaries - both in how they can be used to support other domains, and in how operations unique to those domains can be conducted. Some nations have progressed much further down this path than others, but all recognize the need to win the "arms race." Unfortunately, as stated previously, Canada is lagging behind its allies and adversaries in how quickly it is developing capabilities in these domains and in achieving operationalization of the domains. However, as can be seen in the discussion on "multi-domain operations," there has yet to be a consensus of what exactly a domain is.[21] This study will approach the thesis using the following methodology.

Methodology

In exploring the issue of leadership in emerging domains, first the term "emerging domain of operations" will be examined as there is no known definition for it at this time. Following that a review of leadership history and theory will be completed to establish a baseline from which to develop an objective methodology for determining if an emerging domain requires unique leadership considerations. Assuming that is the case then methodologies will be developed to allow the institution to understand what leadership

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[20] Jerry V. Drew, "Space, Cyber and Changing Notions of War," *Small Wars Journal*, accessed 23 May 2019, https://smallwarsjournal.com/jrnl/art/space-cyber-and-changing-notions-of-war.
[21] Michael Spirtas, RAND, "Toward One Understanding of Multiple Domains," last updated 2 May 2018, https://www.rand.org/blog/2018/05/toward-one-understanding-of-multiple-domains.html.

traits must be privileged over others and why, so as to ensure the proper leadership criteria are used for leader selection. The structure of the paper will be based on three chapters, as described below.

Chapter one will examine the term "emerging domain of operations," and its components in order to understand its meaning. The goal will be to find, or define, a suitable definition for this term based as much as possible on existing CAF, allied and alliance terminology at the national and alliance level. Since a suitable definition will not be forthcoming from existing terminology resources, one will be defined for the purposes of this paper using NATO terminology standards so that it can serve as a basis for future NATO terminology discussions.

Chapters two, three and four examine the history and evolution of leadership theory, and CAF leadership doctrine. Chapter two will leverage existing summaries of leadership theory to provide an overview of the evolution of leadership theory from its origins in the late 19th century up to the end of the 20th century; the focus of this chapter will be two-fold: identifying antecedent reasons for the belief that generalists make better senior leaders, and tracing the evolution of individual traits and characteristics. Chapter three will transition to a review of CAF leadership doctrine and theory, with the goal of finding evidence for or against the theory that generalists make better leaders in the military context, and to find factors or gaps that prevent dynamic adaptability to new leadership theories and requirements. Chapter four will review several contemporary leadership theories, with the objective of demonstrating that there is empirical evidence supporting the theory that specialists make better leaders than generalists in a number of situations.

Chapter five will consist of the analysis and recommendations. Here the findings from earlier chapters will be used to demonstrate the validity of the thesis that emerging domains of a technical nature require specialist leadership and prove that the status quo for leadership requirements and leader selection is insufficient for these domains. The findings of the previous chapters will enable the formulation of the concept that for any domain identified as an "emerging domain" it is necessary to objectively confirm if unique leadership requirements are required. This will necessitate processes that will allow a formal analysis of the requirements so that accurate leader selection criteria can be developed. This will permit senior leaders to take a risk-management approach to leader selection such that they can better balance the risk of selecting leaders for career progression vice advancement of institutional objectives, as these can be competing objectives in situations where sufficient human resources are lacking. The paper will conclude with a summary of key findings and recommendations, as well as thoughts on future research opportunities.

If the CAF expects to operate effectively in emerging domains of operations, as Canadian defence policy intends us to, it is essential that it have leaders capable of getting the force from an initial operational capability (IOC) to the point of full operational capability (FOC). But, before reviewing leadership theory or exploring the leadership needs of emerging domains of operations, it is necessary to understand the term "emerging domain of operations." Therefore, the first step in this study will be to determine what an emerging domain of operations is, as it seems there is no one person or organization who is certain of that.

CHAPTER ONE – EMERGING DOMAINS OF OPERATIONS

"Our language is funny – a 'fat chance' and a 'slim chance' are the same thing."

- Jens Gustav White

Introduction

The term "emerging domain of operations" has been used with increasing frequency in recent years by western nations, particularly when discussing the comprehensive exploitation of space, cyberspace, information, and human cognition for military purposes.[22] But what exactly is meant by this term from a military perspective?[23] This chapter will examine this contested term to determine if a suitable definition exists already. If not, one will be defined based on NATO standards, while making use of any applicable allied terminology.

First, the term will be deconstructed into its component parts and the English language definitions of them examined to assess if there are any glaring inconsistencies in their application. This will allow for the construction of an accurate definition rooted in terms that have specific and definitive meaning, if necessary. Following that, a comprehensive review of national and alliance military terminology and doctrine will be completed to look for existing definitions of the components of the term or uses of the component terms in other definitions. This chapter will also examine uses of the components in other fields to determine if there are useful deductions that will assist

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[22] The following terms, which are found in the academic literature and in national and NATO military doctrine, will be considered synonymous with "emerging domain of operations": emerging operational domain, emerging warfare domain, and emerging domain of warfare; David S. Alberts *et al*, *Understanding in Information Age Warfare* (Washington: CCRP Publication Series, 2001), 10-13. This publication contains references to the physical, information and cognitive domains in the context of the information warfare.

[23] Erik Heftye, RealClear Defense, "Multi-Domain Confusion: All Domains Are Not Created Equal," last modified 26 May 2017, accessed 5 February 2019, https://www.realcleardefense.com/articles/2017/05/26/multi-domain_confusion_all_domains_are_not_created_equal_111463.html

based on their usage. Upon completion of the review, useful findings will be consolidated and further assessed for usefulness. Finally, if a useful definition is not forthcoming from the terminology review then the terminology development standards in NATO Standard AAP-77 will be used to produce an intensional definition.[24] AAP-77 provides guidance for writing definitions and advises the use of "intensional definitions whenever possible," which consist of an optional "qualifier," a "superordinate term," and then any characteristics which differentiate it from other concepts.[25]

Domain and Environment

There appears to be considerable ambiguity about the meaning of the term "domain" amongst military theorists and professionals alike, as conveyed by Dr. Jared Donnelly and LCDR Jon Farley.[26] Furthermore, no formal definition has been agreed upon by NATO militaries nor is one to be found in national or alliance terminology resources.[27] In fact, not even the superordinate concept of a "domain" has a standardized

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[24] NATO, NATO Standard AAP-77, *NATO Terminology Manual*, ed. A v1 (Brussels: NATO Standardization Office, 2018), 36, https://www.natobilc.org/documents/AAP-77%20EDA%20V1%20E.pdf. In AAP-77, Annex A, p. A-1, an "intensional definition" is defined as: "a definition in which you start the definition with a superordinate term to situate the concept and then list the characteristics that distinguish the concept from other concepts. This is the type of definition that most clearly describes a concept within a concept system and is the preferred method."

[25] NATO, NATO Standard AAP-77…, 36.

[26] Jared Donnelly and Jon Farley, Over-the-Horizon Journal, "Defining the "Domain" in Multi Domain,", last modified 17 September 2018, accessed 5 February 2019, https://othjournal.com/2018/09/17/defining-the-domain-in-multi-domain; Erik Heftye, RealClear Defense, "Multi-Domain Confusion: All Domains Are Not Created Equal."

[27] No definition was found in any of the following resources: Government of Canada, "Termium Plus", last modified 4 May 2019, https://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=domain&index=alt&codom2nd_wet=EI#resultrecs; Department of National Defence, B-GJ-005-000-FP-001, *CFJP 01 – Canadian Military Doctrine* (Ottawa: DND, 2011); Department of National Defence, B-GJ-005-300-FP-001, *CFJP 3.0 – Operations* (Ottawa: DND, 2011); NATO, AAP-06, *NATO Glossary of Terms and Definitions (English and French)*, ed. 2018 (Brussels: NATO Standardization Office, 2018); New Zealand Defence Force, *New Zealand Defence Force Doctrine (NZDDP-D)*, ed. 4 (Wellington: HQ New Zealand Defence Force; 2017); UK Ministry of Defence, Joint Doctrine Publication 0-01.1, *UK Terminology Supplement to NATOTerm*; Australian Defence Force, *Land Warfare Doctrine 3-0 – Operations*, ed. 2018; United States of America Department of Defence, *DOD Dictionary of Military and Associated Terms* (USA: DoD, April 2019).

definition amongst NATO nations.[28] If the lack of a common definition for the term "domain" – which is used extensively throughout national and alliance doctrine - is not concerning enough, consider that this term is often, but inconsistently, used interchangeably with "environment."[29] This imprecision clearly indicates a lack of rigour in terminology development and usage but what are the implications for leadership in these "emerging domains?"

This issue does have specific implications for the CAF and raises several questions. What is the meaning of this term for the CAF? And, as it relates to military leadership among other things, should its use have specific and definable force development implications? Or, is it just going to remain one of many popular military buzz-phrases that is devoid of true meaning, but which garners internal and external attention? Unfortunately, it appears the latter is true for the CAF and its NATO allies.[30]

In an effort to avoid the latter implication for the CAF, in this chapter the term "emerging domain of operations" will be analyzed, and if necessary defined, to ensure consistency in its meaning so it can be used without confusion in the context of this study. It is important to establish a common understanding of what an "emerging domain of

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[28] In not finding a common definition for "domain" the author refers to the same resources as were examined when looking for a definition of "emerging domain of operations." Defining "superordinate:" NATO, NATO Standard AAP-77, *NATO Terminology Manual*, ed. A v1 (Brussels: NATO Standardization Office, 2018), 3-4. This publication defines "superordinate" within the "concept system" of terminology as follows: "The fundamental elements of terminology are the concept, the designation and the definition. A concept, or notion, is a mental representation of something that can be considered a unit of knowledge which usually exists in relation to other concepts which collectively form a concept system. In such a system, concepts are ranked in descending order from the most general to the most particular. A concept which is ranked higher (more general) is called the superordinate concept. A lower-ranked concept (more particular) is called the subordinate concept. Subordinate concepts at the same level and having the same criterion of subdivision are called coordinate concepts.

[29] In stating that "domain" and "environment" are inconsistently used interchangeably the author refers to the same resources as were examined for the definitions of "domain" and "emerging domain of operations."

[30] Erik Heftye, RealClear Defense, "Multi-Domain Confusion: All Domains Are Not Created Equal." The problem of overuse of "buzz-phrases" was independently identified by the author; however the problem was also articulated by Heftye.

operations" is so that one can be differentiated from established domains in a way that is objective, systematic and repeatable. This will then allow objective differentiation of specific characteristics and requirements of that domain, such as leadership, from those of established domains in a way that is useful for decision-making. Any other approach would produce subjective results which cannot be substantiated and are open to repudiation.

Term Deconstruction and Component Meanings

This section will deconstruct the term "emerging domain of operations" and define the component parts using the online Oxford English Dictionary (OED). The aim is to analyze each component's definition to determine if there are obvious misuses leading to ambiguity. The component terms will be defined and analyzed in decreasing order of their lifespan in military terminology.

Emerging Domain of Operations

The OED did not provide a definition for this term as a whole, however definitions of its component terms are found below.

Operation

The definition of this component, "an organized activity involving a number of people," is clear and should not result in ambiguity; however, it is not necessary for a military operation to involve "a number of people" although they usually do.[31] This

[31] Oxford Dictionaries, "English Oxford *Living* Dictionary," *operation*, def. 3, https://en.oxforddictionaries.com/definition/domain.

point notwithstanding, it will be shown that this definition is consistent with the NATO definition.[32]

Domain

"A specified sphere of activity or knowledge."[33] In the context of describing military operations the more relevant element of this definition is "a specified sphere of activity." However, this definition is a source of considerable ambiguity when considered as part of the whole term "emerging domain of operations." Presumably "sphere" is used conceptually and not meant literally in the geometric sense, so the "specified sphere of activity" must be subordinate to a conceptual "sphere of activity" that is "less-specific" or "generalized." Is this "generalized sphere of activity" also considered a domain or is there a unique term that distinguishes it from the subordinate sphere(s); and, is there an upper-bound to the "sphere(s) of activity"; if so, what term is used to describe it – i.e. is there a "universal" or "maximal sphere of activity" that is superordinate to all elements in a given hierarchy of "spheres of activity?"[34] An additional issue this definition fails to address is whether there can be multiple coordinate "spheres of activity" within a given superordinate "sphere," and, if so, whether there is a mechanism or characteristic(s) by which they are demarcated from each other.

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[32] NATO, AAP-06, *NATO Glossary of Terms and Definitions (English and French)*, ed. 2018 (Brussels: NATO Standardization Office, 2018), 91.
[33] Oxford Dictionaries, "English Oxford *Living* Dictionary," *domain*, def. 1.1, https://en.oxforddictionaries.com/definition/domain. Erik Heftye, RealClear Defense, "Multi-Domain Confusion: All Domains Are Not Created Equal." Heftye refers to a similar definition from the Merriam-Webster dictionary in his article.
[34] NATO, NATO Standard AAP-7…, 3-4.

Emerging

"Becoming apparent or prominent."[35] In the context of describing military operations both elements of this definition could be applicable, although less so the "prominent" element. The element "becoming apparent" is applicable because it articulates the sense of gradual, but growing, realization that something which was not perceived as being a "domain of operations" is or will be one. The element "becoming prominent" is applicable because it articulates the possibility that something which was not important, in this case a formerly unknown domain of operations, is gaining importance. Although both elements are applicable to the term "emerging domain of operations" neither fully captures the intended meaning, therefore this component term is also a source of ambiguity.

National and Alliance Terminology

In this section the national and alliance definitions of the term and its components for Canada, NATO, Australia, New Zealand, the United Kingdom and the United States of America will be consolidated in Table 1.1. They will then be analyzed for similarities with the definitions from the previous section and between each other to find any patterns or consensus in definitions. Any findings of interest will be summarized at the end of the section.

[35] Oxford Dictionaries, "English Oxford *Living* Dictionary," *emerging*, https://en.oxforddictionaries.com/definition/emerging.

Table 1.1 – National and Alliance Definitions

Nation/ Organization	"Emerging Domain of Operations"	Operation	Domain	Emerging
CAF	No records were found.[36]	"A combination of activities with a common purpose or unifying theme."[37]	"A sphere of activity, influence or knowledge related to a specific physical or conceptual property."[38]	No definition but makes reference to a 1995 IMF paper on emerging equity markets.[39]
NATO	No records were found.[40]	"A sequence of coordinated actions with a defined purpose."[41]	"A specific field of knowledge or expertise."[42]	No definition found.[43]
Australia	No definition found.	"A designated military activity using lethal and/or nonlethal ways and means to achieve directed outcomes in accordance with national legal obligations and constraints."[44]	"…the physical or conceptual areas in which human activity and interaction occurs, including the four environmental domains of maritime (including subsurface), land, air and space, and the three non-environmental domains of cyberspace, the electromagnetic spectrum, and information."[45]	No definition found.

[36] Government of Canada, "TERMIUM Plus," *emerging domain of operations and alternates*, searched on 6 May 2019, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=emerging+domain+of+operations&index=alt&codom2nd_wet=EI#resultrecs.
[37] Government of Canada, "TERMIUM Plus," *operation*, last modified 25 February 2014, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=operation&index=alt&codom2nd_wet=EI#resultrecs.
[38] Government of Canada, "TERMIUM Plus," *domain*, last modified 4 December 2013, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=domain&index=alt&codom2nd_wet=EI#resultrecs.
[39] Government of Canada, "TERMIUM Plus," *domain*, last modified 31 January 1995, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=emerging&index=alt&codom2nd_wet=EI#resultrecs.
[40] NATO, "NATOTerm," *emerging domain of operations*, accessed 6 May 2019, https://nso.nato.int/natoterm/Web.mvc
[41] NATO, "NATOTerm," *operation*, last updated 10 April 2014, https://nso.nato.int/natoterm/Web.mvc
[42] NATO, "NATOTerm," *domain*, last updated 1 March 2005, https://nso.nato.int/natoterm/Web.mvc
[43] NATO, "NATOTerm," *emerging*, accessed 6 May 2019 , https://nso.nato.int/natoterm/Web.mvc
[44] Australian Defence Force, *Land Warfare Doctrine 3-0 – Operations*, ed. 2018, 6, https://www.army.gov.au/sites/g/files/net1846/f/lwd_3-0_operations_full.pdf.
[45] Australian Defence Force, *Land Warfare Doctrine 3-0 – Operations*, ed. 2018, 13, https://www.army.gov.au/sites/g/files/net1846/f/lwd_3-0_operations_full.pdf.

Nation/ Organization	"Emerging Domain of Operations"	Operation	Domain	Emerging
New Zealand	No definition found.	1. A military action or the carrying out of a strategic, tactical, Service, training, or administrative military mission.[46] 2. The process of carrying on combat, including movement, supply, attack, defence and manoeuvres needed to gain the objectives of any battle or campaign.[47]	No definition found.	No definition found.
United Kingdom	No definition found.	The UK adopts NATO terminology and provides a *UK Terminology Supplement to NATOTerm* for terminology not defined by NATO, or where UK defines the term differently.	Discrete spheres of military activity within which operations are undertaken to achieve objectives in support of the mission. Note: The operational domains are maritime, land, air, space, and cyber and electromagnetic. (JDCB Agreed)[48]	No definition found.
United States of America	No definition found.	1. "A sequence of tactical actions with a common purpose or unifying theme. (JP 1)."[49] 2. "A military action or the carrying out of a strategic, operational, tactical, service, training, or administrative military mission. (JP 3-0)."[50]	No specific definition provided but separate domains are defined by physical or virtual boundaries and a domain is generally described as: "a useful construct for visualizing and characterizing the physical environment in which operations are conducted."[51]	No definition found.

[46] New Zealand Defence Force, New Zealand Defence Doctrine (NZDDP-D), ed. 4 (Wellington: HQ New Zealand Defence Force, 2018), 84.
[47] *Ibid*.
[48] UK Ministry of Defence, Joint Doctrine Publication 0-01.1, *UK Terminology Supplement to NATOTerm*, ed. A, (Arncott: MoD, 2019), 41. Note, this is the definition for "operational domains" not just "domains."
[49] United States of America Department of Defence, *DOD Dictionary of Military and Associated Terms* (USA: DoD, April 2019), 163.
[50] *Ibid.*
[51] *Ibid*., IV-9.

Analysis

Emerging Domain of Operations

There was no definition found in the terminology or doctrine of any of the nations or NATO and it appears that NATO does not use the term "domain" in the same way as the nations do in their terminology. A lack of any form of definition will make it very difficult for nations to agree on other terms or doctrine that makes use of this term. It is therefore essential to develop a common definition for this term; however, to do so the component terms must be analyzed first to confirm if they are defined consistently.

Operation

The CAF, NATO, UK and first US definitions are similar to each other, and to an extent the OED definition as well. This is because they are all generalized and do not use specific military terminology such as combat, but there are three key differences. The first is that the OED defines an operation as a single "activity" whereas the CAF, NATO, UK and US define it as being multiple "activities" or "actions" that are coordinated in some way.[52] A second difference is that the OED refers to a "number of people" being involved whereas the other four make no mention of numbers of personnel required.[53] The third key difference is that because the OED definition only refers to one activity, there is no concept of a unifying purpose, whereas the others refer to some form of

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[52] Oxford Dictionaries, "English Oxford *Living* Dictionary," *operation*, def. 3, https://en.oxforddictionaries.com/definition/domain; Government of Canada, "TERMIUM Plus," *operation*, last modified 25 February 2014, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=operation&index=alt&codom2nd_wet=EI#resultrecs; NATO, "NATOTerm," *operation*, last updated 10 April 2014, https://nso.nato.int/natoterm/Web.mvc; United States of America Department of Defence, *DOD Dictionary of Military and Associated Terms* (USA: DoD, April 2019), 163.

[53] *Ibid*.

"common purpose," "unifying theme," or a "defined purpose."[54] This last difference is the most significant break from the OED definition as it alludes to the possibility of having disparate activities or actions taking place that will all contribute to achieving a common objective.

Amongst the national and alliance definitions there are further differences. The CAF definition is slightly different in that it uses "a combination" as a qualifier for the multiple "activities" while the NATO, UK and US definitions use "a sequence" as a qualifier for the multiple "actions," with the US including "tactical" as an additional qualifier to the "actions."[55] The use of "sequence" by NATO, UK and US implies a more rigid adherence to a specific time-bound order for the completion of actions, whereas the CAF use of "a combination" implies the need to do many things together but is less rigidly time-bound.[56]

The primary AUS and NZ definitions differ significantly from the NATO definition and those of the other nations in that they make use of much more militaristic terminology. In their definition the Australians qualify the single "activity" to be completed with the term "A designated military" preceding it, this makes it clear that it is an activity that only the military can conduct.[57] In addition, the AUS definition

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[54] *Ibid*.
[55] Government of Canada, "TERMIUM Plus," *operation*, last modified 25 February 2014, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=operation&index=alt&codom2nd_wet=EI#resultrecs; NATO, "NATOTerm," *operation*, last updated 10 April 2014, https://nso.nato.int/natoterm/Web.mvc; United States of America Department of Defence, *DOD Dictionary of Military and Associated Terms* (USA: DoD, April 2019), 163.
[56] *Ibid*.
[57] Australian Defence Force, *Land Warfare Doctrine 3-0 – Operations*, ed. 2018, 6, https://www.army.gov.au/sites/g/files/net1846/f/lwd_3-0_operations_full.pdf.

incorporates the terms "lethal" and "non-lethal."[58] As this is terminology commonly associated with military targeting processes, the inclusion of "lethal" and "non-lethal" goes to further militarize their definition of an operation.[59] Interestingly, the NZ definition is the only one which states that an operation is a "process."[60] They define it as the "process of carrying on combat" and incorporate a number of other militarized terms such as "manoeuvre," "attack," and "defence."[61] Their definition concludes with a militarized unifying statement which states that the aforementioned actions are completed in order to "gain the objectives of any battle or campaign."[62]

Finally, NZ and the US, which each list two different definitions of "operation" also have one of them in common.[63] This secondary definition appears to be an attempt to broaden the scope of an operation significantly so that it can account for any military activity, at any level. It includes the terms "training" and "administration" as activities to be conducted in the completion of a mission.[64]

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[58] *Ibid*.
[59] Australian Defence Force, *Land Warfare Doctrine 3-0 – Operations*, ed. 2018, 6, https://www.army.gov.au/sites/g/files/net1846/f/lwd_3-0_operations_full.pdf.
[60] New Zealand Defence Force, New Zealand Defence Doctrine (NZDDP-D), ed. 4 (Wellington: HQ New Zealand Defence Force, 2018), 84, definition 2.
[61] *Ibid*.
[62] *Ibid*.
[63] *Ibid*., definition 1; United States of America Department of Defence, *DOD Dictionary of Military and Associated Terms* (USA: DoD, April 2019), 163.
[64] *Ibid*.

Domain

The most common themes observed in the definitions are the use of the term "sphere" which aligns with the OED definition.[65] Additionally, the use of terms such as "activity," "influence," and "interact" indicate that more than just "actions" are conducted by militaries within the sphere.[66] Finally, there is a sense that environments and domains are linked in that an environment can be encompassed completely by a domain, but it can also be subdivided into multiple domains.

Emerging

Neither the nations nor NATO provide a definition for "emerging" in their terminology or doctrine.

Recommendations

In this section definitions in line with NATO AAP-77 are proposed for "domain," "domain of operations," and "emerging domain of operations," and affiliated terms such as "operational domain." The NATO standard recommends that whenever possible intensional definition be developed for new terminology, a depiction of how to construct an intensional definition is found at figure 1.[67]

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[65] Oxford Dictionaries, "English Oxford *Living* Dictionary," *domain*, def. 1.1, https://en.oxforddictionaries.com/definition/domain; Government of Canada, "TERMIUM Plus," *domain*, last modified 4 December 2013, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=domain&index=alt&codom2nd_wet=EI#resultrecs; UK Ministry of Defence, Joint Doctrine Publication 0-01.1, *UK Terminology Supplement to NATOTerm*, ed. A, (Arncott: MoD, 2019), 41. Note, this is the definition for "operational domains" not just "domains."

[66] Government of Canada, "TERMIUM Plus," *domain*, last modified 4 December 2013, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=domain&index=alt&codom2nd_wet=EI#resultrecs; Australian Defence Force, *Land Warfare Doctrine 3-0 – Operations*, ed. 2018, 13, https://www.army.gov.au/sites/g/files/net1846/f/lwd_3-0_operations_full.pdf; UK Ministry of Defence, Joint Doctrine Publication 0-01.1, *UK Terminology Supplement to NATOTerm*, ed. A, (Arncott: MoD, 2019), 41. Note, this is the definition for "operational domains" not just "domains."

[67] NATO, NATO Standard AAP-77…, A-1.

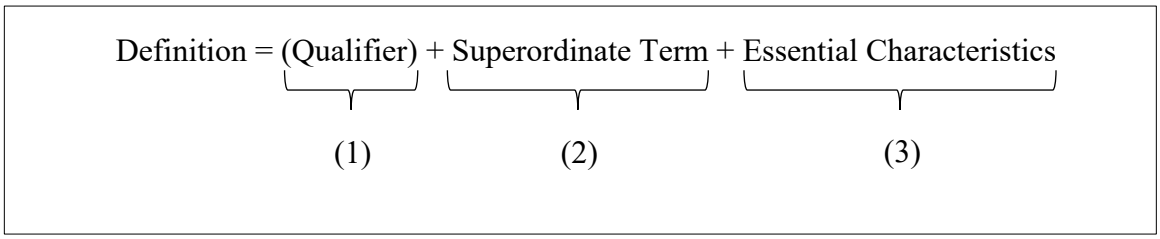

Figure 1.1 – Structure of an Intensional Definition[68]

Proposed Definition – "Domain"

The conceptualization of all or part of an environment as a sphere that is subject to natural and/or human influence, which can be interacted with by parties using natural or man-made capabilities, and within or through which, parties may interact with each other or other objects.

The definition is based on the superordinate term "environment" because the universe is perceived as being sub-divided into different environments based on physical or non-physical differences between them. Therefore, it encompasses everywhere that militaries currently operate but also everywhere that they could operate in the future if science uncovers or creates new environments. This applies directly to the concept of the emerging domain of cyberspace, which was created to account for the man-made environment of cyberspace. To further demonstrate the applicability, a possible future environment could be the quantum environment, and a decision would then need to be made as to whether or not the military will conduct operations in that environment, in which case a new domain of operations would be created to account for that.

The term "conceptualized" is a qualifier that makes it understood that a domain is conceptual in nature and thus it exists as a human construct. It is used in association with the term "sphere" because a domain needs to be conceived as consisting of everything

[68] *Ibid*., 36.

that could be associated with it down to the most minute object or insignificant action. A sphere is applicable because although it is bounded, it is the geometric form associated with being "all-encompassing." This is because it contains the most volume for a given fixed dimensional variable, the radius, which makes it more all-encompassing than a cube, cylinder, etc., for a given fixed dimension.

"Subject to natural and/or human influence," reflects the fact all environments can be altered, temporarily or permanently, by natural and/or human influences and that this extends to the domains as well. On the side of natural influence, it includes things such as weather, erosion, electromagnetic interference, and any other natural force or phenomena. For human influence it includes human acts that change the state of an environment, such as pollution and construction amongst many others for the traditional physical environments; and, for cyberspace it could include adding new protocols, massive changes as a result of new developments such as quantum computing, and a myriad of other things based on new scientific advancements.

Finally, "parties" is used to reflect that within a domain any number of actors such militaries, other government departments or agencies, the public and non-state actors, can be present. And, these parties can interact with the environment itself, objects within it and with each other, through natural capabilities such as speaking or using man-made capabilities such as frigates, tanks, aircraft, or hardware and software.

As this definition is the foundation for the others it must be general enough to allow for adaptation, but it must clarify what a domain is so that the other definitions that build upon it are clearly articulated.

Proposed Definition – "Domain of Operations"[69]

A domain within which one or more parties may function independently or in coordination with another(s) in order to complete one, or a combination of, activity(ies) that will create effects which will result in the achievement of military operational objective(s).

This merges the proposed definition of a domain with a generalized definition of what an operation is based on the most relevant elements of the definitions from allies and NATO.[70] The term "function" is used vice "manoeuvre" because it does not apply in all domains, for example in cyberspace one does not physically manoeuvre. The term "combination" is used where more than one activity is to be completed because it represents that these activities could be organized and executed in any manner, including sequentially. This results in creating "effects" as per contemporary military doctrine wherein militaries create effects which result in the accomplishment of objectives with a view to having operational success.

Proposed Definition – "Emerging Domain of Operations"

A proposed domain of operations that differs from established domains based on a need for new capabilities and/or operating concepts, which may not exist yet and which have not been operationalized or institutionalized, in order to interact with the domain and to conduct activities in or through it.

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[69] The terms operational domain and others would be covered by this definition as well.
[70] Government of Canada, "TERMIUM Plus," *operation*, last modified 25 February 2014, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=operation&index=alt&codom2nd_wet=EI#resultrecs; NATO, "NATOTerm," *operation*, last updated 10 April 2014, https://nso.nato.int/natoterm/Web.mvc; United States of America Department of Defence, *DOD Dictionary of Military and Associated Terms* (USA: DoD, April 2019), 163.

Although there is no clear use of "emerging" in military literature, it is assessed that it is being used as a qualifier for new environments within which military operations can or could be conducted. Or, to describe the less likely situation of an established environment that is suddenly subject to rapid evolution due to a significant change such as a new operational or social paradigm or a significant technology advancement.

"Proposed" is used as a qualifier because an emerging domain of operations may not necessarily become one. "Established" is inserted as a qualifier to ensure the distinction between already existing domains. The definition then provides characteristics that distinguish an emerging domain from established domains, which is that there are capabilities or operating concepts that make it unique from other domains and which are necessary in order to conduct operations within it.

Implications for Leadership

The implications for leadership are significant in that the proposed definition has consequences for force development and for the conduct of operations. The CAF has had to invest significantly from a leadership perspective just to begin understanding what the implications are in the cases of space and cyberspace. As that analysis progresses there will be further implications, and one significant impact has already been seen in the formation of a new Cyber Operator (Cyber Op) trade.[71] Labelling something an "emerging" domain has significant leadership implications because it necessitates developing an understanding of that domain, often while trying to determine how to operate within it.

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[71] CANFORGEN 162/17 CFD 004/17 281416Z SEP 17, Cyber Operator (Cyber Op) MOSID 00378 – Applicant Solicitation.

The need for specialist leadership in emerging domains stems primarily from the need for "new capabilities or operating concepts" that are unique to these domains. This paper has proposed that determining whether an emerging domain requires specialist leadership is based on an objective analysis of the domain itself. Two of the critical factors in that analysis are the nature of the new capabilities and operating concepts. The more they depart from those of established domains, the more likely the need for specialists to take on the leadership roles because it would simply take a generalist too long to learn enough about the domain to understand the nuances that are needed for effective decision making.

Conclusion

In this chapter the contentious term "emerging domain of operations" was examined in order to determine if sufficient consensus existed between military definitions to accept one for the purposes of this paper. A review of allies' and NATO terminology revealed that "emerging domain" is not in the lexicon at all. Furthermore, it was not possible to find a common definition for the term "domain" amongst Canada's closest allies, with the exception of the US and NZ which share a secondary definition for the term domain. By analyzing the terminology in use, as well as formal English definitions of the component words, definitions were proposed for "domain," "domain of operations," and "emerging domain of operations." These were developed based on NATO Standard AAP-77's process for constructing intensional definitions. This will ensure that there is no confusion with respect to this term throughout the remainder of the study, and it is recommended that these definitions be used as a basis for discussion within the CAF for developing doctrinal definitions for these terms. With the term "emerging domain of operations" defined it is now possible to examine leadership theory

and apply it to understanding the leadership needs of emerging domains. The next chapter will consist of a review of the evolution of leadership theory from its origins in the late 19th century until the end of the 20th century.

CHAPTER TWO – LEADERSHIP LITERATURE REVIEW

Leadership is one of the most observed and least understood phenomena on earth.

- James MacGregor Burns, *Leadership*

Introduction

The next three chapters will focus on leadership theory, beginning with a review of the history of leadership research to understand where it started and where it is now. The next chapter will be a review of the most recent CAF leadership publications in order to place the reader on solid footing with respect to the CAF model of military leadership and the responsibilities of CAF leaders. With the CAF perspective established, the stage will be set the stage for the final component of the review which will look at several areas of modern leadership research related to individual differences and the core topic of generalist and specialist leaders. Since there is literature supporting both sides of the argument, a thorough examination is required to demonstrate that in certain situations specialists, due to their expertise, will have a higher probability of achieving desired organizational outcomes when compared to generalists. The key findings will then be used in the analysis to demonstrate the validity of the thesis.

By the end of these chapters it should be clear that with leadership, as with all other fields of study dealing with human behaviour and social interaction, there is not a "one size fits all" solution when it comes to choosing between a generalist or a specialist for leadership positions. This idea will form the basis from which to apply the findings to emerging and dynamic domains of warfare, specifically cyberspace and space, and demonstrate that given their novelty as domains of military operations and the speed with which they are changing, the CAF needs military leaders specializing in these domains in the appropriate leadership positions if it is to keep pace with allies and adversaries alike.

As stated, the current chapter will review the literature on leadership in order to sift through the myriad theories, concepts and models to identify those relevant to the problem in question: is it advantageous for the CAF to employ specialist military leaders at all levels in emerging domains of operations? The objective of this chapter is to provide an overview and summary of the history and evolution of leadership theory from its origins to the end of the 20th century, identifying information that is pertinent to the thesis.

The History of Leadership Science – A Primer

The Study of Leadership is Really New…So What?

Scattered throughout humankind's history are the musings of many great thinkers and philosophers, including Plato, Sun Tzu, and Niccolò Machiavelli, on leaders and leadership.[72] It is clear, however, that leadership was not the primary topic of discussion in their writings and debates; rather it was commented on in the context of their hypotheses in other fields such as philosophies of society, justice, and politics in some cases, and conflict and war in others.[73] Therefore, despite a long history of inclusion within the discourse of numerous other fields in what became the social and behavioral

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[72] Plato, *The Republic*, ed. and trans. by Benjamin Jowett (Public Domain USA: The Gutenberg Project, 1998), 333, http://www.idph.net/conteudos/ebooks/republic.pdf; Sun Tzu, *The Art of War*, ed. and trans. by Samuel B. Griffith (New York: Oxford University Press, 1963), 65, 84, 87-88; Niccolo Machiavelli, *The Prince*, ed. and trans. by W.K. Marriott (Public Domain Australia: Planet Ebook, 2018), 40-44 & 87-119, https://www.planetebook.com/free-ebooks/the-prince.pdf.

[73] In *The Republic*, Plato indirectly discusses leadership when he explains the concept of the "philosopher kings" whose role would be to rule because of their dedication to knowledge and the truth; however, this is primarily a philosophical study of justice, ethics and society, not leadership. In *The Art of War*, Sun Tzu discusses the characteristics and responsibilities of rulers and, generals or commanders, so one can see an overlap with leadership when viewed from a contemporary perspective; however, this is primarily a study of the conduct of war, not leadership. In *The Prince*, Niccolò Machiavelli is slightly more direct in addressing some aspects of leadership in that he discusses strategies to remain in power depending on the manner in which "principality" was obtained and, how to avoid rebellion or insurgencies by not provoking hatred amongst the population; however, this is primarily a study of the retention and use of power not leadership.

sciences, the academic study of leadership itself is a very recent phenomena.

It is so new in fact that in a 1990 paper Albert S. King noted that although Ralph Stogdill (in 1974) found the term "leadership" existed as far back as the late 1700s, Bernard Bass (in 1981) determined that it did not become a topic of research until the early 20th century.[74] By way of comparison it has been argued that the social sciences, broadly speaking, found their scientific footing in Europe during the Renaissance of the 14th-17th centuries; while, the behavioral sciences can trace their scientific roots back as far as the Enlightenment of the 17th century to the philosophical analysis of René Descartes resulting in his dualism framework which was the forbearer of Wilhelm Wundt's work during the mid-1800s resulting in the publication of "Principles of Physiological Psychology" in 1874.[75] The extent to which leadership was included, even if only indirectly, within treatises on topics in the aforementioned fields is indicative of its fundamental importance in group behavior and social constructs. Simultaneously it can see that the gap between its initial use and its adoption as an important field of academic research are indicative of its elusiveness to human understanding. But why is it important to know that the study of leadership is so new and is not easy?

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[74] King, Albert S. "Evolution of Leadership Theory," *Vikalpa* 15, no. 2 (April 1990): 43, https://journals.sagepub.com/doi/pdf/10.1177/0256090919900205. Ralph Stogdill and Bernard Bass contributed significantly to the literature on leadership and management. Between them they have published numerous books and articles on the subjects of leadership and management, and a review of Google Scholar indicates that both have been cited thousands of times.

[75] Waldemar Voisé, James H. Labadie, "The Renaissance and the Sources of the Modern Social Sciences," *Diogenes* 6, no. 23 (September 1958): 45, https://doi.org/10.1177/039219215800602304; William Bristow, "Enlightenment", *The Stanford Encyclopedia of Philosophy* (Fall 2017), ed. by Edward N. Zalta, https://plato.stanford.edu/archives/fall2017/entries/enlightenment; Psychology Research and Reference, "Psychology during Renaissance and Enlightenment," accessed 25 April 2019, https://psychology.iresearchnet.com/history-of-psychology/renaissance-enlightenment; Psychology Research and Reference, "The Scientific Revolution," accessed 25 April 2019, http://psychology.iresearchnet.com/history-of-psychology/renaissance-enlightenment/the-scientific-revolution; Kendra Cherry, "The Origins of Psychology," updated 9 March 2019, https://www.verywellmind.com/a-brief-history-of-psychology-through-the-years-2795245.

As can be expected in studying any difficult problem consensus is hard to come by. This is especially true for a field that is very new; that has complex intersectionality with numerous other fields; and, where experimental testing of leadership theories can be difficult without applying them to real-world situations which can be risky for the individual and the organization – especially in a military context.[76] Leadership research and literature is replete with ongoing debates about virtually all aspects of leadership research: from the very nature and definition of leadership which continues to evolve; to theories about the types of leadership approaches and the factors influencing leadership effectiveness; and, to the conceptual tools developed to assist leaders in selecting the most appropriate leadership approach for a given situation so they can apply it effectively to achieve a desired outcome.[77] A way to visualize the current understanding of leadership might be to say: a pebble has been tossed into a pond and theorists are now busying themselves with trying to understand the ripples on the surface, but they have no idea what is going on beneath the surface or how deep the pond is. So, there is still a lot that is unknown about leadership which is concerning when considering the monumental impact leaders anywhere in the world, good or bad, can have on virtually everything that is important to humanity and the world it inhabits.

Although its not clear precisely where the study of leadership is headed or when a significant finding might change existing paradigms, that does not mean the CAF should sit idly until a "perfect" model is found. The low probability of finding the perfect model

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[76] Michael Dunn, "How do we Acquire Knowledge in the Human Sciences?," last modified 10 May2013, https://www.theoryofknowledge.net/areas-of-knowledge/the-human-sciences/how-do-we-acquire-knowledge-in-the-human-sciences

[77] Peter G. Northouse, *Leadership: Theory and Practice*, 7th ed. (Los Angeles: SAGE Publications, 2016), 2-9.

notwithstanding, the fact is that even if found it would never fully resolve inadequate leadership outcomes. Tom Karp, of the Kristiania University College in Oslo, addresses this in discussing the concept of "good-enough" leadership.[78] He states that since it is known people and organizations are imperfect, it is impossible to achieve perfect outcomes through leadership, no matter how well the underlying science is understood.[79]

This brings us back to the question of why it is important to understand that the study of leadership is new and evolving rapidly. The answer is because of how important it is to make the best possible decisions concerning all aspects of leadership in the CAF. A future section dedicated to CAF leadership will demonstrate that in addition to being "command-centric," the CAF is also a leader driven organization. This is because appointed and *emergent* leaders at all levels can influence the people and the institution considerably, both now and into the future.[80] Consequently, the risks to mission success – and by extension national security – are disproportionately high if mistakes are made in identifying CAF leadership requirements and leader selection criteria. It is therefore essential to consider all relevant leadership research when formulating opinions which shape CAF leadership decisions. It should not be satisfactory to rely on potentially outdated theories or accept the status-quo. This is especially true in emerging domains where getting it wrong early can make it impossible to catch up. That is not to say the conclusions of this paper should be accepted without a critical eye, only that they should

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[78] Tom Karp, "We Are Asking the Wrong Question about Leadership: The Case for 'Good-Enough' Leadership," in *Dark Sides of Organizational Behavior and Leadership*, ed. by Maria Fors Brandebo (Public Domain: IntechOpen, 2019), 55-59. https://www.intechopen.com/books/dark-sides-of-organizational-behavior-and-leadership/we-are-asking-the-wrong-question-about-leadership-the-case-for-good-enough-leadership

[79] *Ibid*, 48-52.

[80] Department of National Defence, A-PA-005-000/AP-004, *Leadership in The Canadian Armed Forces: Conceptual Foundations* (Ottawa: DND Canada, 2005), 6.

not discarded out of hand because of a bias towards antiquated ideas of military leadership that may have been superseded. With this in mind the history of leadership research will be examined in more detail with a view to understanding the key phases in its evolution and to highlight elements pertinent to this study.

Leadership Research – An Evolution Story

Much has been written about the history and evolution of leadership research.[81] In the 2016 edition of his book, *Leadership*, Peter Northouse provides two interesting quantitative measures. First he notes that in 1991 Joseph C. Rost "found more than 200 different definitions of leadership" by analyzing leadership literature published between 1900-1990.[82] Second, he notes that in a separate 1991 publication Fleishman, et al, found that "as many as 65 different classification systems" for leadership dimensions had been developed over the previous 60 years.[83] These metrics underscore the pace of evolution in leadership research, but also the degree to which the evolution itself has been catalogued and documented. They also make it clear that a comprehensive review is a significant undertaking that could be overwhelming for a reader. To avoid this and ensure the most important studies are considered the author borrows heavily from three works in discussing the evolution of leadership research: Albert S. King's 1990 article which maps leadership theories developed between 1900-1990 to eras and periods of leadership research (see Annexes A and B); Jessica E. Dinh, et al, for theories developed

[81] To list a few: Ralph M. Stogdill (1974), Bernard Bass & Ralph M. Stogdill (1990), Albert S. King (1990), Joseph C. Rost (1991), Peter G. Northouse (1997-2018), Nitin Nohria & Rakesh Khurana (2010) and Jessica E. Dinh et al (2014).
[82] Peter G. Northouse, *Leadership: Theory and Practice*, 7th ed. (Los Angeles: SAGE Publications, 2016), 2.
[83] *Ibid*, 5.

in the 21st century; and, Peter G. Northouse throughout.[84]

The Personality Era

The Great Man Period.

The first era of leadership research defined by King was the "Personality Era" which consisted of the "Great Man" and "Trait" periods.[85] In the beginning there was the "Great Man Theory." As far as is known this is the first theory of leadership, although it is regarded by most modern scholars as a faith-based statement of opinion rather than a rigorously researched scientific theory.[86] It is attributed to Scottish historian Thomas Carlyle based on a series of six public lectures he gave in early 1840 and the associated volume, *On Heroes, Hero-Worship, and the Heroic in History*, published the following year.[87] During the lectures Carlyle asserted "that certain individuals, certain men, are gifts from God placed on earth to provide the lightening needed to uplift human existence."[88] Given the context of the talks it is unlikely that he set out to create a leadership theory in the strictest sense. He was explaining a theory of history wherein specific individuals were responsible for significant historical outcomes because they were "great men" by virtue of divine selection or in his words "natural luminary[ies]

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[84] Albert S. King, "Evolution of Leadership Theory;" Jessica E. Dinh, et al, "Leadership theory and research in the new millennium: Current theoretical trends and changing perspectives;" and, Peter G. Northouse, "Leadership: Theory and Practice" 7th ed. For brevity, no all eras from King's work will be discussed in this section, the following eras are omitted either because they are not applicable or because they are covered in later sections: the Contingency Era (not applicable); the Transactional Era (not applicable); the Culture Era (not applicable); and, the Transformational Era (covered in CAF Leadership section).
[85] Albert S. King, "Evolution of Leadership Theory," *Vikalpa* 15, no. 2 (April 1990): 45, Table 1, https://journals.sagepub.com/doi/pdf/10.1177/0256090919900205
[86] Bert Alan Spector, "Carlyle, Freud, and the Great Man Theory More Fully Considered," *Leadership* 12, no. 2 (April 2016): 251, https://journals.sagepub.com/doi/pdf/10.1177/1742715015571392.
[87] Bert Alan Spector, "Carlyle, Freud, and the Great Man Theory…," 250.
[88] *Ibid*.

shining by the gift of heaven."[89]

The idea that only "great men" can lead humanity from darkness is easily discredited and although Bert Spector does not dispute this fact he does take a more nuanced approach to the "Great Man Theory."[90] His research indicates that Sigmund Freud proposed an analogous theory in which groups of people, driven by the need for dependency and love, identify and follow a "single, special leader" – in other words a "great man."[91] The Catholic Church and the military were two institutions that Freud held up as examples of this.[92] In Freud's view the "commander-in-chief for the military [was a] father figure who [was] loved by group members and [was] thought to love all followers in the group equally."[93] Contemporary leadership theorists, and military leaders and members alike, are unlikely to accept the Freudian theory as it is; however, replace the word "love" with another such as "respect" or "trust," and it would have more credence. Is there a link between this and the issue at hand? The author believes there is a link, though incidental, as described below.

Many militaries, the CAF included, have cultures that prize acts of heroism under duress above all-else, celebrating the individuals and their deeds, and promoting their retention in institutional memory.[94] This is done for good reason as it strengthens esprit-de-corps via a shared history of heroic acts, and it establishes a standard of conduct to be

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[89] Thomas Carlyle, *On Heroes, Hero-Worship, and the Heroic in History* (Public Domain (USA): Project Gutenberg, 2008), ed. by Ron Burkey, and David Widger, 1-2.
[90] Bert Alan Spector, "Carlyle, Freud, and the Great Man Theory…," 255.
[91] *Ibid*.
[92] *Ibid*.
[93] Bert Alan Spector, "Carlyle, Freud, and the Great Man Theory…," 255.
[94] Allan English, "The Masks of Command: Leadership Differences in the Canadian Army, Navy and Air Force," paper prepared for the Inter-University Seminar on Armed Forces and Society Conference (Kingston: Canadian Defence Academy Press, 2002): 25-27; Department of National Defence, A-PA-005-000/AP-005, *Leadership in the Canadian Forces: Leading People* (Ottawa: DND, 2007), 8. The heroic acts being referred to are predominantly physical acts of courage and heroism, but in some cases there are ethical acts of courage or heroism that are recognized.

emulated. However, in addition to celebrating and memorializing these individuals, they are often identified for accelerated career advancement which necessitates filling more elevated leadership positions. This is where one issue can arise that is particularly prevalent in the CAF and applicable to a much broader group of military leaders than just those categorized as "heroic."

When it comes to filling senior leadership positions that are not trade specific, usually at the rank of colonel and higher, the CAF tends to rationalize selecting "generalists" for those positions over ensuring the best organizational outcomes. This is especially true in the CAF for emerging domains of warfare where growth at the senior ranks occurs without a corresponding expansion in the rest of the force – at least in the near-term.[95] There are many reasons for this. One is that it is deemed more important to ensure identified individuals continue to advance no matter their competency to lead effectively in a given position. This is rationalized by assuming that through their general leadership ability they will overcome position specific competency limitations. The fact that it is virtually impossible to conduct a post-tour comparative assessment of their performance versus that of someone more qualified makes it difficult to argue against the status quo. Another reason this occurs is that there are not enough specialists in the force

[95] Lee Berthiaume, "Generals and Admirals by the Dozen as Growth of Canadian Forces' Senior Brass Outpaces the Rank and File," *National Post*, 3 May 2018, https://nationalpost.com/news/politics/militarys-top-brass-has-grown-more-quickly-than-the-rank-and-file-since-2003.

that make it to the senior ranks to fill these positions.[96] This is a systemic flaw which could be addressed with more effective long-term career planning and a shift in thinking that would make it mandatory to have military leaders with the requisite expertise fill these positions.

This issue is not rooted in a deliberate attempt to undermine the CAF's capabilities in the emerging domains of space and cyberspace. However, the troubling takeaway is that a logical link exists from a demonstrably outdated theory of leadership to the way in which senior leadership selection is managed by the CAF in these new domains of warfare. Despite the fact that Carlyle's original "Great Man Theory" was contested from the beginning by other great thinkers of the time, including social scientist Herbert Spencer and author Leo Tolstoy, the underlying idea that leadership was inextricably linked to personality persisted.[97]

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[96] Office of the Auditor General of Canada, "Report 5: Canadian Armed Forces Recruitment and Retention – National Defence," *Reports of the Auditor General of Canada – Fall 2016* (Ottawa: OAGC, 2016), 2, 5-6, 7-9, 12-13, http://publications.gc.ca/collections/collection_2016/bvg-oag/FA1-2016-2-4-eng.pdf; SIGS Career Manager, "Career Manager Briefing 2013," last updated 8 January 2013, available on DWAN; Teleconference with Director of Land Command and Information, 16 April 2019; CELE Career Manager, "Career Manager Briefing – Octobre 2018," last updated 30 January 2019, available on DWAN; AERE Career Manager, "Career Manager Briefing," last updated 19 February 2019, available on DWAN. The OAG report indicates that the Regular Force was below its authorized manning of 68,000 and that number of members actually decreased by 1,300 since 2012, indicating that departures exceeded intake. The report also found that the CAF recruitment targets were not based on its needs, but on the ability of the recruiting group to recruit a target number. Therefore, although recruiting targets were achieved, the CAF's needs by occupation were not met meant many occupations, including Signals Officer, were undermanned and had been for many years. As of 31 March 2016, 21 of the CAFs 84 occupations were below 90% manning. The CAF also struggled with attracting the right types of recruits based on their education or qualifications, nor was it retaining the people in the right occupations. The Career Manager briefs provided more detailed statistics. Although the SIGS briefing is now six years out of date, at the time it indicated that the trade was short 31 Captains. In the telecon with DLCI on 16 April 2019, the Colonel indicated that this situation had only worsened and that the trade was now short at the Captain, Major and Lieutenant-Colonel ranks due to poor recruitment and retention. The CELE statistics are accurate as of 31 January 2019, and indicate that they are short by a total of 46 positions (11%) between Captain to Colonel but that the biggest shortages by percentage are at the Lieutenant-Colonel rank (24% short) and Major (16% short). Both SIGS and CELE are the primary feeder trades for leadership in the cyberspace domain, therefore there are systemic shortages making it difficult to have the necessary critical mass of personnel needed in order to produce sufficient senior leaders.

[97] Bert Alan Spector, "Carlyle, Freud, and the Great Man Theory…," 254.

The prevailing view in the 19th and early 20th century continued to be that leadership could be understood by studying the individuals who were leaders because it was something inherent in them. It was an aspect of personality embodied in select individuals by virtue of lineage, heritage or some other antecedent factor.[98] One of the most important studies attempting to link leadership to personality was published by A.O. Bowden in 1927.[99] He sought to measure the social (or mental) personality component of student leaders in U.S. colleges to determine if there was a relationship between the two and found that there was a possible correlation.[100] However, the theory was invalidated given that individuals with vastly different personalities were still effective leaders and because it had no practical value as practicing managers could not simply adopt alternative personalities.[101] Although the overall theory proved to be inadequate, the idea of measuring the specific personality traits, in this case intelligence, temperament, self-expression and sociality, was novel and it initiated a new line of research.

The Trait Period

Following the failure of the "Great Man-based" personality theories came the "Trait Period."[102] Researchers sought to find a set of personality traits common to all great leaders which would allow for predictive modelling of leadership success, and provide practitioners with traits they could emulate in order to improve their own performance.[103] King states that "leadership theory was advanced only slightly" by trait

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[98] King, "Evolution of Leadership…," 45.
[99] *Ibid*.
[100] A.O. Bowden, "A Study of the Personality of Student Leaders in Colleges in the United States," *The Journal of Abnormal and Social Psychology* 21, no. 2, 149-151 & 154, http://dx.doi.org/10.1037/h0073378. It should be noted that
[101] King, "Evolution of Leadership…," 46.
[102] *Ibid*., 45, Table 1.
[103] *Ibid*., 46.

theory and that it was not particularly useful to practitioners because they could not simply adopt the personality traits that were identified as enabling improved leadership performance.[104] King's assessment is true to a degree. It is true that personality traits are not the source of leadership in an individual, or put differently they are not the differentiating factor between leaders and followers which is what early researchers were looking to discover.[105] However, they are not absent from the equation either.[106] And, it is true that the traits being examined were not conducive to enabling practitioners to improve, but this is caveated by the less comprehensive understanding of personal traits available to researchers in the early 20th century. Northouse provides a much more comprehensive analysis of the "trait approach" several aspects of which will be discussed in detail in a later section on "Traits, Characteristics and Individual Differences." The key elements to take away at this time are twofold. First, that early efforts to study personal traits and leadership were limited by a lack of understanding in other areas of behavioral science such as psychology. And second, that one of the most significant works in the mid-20th century was Stogdill's 1948 review of leadership theory. He opened the door to a new way of looking at personal traits in relation to leadership, and redefined leadership as a process between people rather than a quality possessed by certain individuals.[107] Suffice to say that although this area of research has waxed and waned over time, there is no doubt that it has been and continues to be an important area of leadership research.[108]

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[104] King, "Evolution of Leadership…," 46.
[105] Northouse, *Leadership: Theory and*…, 19.
[106] *Ibid*.
[107] Northouse, *Leadership: Theory and*…, 19.
[108] *Ibid*., 21-23.

In closing on the "Personality Era," it is evident that early leadership research was not focused on answering the question of what leadership "is." That fundamental question was superseded by trying to understand what a leader "was," because researchers had assumed that leadership was something inherent in certain people. However, by the middle of the 20th century doubt was cast on this conceptualization of leadership.[109] Researchers then began charting a new way forward on the premise that leadership was a process of reciprocal interaction between leaders and followers, but the details of the process and the nature of the interactions remained open questions.[110]

The Influence Era

The "Personality Era" was succeeded by the "Influence Era" which consists of two periods: the "Power Relations," and, the "Persuasion" periods. This era is characterized by the realization that leadership "is a relationship between individuals" and that there is a power dynamic at play within the leader-follower relationship.[111] Northouse contends that despite the lack of theoretical research into the relationship between leadership and power, the two are obvious links between the two because power is part of the influence process, and leadership is the process of influencing people.[112]

The Power Relations Period

The most prominent study of power that is referred to in the context of leadership is the 1959 work of J.R. French Jr. and B. Raven which found that there were five bases of social power: referent; expert; legitimate; reward; coercive; and, a sixth was identified

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[109] Northouse, *Leadership: Theory and*…, 19.
[110] *Ibid*., 19-21.
[111] King, "Evolution of Leadership…," 46.
[112] Northouse, *Leadership: Theory and*…, 10.

by Raven in 1965 which he called information power.[113] In a 1990 work J.P. Kotter stated that these six bases of power can also be divided into two categories depending on where the base of power derives its origin.[114] Power that is derived from the position one occupies in an organization is called "positional power" and includes the legitimate, reward, coercive, and information bases of power.[115] Power that is derived from one's behaviour or knowledge, as perceived by followers, is called "personal power" and includes the referent and expert bases of power.[116] Leadership study during this period focused on understanding leader effectiveness as a function of the sources and amount of power available to the leader, and the manner in which that power was used.[117]

The Persuasion Period

There is a realization in this period that the use of coercive power to force others to achieve a goal is not the same thing as leadership, and thus coercive power is separated from leadership.[118] However, the idea of a "dominant leader" in the leader-follower dyad remains popular, and many leaders continue to believe they are responsible for persuading followers to adopt and achieve a common goal.[119]

It is widely understood that leaders are no longer the only ones with the ability to wield power in the leaders-follower relationship. Northouse summarizes Barbara Kellerman's research on this from her 2012 book, *The End of Leadership*, by saying that

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[113] John R.P. French, Jr., and Bertram Raven, "The Bases of Social Power," in *Studies in Social Power* (Ann Arbor: University of Michigan, 1959), 152-155; and, B.H. Raven, "Social Influence and Power," in *Current Studies in Social Psychology* (New York: Holt, Rinehart, & Winston, 1965), 371-382, adapted in Peter G. Northouse, *Leadership: Theory and*…, 10. See Annex C for the definitions of the six bases of power.
[114] Northouse, *Leadership: Theory and*…, 10.
[115] *Ibid.*, 12.
[116] Northouse, *Leadership: Theory and*…, 10.
[117] King, "Evolution of Leadership…," 46.
[118] King, "Evolution of Leadership…," 46; Northouse, *Leadership: Theory and*…, 13.
[119] King, "Evolution of Leadership…," 46.

"power used to be the domain of leaders, but that is diminishing and shifting to followers."[120] Some of the reasons for this are the equalization of access to information and knowledge due to the information revolution brought about by the internet; and, rapidly changing expectations of transparency and equality that led to social actions such as the "Occupy Wall Street," "#MeToo," and "Black Lives Matter" movements.[121] Although not to the same extent as those social movements, this shift towards transparency and diffusion of power downwards is also something the CAF is experiencing. "SSE" and "The Journey" are a recognition of a cultural shift and express a vision for a different way of managing CAF human resources. They also acknowledge that followers have a say in decision-making, at least when it comes to their careers and their service.[122]

Despite recognition within the CAF that the balance of power needs to change in some areas, such as career management, there will always be a limit to this.[123] In accordance with the National Defence Act (NDA) and Queens Regulations and Orders (QR&Os) commanders will continue to have positional power in all its forms, including

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[120] Northouse, *Leadership: Theory and*…, 11.
[121] Heather Gautney, "What is Occupy Wall Street? The History of Leaderless Movements," *On Leadership* (Washington, D.C.: The Washington Post, 10 October 2011), https://www.washingtonpost.com/national/on-leadership/what-is-occupy-wall-street-the-history-of-leaderless-movements/2011/10/10/gIQAwkFjaL_story.html?noredirect=on&utm_term=.320851f0d329; Stephane Fortado, "Workplace Sexual Abuse, Labor and the #MeToo Movement," Labor Studies Journal 43, no. 4 (Winter 2018): 241, DOI: 10.1177/0160449X18809431; Colin Wayne Leach and Aerielle M. Allen, "The Social Psychology of the Black Lives Matter Meme and Movement," *Current Directions in Psychological Science* 26, no. 6 (Winter 2017): 543.
[122] Department of National Defence, *Strong, Secure, Engaged: Canada's Defence Policy* (Ottawa: DND, 2017), 19-30.
[123] *Ibid.*, 22.

coercive, and especially in times of conflict.[124] However, in emerging domains the ability to wield positional power even when combined with outstanding general military knowledge may not yield the results needed. This is demonstrated in an article on the causes of managerial failure which found that in a rapidly changing environment "job mismatch/skills gap" in managers resulted in failure 69% of the time, which was the third most likely reason for failure.[125] That study examined managers in organizations that were in the midst of change initiatives which resulted in them being put in situations they did not have the skills or knowledge to deal with.[126]

In the case of the CAF and emerging domains, we are deliberately putting senior leaders into these situations, as will be shown in a review of the Director General Cyberspace (DG Cyber) appointees in chapter three. In these types of change situations, such as adapting to emerging domains, the importance of expert power in cannot be understated. The article also identified that one of the consequences was poor performance among those "who depend on [the managers] performance and leadership to get results."[127] CAF members who work in these domains will always remain loyal, and respect the rank and authority of a superior, but they would have more confidence in senior leaders who do not need the basics of cybersecurity explained to them when they

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[124] Department of National Defence, *Queens Regulations and Orders*, vol 1, ch 3, sect. 2 "Command," last updated 1 October 2018, https://www.canada.ca/en/department-national-defence/corporate/policies-standards/queens-regulations-orders/vol-1-administration/ch-3-rank-seniority-command-precedence.html#cha-003-20; Government of Canada, "TermiumPlus," *Command*, record 3, las updated 15 March 2008, http://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=command&index=alt&codom2nd_wet=EI#resultrecs; National Defence Act, R.S.C., c. N-5, 1985, s. 62-65, last updated 23 May 2019.

[125] Clinton O. Longenecker, Mitchell J. Neubert and Laurence S. Fink, "Causes and Consequences of Managerial Failure in Rapidly Changing Organizations" *Business Horizons* 50, no. 2 (March-April 2007): 149

[126] *Ibid*., 147.

[127] *Ibid*., 149.

visit.[128]

The Behaviour Era

Research in this era took a completely different approach to leadership by looking at it from a behavioral perspective.[129] This was a revolutionary idea and was very popular amongst researchers and practitioners alike because behaviour could be analyzed empirically by researchers and practitioners could take advantage of the theories by adapting their behaviour.[130] King divided this era into three main periods of research: the "Early Behaviour Period;" the "Late Behaviour Period;" and, the "Operant Period."[131] The latter two periods will not be discussed here as they focus on the application of behavioral theory to management methods which are not pertinent to the issue at hand.

The Early Behaviour Period

Two major studies, the Ohio State and Michigan studies, dominated research during this period.[132] Although the studies had different focus areas and interpreted their results differently, they both found that leadership behaviours fall into one of two general categories: task behaviours; and, relationship behaviours.[133] Task behaviours are leader interactions that "help group members achieve their objectives," such as approving funding for training or providing guidance on a particular task.[134] Relationship

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[128] This is based on the authors experiences, observations and interactions with personnel at the Canadian Forces Network Operations Centre from 2016-2018. On two occasions the unit was tasked to prepare to host a CAF senior leader responsible for cyberspace operations and on both occasions the message was passed down not to get too "technical" or "in the weeds" because this was not a "cyber person." Although it is understood that not all leaders will have expertise in the domain, this did not engender confidence that our needs were going to be understood.
[129] King, "Evolution of Leadership…," 46.
[130] King, "Evolution of Leadership…," 46.
[131] *Ibid*.
[132] *Ibid*.; Northouse, *Leadership: Theory and*…, 71. The Ohio State studies use the terms "initiating structure" and "consideration" rather than "task" and "relationship."
[133] Northouse, *Leadership: Theory and*…, 71.
[134] *Ibid*.

behaviours are interactions that "help followers feel comfortable with themselves, with each other, and with the situation in which they find themselves," such as conducting team building activities and resolving workplace disputes.[135]

Leaders should constantly strive to improve their followers' abilities to accomplish objectives and develop workplace relationships that are conducive to individual and group satisfaction. For emerging domains, it is reasonable to conclude that having expertise in the domain will assist the leader in their interactions with followers when it comes to task accomplishment.

The Situation Era

The fundamental concept uncovered in this era is that leadership is not only a function of the leader and the follower, but also of external factors referred to generally as situational factors.[136] A key finding of this theory is that because leadership occurs in different situations leaders must be able to adapt their leadership style to suit the situation.[137] In a sense this meant that other leadership theories and approaches could be seen as a menu of options from which leaders could select based on the situation they were dealing with.[138] In addition to assessing themselves and the situation, the leader needed to evaluate their followers for their competence and commitment in a given situation as this is a critical factor in selecting the appropriate leadership approach to use.[139] One of the key outputs of this era was the "Situational Leadership® ,II" model developed by Ken Blanchard, et al, which is designed to assist a leader in choosing the

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[135] *Ibid*.
[136] Northouse, *Leadership: Theory and*…, 93.
[137] *Ibid*.
[138] King, "Evolution of Leadership…," 47.
[139] Northouse, *Leadership: Theory and*…, 93-95.

best leadership style to use by mapping supportive behaviour against directive behaviour, while considering the development level of the followers.[140]

Directive behaviour is described by Northouse as clarifying, "often with one-way communication, what is to be done, how it is to be done, and who is responsible for doing it."[141] The ability for a leader to take an increasingly directive approach is to a large extent contingent on their expertise in a particular domain or field. It is clear that in any domain – emerging or otherwise - military leaders are expected to be able to be directive when the situation warrants. This tends to be more prevalent in operational and tactical level situations where decision making tends to be more rapid with less opportunity for consultation; however, it is also true in strategic leadership situations as well. When direction is required at the institutional level about which capabilities of a particular domain to prioritize investment in, the senior leader with expertise in that domain will usually be able to make a more informed decision than a peer without that same expertise.

Additional Theories and Approaches

King's study was published in 1990 and since then new leadership approaches and theories have been developed, and existing theories have been elaborated on or improved. Several of these theories are applicable to leadership in emerging domains and will be identified for informative purposes but only the "Skills Approach" will be elaborated as it is directly linked to the issue of leadership in emerging domains.

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[140] *Ibid*., 95. The four styles are divided into four quadrants and are: S1- High Directive-Low Support; S2 – High Directive-High Supportive; S3 – High Supportive-Low Directive; and, S4 – Low Supportive-Low Directive. The followers need progressively less direction and support from the leader as the styles move from S1 to S4.

[141] Northouse, *Leadership: Theory and*…, 94.

Additional Theories

The focus of Dinh, et al, is primarily a trend analysis of leadership research. They sought to quantify the amount of research interest in various leadership approaches and theories, and what types of research methodologies were being applied to them. However, in doing so they also identify a number of emerging theories of leadership in their work. Several are relevant to leadership in emerging domains including: strategic leadership approaches; leading for creativity, innovation, and change; and, contextual leadership theory. Although these theories do present interesting concepts for consideration in future research, they were not applicable to this study.

The Skills Approach

This approach to leadership has its origins in the 1955 work of Robert Katz on "Skills of Effective Administrator" which was published in the *Harvard Business Review*.[142] The theory was to look at leadership as a set of developable skills that could be learned and developed rather than as a set of personality traits.[143] The original theory proposed by Katz identified three basic sets of skills in leaders: technical, human, and conceptual.[144] Human and conceptual skills deal with the ability to interact with others, and the ability to understand ideas and concepts, respectively.[145] Both of those are important; however of particular interest of this paper is the concept of technical skills which equate to competency in a particular area or specialization.[146] Northouse states that:

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[142] *Ibid*., 43.
[143] *Ibid*.
[144] *Ibid*., 44.
[145] *Ibid*.
[146] *Ibid*.

> Technical skill is most important at lower and middle level management and less important in upper management. For leaders at the highest level, such as CEOs, presidents, and senior officers, technical competencies are not as essential. Individuals at the top level depend on skilled followers to handle technical issues of the physical operation.[147]

Considerations for Leadership in Emerging Domains

The evolution of leadership theory provides several key insights for leadership in emerging domains of operations. Although the theory that leadership was a function of the individual personality characteristics was proven to be incorrect, the concepts of individual traits and skills remain pertinent. The research by Longenecker, et al., demonstrated the importance of leaders and managers having the right skills to perform successfully and enable the same in their subordinates. As per the quote above, Northouse promotes the commonly held idea that as leaders progress higher up an organization, they require less technical expertise. It remains to be determined if this is universally true or, if the highly technical and rapidly evolving nature of emerging domains of operations are unique in this sense. Clearly the importance and relevance of specialist skills, knowledge and expertise need to be considered before being discarded.

Conclusion

It is clear that despite the short life of leadership science it has become a significant and active field of research. This review has demonstrated that there are a number of research theories that contribute to the concept of military leadership, and some of its associated stereotypes and biases such as "the leader hero." There are also many theories that support the importance of individual attributes and specialization, but for each of those there is a theory or theorist who states that argue for generalization at

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[147] *Ibid*.

senior levels. In later sections it will be shown that there is support for Northouse's, but that there is a growing amount of opposing research indicating that having leaders with specialist expertise in the organizations core subject matter to consistently better results for the organization.

Given that emerging domains of military operations tend to have a technical component to them it is paramount that the CAF determine how important specialization and expertise are so that accurate leadership requirements can be developed to enable the selection of the optimal leaders, and reduce the risk to the organization of failing to keep pace with adversaries and allies in these domains. The next stop in this journey is to determine what insights CAF leadership doctrine and theory provides.

CHAPTER THREE – CAF LEADERSHIP DOCTRINE

Introduction

Leadership in the CAF is intrinsically linked to accomplishing the CAF mission which "is to defend Canada and Canadian interests while contributing to international peace and security."[148] This mission statement is deliberately general in its wording so that it can account for any conceivable change to the domestic and global security environment. Although the mission statement can and should remain general, CAF leadership doctrine must be adaptable in order to address *specific* leadership needs, based on current and future security, human resource and public environments.[149]

Between 2005 and 2007 the CAF published its most recent leadership doctrine as a series entitled "Leadership in the Canadian Forces" consisting of four keystone manuals on the subject of leadership. The four manuals are: *Doctrine*; *Conceptual Foundations*; *Leading People*; and, *Leading the Institution*.[150] Collectively these publications form the foundation for the training, education and practice of leadership in the CAF today.[151] These keystone leadership publications are supplemented by 2009's *Duty with Honour – The Profession of Arms in Canada* and 2012's *The Department of National Defence and*

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[148] Department of National Defence, A-PA-005-000/AP-003, *Leadership in the Canadian Forces: Doctrine* (Ottawa: DND Canada, 2005), 2

[149] Department of National Defence, A-PA-005-000/AP-004, *Leadership in the Canadian Forces: Conceptual Foundations* (Ottawa: DND Canada, 2005), xiii-xv.

[150] Department of National Defence, A-PA-005-000/AP-003, *Leadership in the Canadian Forces: Doctrine* (Ottawa: DND Canada, 2005); Department of National Defence, A-PA-005-000/AP-004, *Leadership in the Canadian Forces: Conceptual Foundations* (Ottawa: DND Canada, 2005); Department of National Defence, A-PA-005-000/AP-005, *Leadership in the Canadian Forces: Leading People* (Ottawa: DND Canada, 2007); and, Department of National Defence, A-PA-005-000/AP-006, *Leadership in the Canadian Forces: Leading the Institution* (Ottawa: DND Canada, 2007).

[151] General (Ret'd) Rick Hillier, foreword to *Leadership in the Canadian Forces: Doctrine* (Ottawa: DND Canada, 2005), iii.

Canadian Forces – Code of Values and Ethics.[152]

This review of CAF leadership publications will serve three purposes. The first is to determine if the doctrine provides explicit evidence supporting the notion that generalist leaders are preferred over specialist leaders. The second is to summarize key elements of current CAF leadership doctrine relevant to determining leadership requirements for emerging domains. And, the third is to identify any factors or gaps in doctrine that make it difficult to adapt to leadership requirements for emerging domains.

Defining *Effective* Leadership

CAF leadership doctrine starts by defining leadership in a generic and value-neutral way as "directly or indirectly influencing others, by means of formal authority or personal attributes, to act in accordance with one's intent or a shared purpose."[153] This definition is firmly grounded in existing leadership research, and it draws on some of the theories discussed in the previous sections. In particular, when stating the means of influencing others, it leverages the concept of positional power as "formal authority," and the concepts of personal power, and personal traits and skills, as "personal attributes."[154]

Although it is an adequate definition of leadership in general, it does not go far enough to meet the needs of the CAF because it does not define what "effective leadership" is. In order to get to that definition, the doctrine first defines the five major dimensions of CAF collective effectiveness.[155] These dimensions of effectiveness are

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[152] Department of National Defence, A-PA-005-000/AP-001, *Duty with Honour: The Profession of Arms in Canada*, ed. 2009 (Ottawa: DND Canada, 2009); Department of National Defence, A-JS-005-DEP/FP-001, *Department of National Defence and Canadian Forces Code of Values and Ethics* (Ottawa: DND Canada, 2012). Note: A-PA-005-000/AP-001, *Duty with Honour: The Profession of Arms in Canada*, was originally published in 2003.
[153] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 3.
[154] *Ibid*. Northouse, *Leadership: Theory and*…, 10-12.
[155] *Ibid*.

used to develop a CAF definition of effective leadership by identifying their components that require leadership involvement, and then altering the general definition by integrating those components. Table 2.1 summarizes the dimensions and their meanings.

The result is a CAF definition of *effective* leadership: "*directing, motivating, and enabling others to accomplish the mission professionally and ethically, while developing or improving capabilities that contribute to mission success.*"[156]

Table 3.1 – Dimensions of CAF Collective Effectiveness

Dimension	Meaning
Mission Success	Expresses the outcome of primary importance to the CAF. This dimension captures the *primacy of operations* and the *unlimited liability* of military members.
Internal Integration	Reflects a concern of the internal organization and stability of military units, systems, and the CAF.
Member Well-Being and Commitment	Signifies a concern for the people who serve the CAF and the quality of their conditions of service.
External Adaptability	Reflects a concern for the external operating environment and the capacity to anticipate and adapt to changing conditions.
The Military Ethos	Encompasses values that describe and define professional conduct, which all military members are expected to adhere to.

Source: Adapted from Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…4.

Defining effective leadership is an important step an organization should take if it wants to have effective leaders but getting from a definition to actually leading effectively is not trivial. The doctrine identifies trust as a very important ingredient for achieving effective leadership and that leaders have a responsibility to "build and maintain trust through their decisions, actions and interactions."[157] CAF doctrine lists a number of expected leader behaviours that build trust, at the top of that list is being highly competent

[156] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 5. Emphasis added by author.
[157] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 6.

in core functions.[158] According to CAF doctrine, excelling one's core function – or specialty – is a critical attribute to gaining the trust of subordinates, peers and superiors, and is therefore a very important attribute for CAF leaders to strive for. The doctrine also states that "senior leaders at the operational level require broader knowledge and expertise relating to strategic systems and institutional functioning."[159] However, it does not say that this additional knowledge and expertise should be at the expense of retaining expertise in one's core specialty. In fact, throughout their careers CAF leaders are expected to seek out and "take advantage of opportunities to enhance their professional expertise and competence."[160] Doing so is critical in the context of emerging domains of operations, as they require CAF leaders to fully assess the institutions needs to operate effectively in them while concurrently trying to understand them. Therefore, leaders must first assess their ability to contend with the institutional challenge emerging domains present, and then "enhance their professional expertise" to meet that challenge. In the chapter on contemporary leadership theories a study will be reviewed which shows that for domains experiencing rapid evolution, specialists with prior expertise have a significant advantage over generalists in their ability to synthesize new knowledge and get ahead of it.[161]

Thus far CAF leadership doctrine has defined a standard of effective leadership and linked having a high level of competence in a core specialty to achieving that standard. There is an understanding that at higher levels within the organization leaders

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[158] *Ibid*. The remainder are listed in Annex D.
[159] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 19.
[160] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 6.
[161] Florenta Teodoridis, Keyvan Vakili, Micheal Bikard, "Can Specialization Foster Creativity? Mathematics and the Collapse of the Soviet Union," *Academy of Management Proceedings* 2017, no. 1 (August 2017), https://journals.aom.org/doi/abs/10.5465/ambpp.2017.224.

will need a broader knowledge base, but nothing indicates that they are no longer expected to remain competent in their area of core expertise – in fact the opposite is true. Thus, beyond the expectation that they will be experts in their core specialty, what function(s) do CAF leaders perform within the organization?

Leadership Functions & Responsibilities

The CAF definition of effective leadership lends itself to providing part of the answer to this question as it has two very distinct components which correspond to the two leadership functions within the CAF, both of which are centred on the accomplishment of the CAF mission. The first function, *leading people*, is encapsulated in the beginning of the definition: "directing, motivating, and enabling others to accomplish the mission professionally and ethically."[162] The second function, *leading the institution*, is articulated in the end of the definition: "developing or improving capabilities that contribute to mission success."[163] These two functions, as expressed in the definition, are derived from the concepts of direct and indirect influence found in the CAF leadership model.[164]

CAF Leadership Model

In brief the integrative CAF leadership model is a systems-based approach to describing how leaders exert influence directly on people, and indirectly on situational factors, in order to achieve desired outcomes.[165] What is being modelled are the interactions between four main variable classes, which are: "leader characteristics and

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[162] *Ibid*.
[163] *Ibid*.
[164] *Ibid*., 24.
[165] Department of National Defence, A-PA-005-000/AP-004, *Conceptual Foundations*…, 120-122.

behaviour variables; individual/group variables; situational variables; and outcomes."[166] Logically the "leader characteristics and behaviour" variables are critical to achieving outcomes in a leader-centric organization such as the CAF. And, although there is no all-encompassing list of "essential leader qualities," once again the doctrine places "[k]nowledge and skills" first among them.[167] Further, it declares that it is mandatory for leaders to have a high level of technical skill and knowledge, while making no concession in this regard for specific domains or fields.[168] Thus, the foundational components of the CAF leadership model reinforce the importance of domain expertise for leaders to be effective in the two functions of *leading people* and *leading the institution*.

Leading People

Leading people is an inherently complicated and difficult endeavour. To be good at it means being able to consistently and correctly predict how to influence what is possibly the most psychologically complex and inconsistent creature on earth – homo sapiens – in order to achieve a specific outcome. The CAF invests significantly in training to produce more predictable responses from individuals, and groups, in the extreme situations that can be encountered on military operations.[169] However, in spite of this training investment, leadership is still required to ensure - to the extent ensuring anything is possible - that military forces accomplish the mission in a manner that is legally and morally acceptable. Here again, in the doctrine for leading people, there is evidence for the importance of expertise and specialization: "[t]he absolute foundation for

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[166] *Ibid*., 120.
[167] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 19.
[168] *Ibid*.
[169] Department of National Defence, A-PA-005-000/AP-005, *Leadership in the Canadian Forces: Leading People* (Ottawa: DND Canada, 2007), 58.

effective leadership is the individual's mastery of the knowledge, skills and techniques required at each level and function of the profession."[170]

Leading the Institution

Institutional leadership creates a number of leadership challenges depending on the problem or situation a leader is trying to resolve. In situations where a shift in organizational culture is needed, such as for Operation Honour, senior leaders must overcome the challenge of influencing everyone in the organization without consistent direct contact.[171] More often though, senior leaders are responsible for the stewardship of existing capabilities or leading the development, and institutionalization, of new capabilities. The latter scenario is of particular interest for emerging domains of operations especially in terms of defining leadership requirements and leader selection.

In *Leading the Institution*, the CAF provides a leadership development framework that institutional leaders can use as a tool to develop their successors at each of the four distinct leadership levels.[172] The framework describes the expected capacities of leaders across five leader elements and sixteen leader attributes, at each of the four distinct leadership levels.[173] The five elements are: expertise; cognitive capacities; social capacities; change capacities; and, professional ideology.[174] The full descriptions of all the elements and their associated attributes can be found in annex E, here is the expertise element in full:

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[170] Department of National Defence, A-PA-005-000/AP-005, *Leading People*…, 44.
[171] Department of National Defence, *The Operation Honour Manual: A Comprehensive Guide to Information and Resources on Sexual Misconduct*, Interim ed. (Ottawa: DND Canada, 2019), 13.
[172] Department of National Defence, A-PA-005-000/AP-006, *Leadership in the Canadian Forces: Leading the Institution* (Ottawa: DND Canada, 2007), 126. The four leadership levels from lowest to highest are: junior; intermediate; advanced; and, senior.
[173] *Ibid*., 127-128.
[174] *Ibid*., 128.

Table 3.2 – Expertise Leader Element

Leader Element	Description (with attributes in bold)
Expertise	Expertise consists of **technical** (clusters, e.g., combat arms, sea trades, aircrew) and **specialist** (Military Occupation Classification) proficiencies, an understanding and development of the **military and organizational environments**, and the practice and eventual stewardship of the profession of arms, with the capacities to represent and transform the system through applications at the **strategic and institutional** levels.

Source: Adapted from Department of National Defence, A-PA-005-000/AP-006, *Leadership in the Canadian Forces: Leading the Institution* (Ottawa: DND Canada, 2007), 130.

In addition to its use for leader development the doctrine also discusses the use of the framework in human resource systems for things such as career management and succession planning. This is in recognition of the fact that institutional leaders are *not* simply interchangeable.[175] This would appear to go against the idea that generalists are able to lead effectively in all cases at the institutional level. In fact, the doctrine explicitly states exactly that:

> The Professional Development Framework, applicable in circumstances that demand significantly different leader attributes and capacities, supports the focus on individual strengths, therefore addressing the realities that not every leader is suitable for every institutional leader position.[176]

Despite a doctrinal recognition that expertise is one of the leader elements that should be considered when selecting institutional leaders, this does not always appear to be the case in practice. To be fair this is not a problem for most senior leader positions in the CAF, which are well-established and have responsibilities that the training, education and career management systems are designed to prepare appointees for. However, this

[175] *Ibid*., 137.
[176] Department of National Defence, A-PA-005-000/AP-006, *Leadership in the Canadian Forces: Leading the Institution*…, 138.

can be an issue in at least two cases: new positions created to deal with external adaptability problems which CAF personnel development systems cannot prepare leaders for, such as leading operations or capability development in emerging domains such as cyberspace and space; and, when established positions need to adapt to rapid and significant changes in their responsibilities, for any number of reasons.

Private Sector Comparative Analysis

Assessment of DG Cyber Appointees

A review of the brief history of the position of DG Cyber offers a revealing example of the former issue.[177] An analysis of the appointees' suitability for the position, based solely on the technical expertise attribute of the expertise element, reveals that the majority had little to no pertinent expertise, or experience.[178] Three of the five appointees to date have no trade-based, employment-based or education-based expertise that would indicate any technical aptitude for the position. Two appointees were from a trade whose training curriculum may have included training or education in subjects that were the predecessors of cyberspace operations, such as network security and information security. Of those two, MGen Loos (Ret'd) has post-secondary education that may have included courses in computer networks and computer network security; however, he did not have any employment-related experience prior to taking command of the Canadian Forces

[177] See annex F for a detailed breakdown of the list of appointees. CANFORGEN 034/18 CMP 018/18 012203Z MAR 18, Promotions and Senior Appointments 2018 – General and Flag Officers, para 2.Q.(2); CANFORGEN 022/17 CMP 014/17 262032Z JAN 17, Promotions and Senior Appointments 2017 – General and Flag Officers, para 2.G.(2); CANFORGEN 104/15 CDS 029/15 011916Z JUN 15, Amendment to Promotions and Senior Appointments 2015 – General and Flag Officers, para 2.C; CANFORGEN 022/13 CDS 011/13 052106Z FEB 13, Senior Appointments 2013 – General and Flag Officers, para 1.G.5; CANFORGEN 055/11 CDS 011/11 251751Z MAR 11, Senior Appointments 2011 – Generals and Flag Officers, para 1.AG.

[178] The analysis was based on the occupation, education, and applicable employment data from annex F.

Information Operations Group (CFIOG) as a Colonel.[179] MGen Allen's undergraduate degree was unrelated to cybersecurity, however her post-graduate thesis for the Master of Defence Studies (MDS) was a comprehensive argument that the CAF should adopt Computer Network Exploitation (CNE) and Attack (CNA) capabilities, the early terminology for offensive cyberspace operations (OCO).[180] Additionally, she had extensive employment-related experience relative to other appointees, at the rank of Major, Lieutenant-Colonel and Colonel prior to her appointment.

Three of the five appointees, which includes the incumbent, had no work experience, educational background or trade training that would have prepared them for the position of DG Cyber. It is therefore proposed, with reasonable confidence, that the leader selection process for the position of DG Cyber does not privilege the expertise element, or the technical expertise attribute of that element, when selections are made.

Responsibility Comparison – DG Cyber and CISO

In order to provide more definitive evidence of this, the responsibilities of a private sector Chief Information Security Officer (CISO) or equivalent positions - such as Vice President of Cybersecurity - will be examined, as will the curriculum vitaes of three individuals filling these types of roles, to determine how they compare to the DG Cyber appointees. Although the responsibilities of a CISO and DG Cyber are not always a one-to-one mapping, they are sufficiently similar to make a representative comparison of

[179] Event Smart, "Depart with Dignity: Bio of MGen G.D. Loos, OMM, CD," accessed 24 May 2019, https://dwdloos.eventsmart.com/bio-of-mgen-loos/. His biography does not indicate employment in cyber security related positions until taking command of the Canadian Forces Information Operations Group.
[180] F.J. Allen, "CN(Eh?) – A Recommendation for the CF to Adopt Computer Network Exploitation and Attack Capabilities," (master's thesis, Royal Military College of Canada, 2002).

expected expertise as seen in the list below.[181]

The specific responsibilities of a CISO will vary based on the size and structure of their organization, but they can all be organized into comprehensive categories the CISO is responsible to oversee on behalf of their organization:[182]

- develop and communicate the *cybersecurity strategy*;
- develop, communicate and enforce *cybersecurity policy and education* programs;
- develop and manage the *cybersecurity workforce* plan;
- plan and implement a *cybersecurity capability development and integration* program;
- maintain situational awareness of cybersecurity incidents and inform other organizational leaders of risks and impacts to business operations; and
- ensure routine changes to operational information technology and future projects, do not compromise cybersecurity.

Although DG Cyber is not responsible for maintaining situational awareness of the security of CAF cyberspace, it will be shown here that they are either responsible for, or play an important role in, the other items in this list.

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[181] There are several reasons for this. The nature and structure of the CAF and DND result in a division of responsibilities along departmental and CAF lines that does not exist in the private sector. And, it generally takes a significant amount of time to complete major changes in CAF organizational structures; so, responsibilities that should belong to DG Cyber but have historically been in the terms of reference of another organization within the CAF or the Department take time to work through bureaucratic processes before they can be aligned under the appropriate lead.

[182] New Horizons – Computer Learning Centres, "How to Become a Chief Information Security Officer," last updated 3 October 2018; Nader Mehravari, "Structuring the Chief Information Security Officer (CISO) Organization," Carnegie Mellon University Software Engineering Institute Blog, 22 February 2016, https://insights.sei.cmu.edu/sei_blog/2016/02/structuring-the-chief-information-security-officer-ciso-organization.htm; Cyber Degrees, "Become a CISO," accessed 24 May 2019, https://www.cyberdegrees.org/jobs/chief-information-security-officer-ciso/; Business News Daily, "How to Become a Chief Information Security Officer (CISO)," last updated 24 May 2018, https://www.businessnewsdaily.com/10814-become-a-chief-information-security-officer.html; LinkedIn Jobs, "BlackBerry: Vice President, Cyber Security," accessed 24 May 2019, https://ca.linkedin.com/jobs/view/vice-president-cyber-security-at-blackberry-1237088017.

When asked in a 2013 interview with if there was a CAF strategy for cyberspace, then BGen Loos in his role as the inaugural DG Cyber, responded that they had not developed one as of yet but that they had developed the plan for one.[183] His response demonstrates an acknowledgment that DG Cyber was responsible for the development of a departmental cyber strategy. In the same interview he discussed the DG Cyber mandate saying that his first task was to translate the strategic intent into "options to operationalize the cyber environment," and that the focus of the DG Cyber team was "to look across all the elements of force development to put a plan in place for building what [the CAF] need[s]."[184] The term "force development" is defined in Canada as:

> A system of integrated and interdependent processes used to identify, conceptualize and implement necessary changes to existing capabilities or to develop new capabilities.[185]

And, according to NATO terminology the elements of a capability include "doctrine, organization, training, materiel, leadership development, personnel, facilities, and interoperability," thus DG Cyber's force development responsibilities encompass the three CISO responsibilities related to policy, workforce and capability development.[186]

Finally, *Strong, Secure, Engaged*, identified a new cyber initiative for the CAF called the Cyber Mission Assurance (CMA) Program.[187] This is a comprehensive program that will assist commanders in understanding cyber risks and the mitigate cybersecurity threat to operations by "developing policy, procedures and technological

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[183] Chris Thatcher, "Operationalizing the Cyber Domain," *Vanguard Magazine*, June/July 2013:13.
[184] *Ibid*., 12-13.
[185] Government of Canada, "Termium Plus," search for "force development," https://www.btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=1&srchtxt=force+development&index=alt&codom2nd_wet=EA#resultrecs
[186] NATO, AAP-06 (2018), *NATO Glossary*…, 23.
[187] Department of National Defence, *Strong, Secure, Engaged*…, 73.

solutions."[188] As with any new cyber initiative, DG Cyber has a central role to play in implementing this program and in raising awareness because delivering on it will require the efforts of everyone.[189] The CMA program is clearly equivalent, if not more ambitious, than the final responsibility listed above. It has now been established that the role of DG Cyber shares a number of responsibilities with the role of a corporate CISO in the private sector. Therefore, a comparison of education and work experience between the two will prove useful in determining if DG Cyber appointees' level of expertise is adequate.

Comparison of Education and Experience

The evidence is unequivocal that the DG Cyber appointees do not have experience that is even remotely comparable to the CISOs of the private sector. The evidence is so unambiguous in this regard that one need only glance at the work experience and education data of the private sector CISOs from IBM™, Deloitte™ Canada and RBC™ that has been compiled at annex G.

However, in the interests of academic rigour several key factors will be examined to demonstrate this fact. In terms of education, two of three private sector CISOs have a technology or science related college or university degree at a minimum.[190] David Cass is the most educated of the three with several post-graduate degrees in science and technology and an MBA from the Sloan School of Business.[191] Among them they have

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[188] The Maple Leaf – Defence Stories, "Cybersecurity Workshop Underlines the Importance of Integrated Effort," last modified 17 January 2019, https://ml-fd.caf-fac.ca/en/2019/01/23739.
[189] *Ibid*.
[190] LinkedIn, "David Cass," accessed 25 May 2019, https://www.linkedin.com/in/dcass001; LinkedIn, "Faisal Malik," accessed 25 May 2019, https://www.linkedin.com/in/faisal-malik-b7a6061/; LinkedIn, "Adam Evans," accessed 25 May 2019, https://www.linkedin.com/in/adamevansrbc/?originalSubdomain=ca.
[191] *Ibid*., David Cass.

numerous computer and information security related certifications from various institutions, and all three have the Certified Information Systems Security Professional (CISSP) certification from the International Information Systems Security Certification Consortium (ISC^2), which is a highly sought after and globally recognized certification.[192] However, the most significant, and striking, difference between the private sector CISOs and the DG Cyber appointees is in the area of work experience. Mr. Cass has the least experience at thirteen years, Mr. Evans has seventeen, and Mr. Malik is the most experienced at twenty-five years, for an average of 18.3 years of employment experience.[193] Both Mr. Malik and Mr. Evans began working in junior level technical fields, while Mr. Cass began in risk management.[194] Mr. Evans has the most experience in pure cybersecurity based on this employment in security operations centres at Scotiabank™ and RBC™.[195]

It is clear that the CAF appointees are not comparable to their private sector equivalents. When taking into consideration the newness of the domain, its highly technical nature, and that during their tenure, the appointees to the position of DG Cyber are responsible for all aspects of CAF cyberspace capability development, the lack of

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[192] LinkedIn, "David Cass," accessed 25 May 2019, https://www.linkedin.com/in/dcass001; LinkedIn, "Faisal Malik," accessed 25 May 2019, https://www.linkedin.com/in/faisal-malik-b7a6061/; LinkedIn, "Adam Evans," accessed 25 May 2019, https://www.linkedin.com/in/adamevansrbc/?originalSubdomain=ca; Search Security, "Certified Information Systems Security Professional (CISSP)," accessed 25 May 2019, https://searchsecurity.techtarget.com/definition/Certified-Information-Systems-Security-Professional.

[193] Noodle, "Be A Data Sherriff: Steps To Becoming A Chief Information Security Officer (CISO)," accessed 25 May 2019, https://www.noodle.com/articles/how-to-become-a-ciso. This source indicates that cybersecurity employees targeting CISO positions should expect that they will need at least 7-12 years of experience in the field before being able to successfully apply for CISO positions.

[194] LinkedIn, "David Cass," accessed 25 May 2019, https://www.linkedin.com/in/dcass001; LinkedIn, "Faisal Malik," accessed 25 May 2019, https://www.linkedin.com/in/faisal-malik-b7a6061/; LinkedIn, "Adam Evans," accessed 25 May 2019, https://www.linkedin.com/in/adamevansrbc/?originalSubdomain=ca.

[195] *Ibid*., Adam Evans.

consistent domain expertise is cause for concern.

There are undoubtedly justifiable reasons for making certain appointment decisions. The need to prepare less technically suitable appointees for further progression, and a lack of technically suitable candidates at the appropriate rank level are two that come to mind. These may be perfectly acceptable reasons; however, in order to be certain the risks to the institution of selecting a non-optimal candidate is being suitably considered an objective approach to this analysis must be taken.[196] A number of questions, arise to form the basis for an objective approach:

- Is there a need to conduct leader selection for positions in emerging domains differently?
- Can the "Leader Framework" be adapted for this purpose?
- If so, how does the CAF determine which leader elements and attributes to privilege over others as selection criteria?
- Do all leadership positions or key appointments in the domain need to be assessed differently?
- If not, how does the CAF determine which should be?
- Once those positions have been identified, how does the CAF measure potential appointees against those elements and attributes objectively?

Summary and Analysis

As Conceptual Foundations notes, "[e]xperienced leaders who have achieved technical and professional mastery and a mature self-confidence are, at the very least, expected to question if not challenge the status quo, to demonstrate initiative, and generally to make things happen."[197] This quote captures a fundamental expectation of leaders in the CAF, which is to lead in the face of the status quo. In this case the status

[196] The author is not aware of the current process used for selecting and is not presuming that an objective approach is not being taken at this time, this is simply a statement of fact.
[197] Department of National Defence, A-PA-005-000/AP-004, *Conceptual Foundations*…, 52.

quo is the notion that generalists are best qualified to lead at senior levels of the institution; and, that specialist expertise is not a leadership requirement for senior officers, even for positions dealing with highly technical or specialized subject-matter. This notion was reinforced by several senior leaders who spoke to the class of JCSP 45 and appears to be predicated on the idea that specialization and strong leadership are mutually exclusive attributes, and that as one rises in rank the importance of expertise to leadership always diminishes.[198] It is the notion that this is an absolute principle which is being contended in this paper. The next section approaches this issue by examining the doctrine to address the three objectives of the chapter.

Discussion

The first objective was to search for support of the aforementioned notion regarding generalists in leadership positions. Based on this review of the CAF's keystone leadership publications, it is clear that they identify the importance of technical expertise and competence at all levels. And, although the doctrine recognizes the need for leaders to broaden their knowledge as they progress in seniority, nowhere does it state that this means leaders can abdicate the responsibility to remain technically competent.

Secondly, the review sought to summarize elements and concepts within the doctrine relevant to emerging domains of operations. The key findings were that the trust building behaviours, the principles of leadership, and the "Leadership Framework" all reinforce the importance of expertise and to a degree specialization. Of particular interest is the "Leadership Framework," which was envisioned primarily as a tool for senior

[198] Ross Pigeau and Carol McCann, "What Is a Commander?" in *Generalship and the Art of the Admiral: Perspectives on Canadian Senior Military Leadership*, ed. by Bernd Horn and Stephen J. Harris (St. Catharines: Vanwell Publishing, 2001), 94-95. As well, the author asked two general officers whether or not the CAF would benefit from primarily having specialists in leadership positions in emerging domains of operations and in both cases, they answered that it would not.

leaders to develop their replacements. However, the doctrine also discusses its potential use in other aspects of human resource management, such as career management. This framework will be examined further for its use in analyzing leadership requirements for senior leadership positions in the cyberspace domain. Although the doctrine is lacking in terms of having adaptation mechanisms and processes for leadership, it does offer more insight than was first imagined.

The final objective of this section was to find factors or gaps in the doctrine that might make it difficult to adapt in order to meet the leadership requirements of emerging domains of operations. It is noteworthy that a thorough review of these publications reveals no references to the debate of specialist vs. generalist leaders, nor were there any references to this in the supporting leadership publications. In addition to this, several key points have been identified through this review.

The doctrine does not discuss the need to continually survey leadership research for useful theories and concepts, or how to dynamically incorporate any that are found into CAF leadership models and concepts. This means the CAF is not prepared to take advantage of new theories that could enable improved organizational outcomes.

Additionally it does not discuss how to handle the introduction of new (emerging) operational domains, or significant changes to established domains, from a leadership perspective. In particular, there is no objective process for assessing if a new domain, or significant change to established domains, requires special consideration to be given to certain leadership elements and what options might be considered to manage this. It is unreasonable for CAF leadership doctrine to be re-written for every possible emerging domain of operations, or each time leadership research reveals something applicable to the CAF, however it should be possible to produce joint doctrine notes for significant

changes that affect CAF leadership. The fact that nothing was produced following Joint Doctrine Note 2017-02 - Cyberspace Operations, or in parallel with it, indicates that the potentially unique leadership requirements of emerging domains are not being considered, or at least not in a timely manner.

Based on the analysis of the history of appointees to the position of DG Cyber and a comparison to the role of the CISO in the private sector, it is clear that expertise is not being sufficiently weighted in leader selection for emerging domains. Its assessed that this is an institutional issue which is attributable to not applying an objective process for determining if changes, such as emerging domains, are significant enough to necessitate updated leader selection criteria or non-traditional leader selection processes; and, because the doctrine does not provide a risk-management approach to leader selection which would ensure decisions are informed by potential risk to institutional outcomes.

The CAF mission "is to defend Canada and Canadian interests while contributing to international peace and security."[199] From this it is deduced that the *most critical responsibility* of CAF leaders is leading the force in the defeat of an adversary attack on one or more components of that mission.[200] In the end it is essential to remember that although leadership is always in service of the CAF mission, which is very general, the approach to leadership must be adaptable and consider the specific nature of the contemporary security environment.

Conclusion

If the CAF expects to achieve operational success in emerging domains, it must

[199] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 2

[200] Department of National Defence, A-PA-005-000/AP-001, *Duty With Honour*…," 13. It is understood that CAF leaders are constrained in the accomplishment of this critical responsibility by any number of limitations, including: any limits on action imposed by the Government of Canada, applicable domestic and international law, conduct in accordance with the DND and CAF Code of Ethics.

focus significant effort on identifying and selecting leaders with the requisite expertise to make this possible. The review of CAF leadership doctrine made it clear that that despite opinions and perceptions to the contrary, the doctrine fully recognizes the importance of expertise and professional competence at all levels.[201] In fact, it provides a "Leader Framework" for senior leaders where one of the five leader elements is expertise, which includes technical expertise.[202] Several gaps were found in the doctrine which centre around a lack methods or concepts to assist leaders with managing significant changes in leadership requirements, whether that is based on a change in the security environment, as with emerging domains or, because of changes to leadership theory due to new research. Although CAF leadership doctrine is comprehensive, it has not been significantly updated since 2007 and leadership research has continued to progress since then, so the CAF must continuously "horizon scan" for changes to leadership theory so it can adapt as needed.

Based on this, there is a need for the CAF force development process to allow for dynamic adjustments to its leadership requirements that are based on objective analysis. This will ensure, to an extent, that leaders are recruited and trained for the fights they will face, and that the right leaders are selected for positions that are suitable for their expertise and to the contemporary security environment. In emerging domains of operations, the CAF must, whenever possible, privilege expertise and specialization in leaders at all levels if it is to succeed in defending Canada and its interests, even if this necessitates bypassing or adapting traditional personnel management policies. In order to ensure accurate deductions and recommendations are made it is essential to include a

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[201] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 19
[202] Department of National Defence, A-PA-005-000/AP-006, *Leadership in the Canadian Forces: Leading the Institution* (Ottawa: DND Canada, 2007), 126-128

review of several important concepts from contemporary leadership theory that have come about since CAF leadership doctrine was published.

CHAPTER FOUR – CONTEMPORARY LEADERSHIP THEORY

Introduction

The pace of leadership research in the fields of individual differences has grown exponentially since 2012, just five years after the publication of *Leading People* and *Leading the Institution*. As contemporary leadership research in this field continues to be more empirical in nature, and more focused on tying specific individual differences to leadership outcomes, it becomes more useful to those responsible for leadership selection. It is essential that the CAF account for advances in leadership research generally, but especially when defining the leadership requirements of emerging domains of operations. This chapter will examine the study of individual differences and the results of several studies that demonstrate the benefits of specialist knowledge and expertise in achieving institutional outcomes.

Traits, Characteristics and Individual Differences

The study of how leadership outcomes are influenced by individuals' traits, characteristics, and the differences in those traits between individual leaders is a research theme dating back as far as the 1920s; making it the most enduring research topic in the science of leadership.[203] Of particular interest to the question of whether specialization and expertise is important in emerging domains is research that examines the links between individual differences and leadership outcomes.

A 2000 study by Mary Shane Connelly, *et al*, examined how leader performance of United States Army officers across six rank levels, and from ten different posts, was

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[203] Stephen J. Zaccaro *et al*, "Leader individual differences, situational parameters, and leadership outcomes: A comprehensive review and integration," *The Leadership Quarterly* 29, no. 1 (February 2018): 2, https://www.sciencedirect.com/science/article/pii/S1048984317300784?via%3Dihub

related to leadership skills and knowledge.[204] This study builds on research by Mumford, *et al*, which found that "leaders' complex problem-skills, social judgement skills, and knowledge directly influence…[their] performance."[205] The study used constructed-response measures to study three hypotheses, which are listed below.[206] Hypotheses one and two of this study are of particular interest to the current study. The first looks to demonstrate that certain leader capabilities, such as domain knowledge, account for variances in leader achievement. The second is similar, however it also accounts for cognitive ability, motivation and personality so that the effects of the other factors is considered in relation to them.

> **Hypothesis 1**. Constructed response measures of key leader capabilities including complex problem-solving skills, social judgment skills and leader knowledge, are expected to account for significant variance in two leadership criterion measures — leader achievement and quality of problem solutions. Each constructed response measure is expected to account for unique variance in these criteria.
>
> **Hypothesis 2**. Constructed response measures of leader problem-solving skills, social judgment skills and knowledge are expected to account for significant variance in problem-solving quality and leader achievement in addition to the variance accounted for by more traditional leader attributes including general cognitive ability, motivation, and personality.
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> **Hypothesis 3**. It is expected that results will support a mediated model of leadership, where problem-solving skills, social judgment skills and knowledge mediate the relationship of general cognitive abilities,

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[204] Mary Shane Connelly *et al*, "Exploring the Relationship of Leadership Skills and Knowledge to Leader Performance," *The Leadership Quarterly* 11, no. 1 (Spring 2000): 66-68, https://www.sciencedirect.com/science/article/pii/S1048984399000430

[205] *Ibid*., 68.

[206] "Constructed-response questions are assessment items that ask students to apply knowledge, skills, and critical thinking abilities to real-world, standards-driven performance tasks. Sometimes called "open-response" items, constructed-response questions are so named because there is often more than one way to correctly answer the question, and they require students to "construct" or develop their own answers without the benefit of any suggestions or choices," from: Karen Tankersley, "Chapter 1. Constructed Response: Connecting Performance and Assessment," in *Tests that Teach: Using Standardized Tests to Improve Instruction* (Online: Association for Supervision and Curriculum Development, 2007), accessed 17 May 2019, http://www.ascd.org/publications/books/107022/chapters/Constructed-Response@-Connecting-Performance-and-Assessment.aspx.

> motivation and personality to leader performance. Specifically, the covariation between cognitive abilities, motivation, personality, and leader performance is expected to diminish when problem-solving skills, social judgment, and knowledge are controlled.[207]

The methodology for measuring the complex problem-solving and social judgement skills was to present the participants leadership scenarios that presented a problem relevant to the skill being measured, and then have them respond to scenario-based constructed response questions.[208] For example, one of the complex problem-solving scenarios was a hypothetical combat situation and the subjects were asked to answer a series of questions asking them to do things such as defining the problem, identify the information needed to solve the problem, and describe possible plans to solve the problem.[209] The component of the study dealing with knowledge measurement was based on the responses provided and was conducted by having the subjects sort "domain-relevant (i.e., Army) leadership tasks into self-generated organizing categories."[210] The level of expertise was then assessed on the basis of the "the number, complexity and organization of the categories and the appropriateness of the tasks sorted into them."[211] For both hypotheses one and two, the data was then analyzed using hierarchical regression to determine if the variables in question resulted in statistically significant differences in leadership performance.[212]

The results of the study indicated that leader performance and the quality of solutions to problems are strongly correlated to leader skills and knowledge, with a range

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[207] Mary Shane Connelly *et al*, "Exploring the Relationship…," 69.
[208] *Ibid*., 70.
[209] *Ibid*.
[210] *Ibid*.
[211] Mary Shane Connelly *et al*, "Exploring the Relationship…," 70.
[212] *Ibid*., 72.

of moderate to large correlation.[213] The method of the study prioritized individual leader skills in the hierarchical regression analysis which led to a stronger correlation to leader skills than to knowledge; however, both of these still exceeded the correlation to between individual motivation and personality, and leader performance.[214] Given that this analysis was based on traditional problems in an established domain – i.e. a combat scenario in the land domain – it is not surprising that knowledge was not a larger differentiating factor when compared to leader skills. This is because mature military training systems, particularly those of western armies, ensure that a minimum knowledge level is attained by all graduates, to do otherwise introduces unacceptable risk to loss of life. The fact that knowledge was still able to have a relatively significant impact on leader performance in this context reinforces its importance.[215] These findings support the CAF doctrinal view that knowledge and expertise are essential elements to effective leadership and organization success.[216]

The Generalist as Leader

As discussed earlier in this study, there is a very strong, almost religious, devotion in many sectors – business and military amongst them - to the idea that generalists make better leaders than specialists. This is despite a paucity of scientific research and peer

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[213] *Ibid*.
[214] *Ibid*., 72-74.
[215] A more revealing study would be pit leaders from different domains (military or otherwise), who have demonstrated equivalent complex problem-solving skills, against the same problem sets to isolate the knowledge factor.
[216] Department of National Defence, A-PA-005-000/AP-001, *Duty With Honour*…, 7.

reviewed literature supporting the hypothesis.[217] This does not mean that it is not true that generalists are better leaders; and in fact some of the literature advocating that specialists make better leaders in certain situations also acknowledges there are circumstances where generalist leaders will have a higher likelihood of success.[218]

Unfortunately, the majority of the literature found supporting the generalist position is undermined by appealing to superficially attractive comparisons to unrelated areas of generalization and specialization that do not hold up under closer scrutiny. An example is a June 2012 article published by *Forbes* in which the author argues in favour of generalists dominating the workforce over specialists.[219] Although this article does not address leadership specifically, it is representative of the types of arguments used to support the position for generalist leaders. The author starts by making an argument for the domination of generalists in the workforce by creating a false correlation to the unrelated subject of survival traits developed through evolutionary biology.[220] Comparisons are made that equate specialists to koalas and generalists to mice, with the conclusion being that specialists can only excel in their specialty, and then only in ideal

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[217] The majority of the articles found by the author that support this position were opinion articles. They were still published by very reputable sources, such as *Forbes*, which gives them credibility; however the lack of peer reviewed research undermines the position. Meghan Casserly, Forbes, "The Secret Power of the Generalist – And How They'll Rule the Future," last modified 10 July 2012, https://www.forbes.com/sites/meghancasserly/2012/07/10/the-secret-power-of-the-generalist-and-how-theyll-rule-the-future/#7b3489f92bd5; Steve Hardy, Creative Generalist, "Leaders as Generalists," last updated 17 December 2013, http://creativegeneralist.com/2003/12/leaders-as-generalists/.

[218] Florenta Teodoridis, Keyvan Vakili, Micheal Bikard, "Can Specialization Foster Creativity? Mathematics and the Collapse of the Soviet Union," *Academy of Management Proceedings* 2017, no. 1 (August 2017), https://journals.aom.org/doi/abs/10.5465/ambpp.2017.224; Ulrich Mabou, Medium, "Specialist vs Generalist: How I Became 'A Fraud in Transition,' And How You Could Better Manage Your Own Transition!," posted 8 April 2018, https://medium.com/@ulrichmabou/specialist-vs-generalist-how-i-became-a-fraud-in-transition-and-how-you-could-better-manage-d4588df7db2e; Lauren Dixon, Talent Economy, "Which is Better: Being a Generalist or Specialist," posted 4 October 2017, https://www.chieflearningofficer.com/2017/10/04/better-generalist-specialist/.

[219] Meghan Casserly, Forbes, "The Secret Power of the Generalist – And How They'll Rule the Future," last modified 10 July 2012, https://www.forbes.com/sites/meghancasserly/2012/07/10/the-secret-power-of-the-generalist-and-how-theyll-rule-the-future/#7b3489f92bd5.

[220] *Ibid*.

conditions; whereas, generalists are more adaptable and can succeed in a variety of roles under less ideal conditions.[221] What the nature of these 'ideal' and 'less-ideal' conditions are in the context of a work environment is unclear, unless it refers to the collapse of an industry, in which case one could argue that other factors such as motivation, discipline and cognitive abilities are more important determinants to future success than whether someone was a specialist or not. Another article uses sports as the analogy, equating specialists to the players and the generalist leader to the coach.[222] However, as the next section demonstrates, there is objective, peer reviewed, research indicating that coaches who played professionally before becoming coaches have a higher probability of leading the team to success than those who did not.

Setting these fallacious arguments aside, there is ample support for the idea that in domains where the pace of change is relatively slow, generalists have advantages in developing creative solutions to problems over specialists.[223] And, since change management and crisis management are important leadership functions that rely on creativity, it is logical to deduce that there are many situations where generalists will prove to be superior leaders. However, do they have that advantage in emerging domains of operations? Based on the evidence provided in this section the answer would need to be based on an assessment of the rate of change in the domain. This assessment would need to address the rate of change from two perspectives. The rate of change in terms of pure technical research would need to be measured, perhaps by analysing the number of scholarly articles being produced; but, also the rate of change as a military domain of

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[221] *Ibid*.
[222] Steve Hardy, Creative Generalist, "Leaders as Generalists," last updated 17 December 2013, http://creativegeneralist.com/2003/12/leaders-as-generalists/.
[223] F. Teodoridis, *et al*., "Can Specialization Foster Creativity…," 6.

operation. A similar metric could be used for this, as was used for theoretical research. The rate at which articles about the subject are produced for military journals, and how often it is topic at defence and security conferences could be measured and would provide an indication of advancements in the domain. Another option would be to approach this from a force development perspective and look to use metrics that measure the rate of change in funding and other resources dedicated to force development efforts for the domain.

The Specialist as Leader

A study by Teodoridis, *et al*., would indicate that a specialist can be a leader, as would a number of studies by Dr. Amanda Goodall, a senior lecturer at the Cass Business School, City University of London.[224] However, the belief that specialists can be superior leaders is far less popular amongst leadership practitioners and researchers, but it does appear to have more objective research supporting it than could be found for generalists. The aforementioned researchers provide strong evidence that in certain contexts specialists are more creative than generalists and they can be superior leaders.

Specialists and Creativity

Teodoridis, *et al.,* examined the question of creativity, which has often been deemed to be the area where generalists excel over specialists in every way. It was their view that there was an "implicit assumption underlying this line of thought," which is that there is relative stability in the domain of study that gives generalists a creative advantage.[225] Additionally, prior research indicated that specialists had a tendency to view all problems through the lens of their specialization – the adage that 'for a hammer

[224] Amanda Goodall, "Amanda Goodall Home Page," http://www.amandagoodall.com/index.html.
[225] F. Teodoridis, *et al*., "Can Specialization Foster Creativity…," 1.

every problem is a nail' is an apt description of this mentality.[226] They wanted to determine whether this was true or if there are certain conditions where specialization fosters creativity. So, a very interesting study was developed that examined three hypotheses:

> **Hypothesis 1**. In fast-evolving knowledge domains, specialists will produce more creative output than their generalist colleagues.
>
> **Hypothesis 2**. In fast-evolving knowledge domains, specialists will produce more breakthroughs than their generalist colleagues.
>
> **Hypothesis 3**. In fast-evolving knowledge domains, specialists will increase collaboration more than their generalist colleagues.[227]

They took advantage of an occurrence – the fall of the Soviet Union – to test their theories and used a "difference-in-difference-in differences (DDD)" methodology to compare research output and collaboration rates in certain fields of mathematical research before and after the fall of the Soviet Union.[228] This proved to be a useful comparison because Soviet researchers had excelled in certain fields, so changes in mathematical research outputs could be compared amongst western researchers as a result of this.[229]

Once they had tabulated the data, they tested the first hypothesis which could be described as testing for general creativity. First they calculated a baseline differential in productivity which indicated that in fields "that did not experience a substantial movement in knowledge frontier, specialists produced approximately 25% fewer citation-weighted publications per year than generalists did in years after 1989."[230] However, in the most affected fields they found that specialists increased their output by an incredible

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[226] *Ibid*., 1-2.
[227] *Ibid*., 3.
[228] F. Teodoridis, *et al*., "Can Specialization Foster Creativity…," 4.
[229] *Ibid*., 3-4.
[230] *Ibid*.

83%, relative to generalists.[231] They then tested the second hypothesis regarding breakthroughs which can be deemed a test of effective creativity. Once again, they established a baseline for domains that changed little, which was that specialists had 25% fewer breakthroughs compared to generalists in these domains, but for domains most affected they produced 74% more breakthroughs than did generalists.[232] Finally, they determined that there was a decline of approximately 7% in the number of collaborators amongst specialists compared to generalists for the least affected domains, while the number of people specialists collaborated with rose by 40% compared to generalist in the most affected domains.[233]

Their results support the conclusion "that specialists have creative advantage over generalists when knowledge domains evolve quickly, and substantial new knowledge components become available."[234] And that "specialists have a more thorough and nuanced grasp of the available knowledge in their domain of specialty" allowing them to react more quickly to new discoveries.[235] In generalizing the outcomes of their findings, they propose that this research would be very useful to Research & Development organization in formulating improved human resource selection criteria, especially for those working rapidly evolving domains.[236] This is clearly applicable to the question of leader selection in emerging domains of operations, especially for leadership in the area of capability development, as there are obvious parallels between the two.

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[231] *Ibid*.
[232] *Ibid*.
[233] *Ibid*.
[234] F. Teodoridis, *et al*., "Can Specialization Foster Creativity…," 2.
[235] *Ibid*.
[236] *Ibid*., 6

Specialists and Leadership

Dr. Amanda Goodall could be viewed has having spearheaded an effort to "debunk" the notion that generalist leaders are more effective in senior leadership roles than specialists. In order to make this point she has conducted, or collaborated on, leadership research in fields as diverse as hospital administration and Formula One racing and proposed a "Theory of Expert Leadership (TEL)."[237] Her findings indicate that, for highly technical or specialized fields, having specialists in leadership positions significantly improves organizational outcomes.

For example, in an article led by James K. Stroller, the authors studied why "the best hospitals are managed by doctors."[238] It was found that in a head-to-head comparison of physician vs manager-run hospitals, physician-run hospitals had approximately 25% higher quality scores.[239] There were several factors contributing to this outcome. One is that in general, management worsens with the separation clinical and managerial responsibilities and knowledge; when asked what "attributes of a physician-leader might account for this," Dr. Toby Cosgrove, the CEO of Cleveland Clinic - which is one of the best hospitals in the United States – responded "credibility…peer-to-peer credibility."[240] Furthermore, it was determined that physician-led hospitals remained focused on the ultimate purpose of patient-care rather than

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[237] Amanda H. Goodall and Ganna Pogrebna, "Expert Leaders in a Fast-Moving Environment," *The Leadership Quarterly* 26, no. 2 (April 2015): 1, https://www.sciencedirect.com/science/article/pii/S1048984314000794?via%3Dihub; and, Amanda Goodall, "Amanda Goodall Working Papers," http://www.amandagoodall.com/workingpapers.html.
[238] James K. Stoller, Amanda Goodall, and Agnes Baker, "Why the Best Hospitals are Managed by Doctors," Harvard Business Review Online (2016): 2, https://hbr.org/2016/12/why-the-best-hospitals-are-managed-by-doctors.
[239] *Ibid*.
[240] *Ibid*.

becoming bogged down in trying to achieve efficiency at the expense of effectiveness.[241] Finally, they discovered a strong connection between leader competence and human resource factors such as employee satisfaction, and improved talent recruitment and management; and, since improved employee satisfaction leads to enhanced organizational performance this is another area were expert leadership contributes, as a second order effect, to organizational success.[242]

This is one example of the research on the TEL. There are also studies comparing the performance of Formula One teams and professional American basketball teams under expert leadership to those that are not. Those studies bare out the conclusion that having expert leaders correlates to improved organizational outcomes.

Conclusion

There is significant historical and contemporary research that supports the importance of expertise in leadership positions, although just as in the CAF doctrine there is a clear understanding that there are also cases where generalists will provide the best opportunity for organizational success.

Although there is no one-sizes fits all solution that covers every scenario or requirement, it must be understood that expertise and specialization are not in and of themselves detrimental to leadership. The CAF requires a process to dynamically and objectively examine emerging domains, and established ones that are facing rapid change, in order to assess what requirements need to be privileged over others for leader positions in those domains. However, even without that domain specific analysis, there is significant empirical evidence from the studies reviewed in this chapter indicating that the

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[241] *Ibid*., 3.
[242]

CAF should employ specialists in leadership positions within emerging domains of operations. It also needs to take a risk-management approach to leader selection. This allows the organization to understand the risks it is assuming if it chooses career progression over institutional success in a given selection process.

CHAPTER FIVE – RECOMMENDATIONS AND CONCLUSIONS

Introduction

The focus of this study is to determine if achieving institutional objectives in emerging domains requires the CAF to privilege expertise and specialization when selecting leaders for those domains. Or, is the current strategy of appointing generalists to key position such as DG Cyber, sufficient to meet the ambitions laid out for the CAF in the new defence policy. By consolidating and analyzing the research findings it will be possible to provide recommendations for the thesis, and several other issues that were identified through the course of this study.

Terminology and Emerging Domains

In order to be able to answer the hypothesis, it was necessary to first provide a definition for an emerging domain of operations as none existed. Additionally, there was no consensus amongst CAF allies or NATO for definitions of "domain" or "domain of operations," so it was necessary to build a hierarchy of recursive definitions in order to reach one for "emerging domain of operations." The proposed definition is: *a proposed domain of operations that differs from established domains based on a need for new capabilities and/or operating concepts - which may not exist yet, and which have not been operationalized or institutionalized - in order to interact with the domain and to conduct activities in or through it*. Based on this proposed definition there are clear leadership implications for military leaders responsible for force development, and those responsible for force employment.

There is potentially a need to simultaneously develop and employ new capabilities in a rapidly evolving capability space, which places a tremendous burden on leaders. An interpretation of Teodoridis', *et al*, findings regarding the productivity of specialists in

rapidly evolving fields of study indicates that having specialist leaders at all levels, but especially senior decision-makers, would better serve the institution.[243] In addition, there is the possibility that certain capabilities and/or operating concepts may not exist yet and thus must be created dynamically. Once again, specialists have an objective advantage over generalists when it comes to being creative in rapidly evolving technical domains.

Leadership in Emerging Domains

Based on the research and findings of the leadership review several conclusions are evident. First and foremost is that CAF leadership doctrine does not make any direct claims that would lead one to believe that generalist leaders are prized over specialists. In fact, the overwhelming message within the doctrine is that expertise and competency should be pursued at all times and at all levels.[244] This is supported by a growing amount of contemporary research into leadership theory which has found that in technical fields, such as medicine and sports, expert leaders achieve better institutional results.[245]

It is therefore counter-intuitive for the CAF to be overly concerned about the leadership abilities of military officers who are also specialists, given the resources and time that is invested in leadership training and education. This is a more valid concern in the private sector where leadership training is not nearly as institutionalized or robust as that in the CAF. As leaders advance in rank and responsibility, it is expected that they will pursue professional development and education as necessary to meet the

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[243] Teodoridis, *et al*., "Can Specialization Foster Creativity…," 5.
[244] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 6.
[245] James K. Stoller, Amanda Goodall, and Agnes Baker, "Why the Best Hospitals are Managed by Doctors," Harvard Business Review Online (2016): 2, https://hbr.org/2016/12/why-the-best-hospitals-are-managed-by-doctors; Amanda H. Goodall and Ganna Pogrebna, "Expert Leaders in a Fast-Moving Environment," *The Leadership Quarterly* 26, no. 2 (April 2015): 1, https://www.sciencedirect.com/science/article/pii/S1048984314000794?via%3Dihub.

responsibilities of their positions.[246] There is, however, a limit to how effective this type of self-learning can be in a time and resource constrained environment. It is therefore preferable that appointees to leadership positions in emerging domains have expertise either based on their post-secondary education or based on employment in similar domains or fields. This is not to say that the CAF should look to employ non-military personnel in these positions. This cannot be completely discounted as a possibility without further research; however, the unique nature of military operations has necessitated the establishment of the profession of arms and the importance of having experience and knowledge of military operations is also essential in making sound decisions that take into account technical and uniquely military considerations.[247]

It is therefore concluded that *the CAF requires specialist military leaders in order to achieve its institutional objectives* of keeping pace with allies and adversaries in operating effectively in the emerging domains of space and cyberspace. In addition to supporting the thesis regarding leadership in emerging domains, the research conducted also led to additional considerations and recommendations.

Additional Recommendations

Leadership Doctrine for Special Cases

Emerging domains can be viewed as a special case for CAF leadership doctrine which must be captured and addressed, therefore three recommendations are made in this regard.

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[246] Department of National Defence, A-PA-005-000/AP-001, *Duty with Honour*…, 18.
[247] *Ibid*.

Initial Assessment of an Emerging Domain

DRDC-CORA should be tasked to develop deliberate analysis process for assessing potential emerging domains to determine if there is a likelihood that they will require specialist leaders to form the core of a capability development team. This will allow the deliberate and structured establishment of positions and funding to address the needs of that domain, rather than allowing this to be an ad-hoc process that is un-resourced. An example of the initial steps of such a process could be that at the earliest indication that an emerging domain of military operations may be declared, MILPERSCOM and Chief of Force Development (CFD) would be tasked to jointly analyze what types of knowledge and skills of the domain and determine if the necessary expertise exists within the CAF to provide some level of effective leadership and to develop a weighted selection matrix based on the leader elements of the "Leader Framework."

Non-Traditional Leader Selection

Once appropriate leader selection criteria are developed it is still necessary to select the best individuals. This can be a challenge in militaries given the manner in which members progress, with very little to opportunity to bypass a rank. However, if the CAF is serious about succeeding in current and future emerging domains it must be willing to approach leader selection from a risk-management perspective. Fundamentally the question in most cases is, is it more important to ensure institutional level progress in that particular domain by selecting the right person? Or, is it more important to provide military leaders with an opportunity to lead at a specific level so they will have that experience for use at the next level, even if they do not have the expertise required to do lead effectively in that position? In the latter case the domain suffers at the expense of

investing in the best leaders. Taking a risk-management approach will result in the opportunity for better informed and more objective decision making, and should lead to the most appropriate leader being selected when it is necessary to do because of the risk evaluation.

Inverted Skill and Knowledge Requirements in Emerging Domains

One additional discovery was the notion of inverted skill and knowledge requirements of emerging domains. It is generally assumed that maintaining a high level of technical skill and knowledge is only required at the tactical level, and that as leaders move to the operational and strategic level this is less important.[248] This may be true for established operational domains where change, whether in technology or the conduct of operations, is very gradual. However, the validity of this assumption needs to be challenged for emerging domains where the underlying theories, technology and operating concepts are changing rapidly and where the nature of military operations in these domains is uncertain. This paper proposes that skilled and knowledgeable leadership is required at all levels in these domains, but especially at senior levels in emerging domains. Two primary reasons were identified for this. The first is that because there are likely to be a very limited number of senior leadership positions dedicated to these domains, and also very few experts to fill those positions – perhaps as few as one – decisions at this level do not have the benefit of peer review by military officers who understand the domain.

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[248] Ross Pigeau and Carol McCann, "What Is a Commander?" in *Generalship and the Art of the Admiral: Perspectives on Canadian Senior Military Leadership*, ed. by Bernd Horn and Stephen J. Harris (St. Catharines: Vanwell Publishing, 2001), 94-95.

Recommendations for Future Research

Additional research is required to adapt the leader development framework for use as a tool for formally and objectively assessing the leadership requirements for positions linked to emerging domains of operations. A possible approach to this would be to conduct a survey of current and past incumbents against the leadership framework elements and attributes to determine their level of expertise. This data could then be used in an analysis using similar methods to those used by Connelly, *et al*., but modified for the emerging domain to assess the impacts of their expertise on leadership outcomes.[249]

Another area for further research would be to use an empirical method to determine the validity of the inverted skill and knowledge requirements for emerging domains. A similar methodology could be applied to this type of research, but modifying the constructed response measures using additional data on the responsibilities and decision making of private sector CISOs.

Conclusion

The evidence supporting the prioritization of expert leaders for senior positions in emerging domains of operations is convincing. Therefore, it has been recommended that the "Leader Framework" be adapted to evaluate leadership positions in emerging domains so that the most important selection criteria be identified. Additionally, a more dynamic, risk-management based, approach for selecting leaders in emerging domains is required to enable more informed decisions that account for the two often competing factors of career progression and organizational success. Until an emerging domain is

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[249] Mary Shane Connelly *et al*, "Exploring the Relationship of Leadership Skills and Knowledge to Leader Performance," *The Leadership Quarterly* 11, no. 1 (Spring 2000): 66-68, https://www.sciencedirect.com/science/article/pii/S1048984399000430.

operationalized and institutionalized, this approach could result in leaders being identified who do not meet the rank requirements of a position – possibly by a significant margin. If so, it may be necessary to use non-traditional leader selection methods to enable the institution to achieve success in these domains in the short to medium term, while developing the critical mass necessary to operationalize and institutionalize its efforts in these domains. These non-traditional means could be as simple as increased willingness to promote personnel as "acting while so employed" in order to get the best fit for purpose.

This paper has provided several contributions to the literature on leadership and military doctrine regarding emerging domains of operation and military leadership in those domains. Additionally, in the area of terminology new definitions for "domain," "domain of operations," and "emerging domain of operations" have been proposed based on NATO terminology doctrine.

Most importantly it has been demonstrated that current CAF leadership doctrine recognizes and reinforces the need to maintain expertise and competency, even as leaders advance to more senior positions.[250] And, contemporary research on the appointment of specialists to positions of leadership proves that specialist leaders deliver better results than generalists in technical domains and domains that are evolving rapidly.[251] Given the technical and rapidly evolving nature of emerging domains of operations, it is clear that if

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[250] Department of National Defence, A-PA-005-000/AP-003, *Doctrine*…, 19.
[251] James K. Stoller, Amanda Goodall, and Agnes Baker, "Why the Best Hospitals are Managed by Doctors," Harvard Business Review Online (2016): 2, https://hbr.org/2016/12/why-the-best-hospitals-are-managed-by-doctors; Amanda H. Goodall and Ganna Pogrebna, "Expert Leaders in a Fast-Moving Environment," *The Leadership Quarterly* 26, no. 2 (April 2015): 1, https://www.sciencedirect.com/science/article/pii/S1048984314000794?via%3Dihub; F. Teodoridis, *et al*., "Can Specialization Foster Creativity…," 2.

the CAF is to meet the ambitions of *Strong, Secure, Engaged* for these domains, it must select military leaders who are specialists in them to ensure success.

ANNEX A – KING'S EVOLUTIONARY STAGES OF LEADERSHIP THEORY

Table 1: Evolutionary Stages of Leadership Theory

Personality Era

Great Man Period

Great Man Theory (Bowden, 1927; Carlyle, 1841; Galton, 1869)

Trait Period

Trait Theory (Bingham, 1927)

Influence Era

Power Relations Period

Five Bases of Power Approach (French, 1956; French and Raven, 1959)

Persuasion Period

Leader Dominance Approach (Schenk, 1928)

Behaviour Era

Early Behaviour Period

Reinforced Change Theory (Bass, 1960)

Ohio State Studies (Fleishman, Harris, and Burtt, 1955)

Michigan State Studies (Likert, 1961)

Late Behaviour Period

Managerial Grid Model (Blake and Mouton, 1964)

Four-Factor Theory (Bowers and Seashore, 1966)

Action Theory of Leadership (Argyris, 1976)

Theory X and Y (McGregor, 1960, 1966)

Operant Period (Sims, 1977; Ashour and Johns, 1983)

Situation Era

Environment Period

Environment Approach (Hook, 1943)

Open-Systems Model (Katz and Kahn, 1978)

Social Status Period

Role Attainment Theory (Stogdill, 1959)

Leader Role Theory (Homans, 1959)

Sociotechnical Period

Sociotechnical Systems (Trist and Bamforth, 1951)

Contingency Era

Contingency Theory (Fiedler, 1964)

Path-Goal Theory (Evans, 1970; House, 1971)

Situational Theory (Hersey and Blanchard, 1969; 1977)

Multiple Linkage Model (Yukl, 1971; 1989)

Normative Theory (Vroom and Yetton, 1973; Vroom and Jago, 1988)

Transactional Era

Exchange Period

Vertical Dyad Linkage/Leader Member Exchange Theory

(Dansereau, Graen, and Haga, 1975)

Reciprocal Influence Approach (Greene, 1975)

Emergent Leadership (Hollander, 1958)

Role Development Period

Social Exchange Theory (Hollander, 1979; Jacobs, 1970)

Role Making Model (Graen and Cashman, 1975)

Anti-Leadership Era

Ambiguity Period

Attribution Approach (Pfeffer, 1977)

Substitute Period

Leadership Substitute Theory (Kerr and Jermier, 1978)

Culture Era

McKinsey 7-S Framework (Pascale and Athos, 1981)

Theory Z (Ouch and Jaeger, 1978)

In Search of Excellence Approach (Peters and Waterman, 1982)

Schein (1985)

Self-Leadership (Manz and Sims, 1987)

Transformational Era

Charisma Period

Charismatic Theory (House, 1977)

Transforming Leadership Theory (Burns, 1978)

Self-Fulfilling Prophecy Period

SFP Leader Theory (Field, 1989; Eden, 1984)

Performance Beyond Expectations Approach (Bass, 1985)

Table A.1 – Evolutionary Stages of Leadership Theory

ANNEX B – KINGS EVOLUTIONARY TREE MODEL

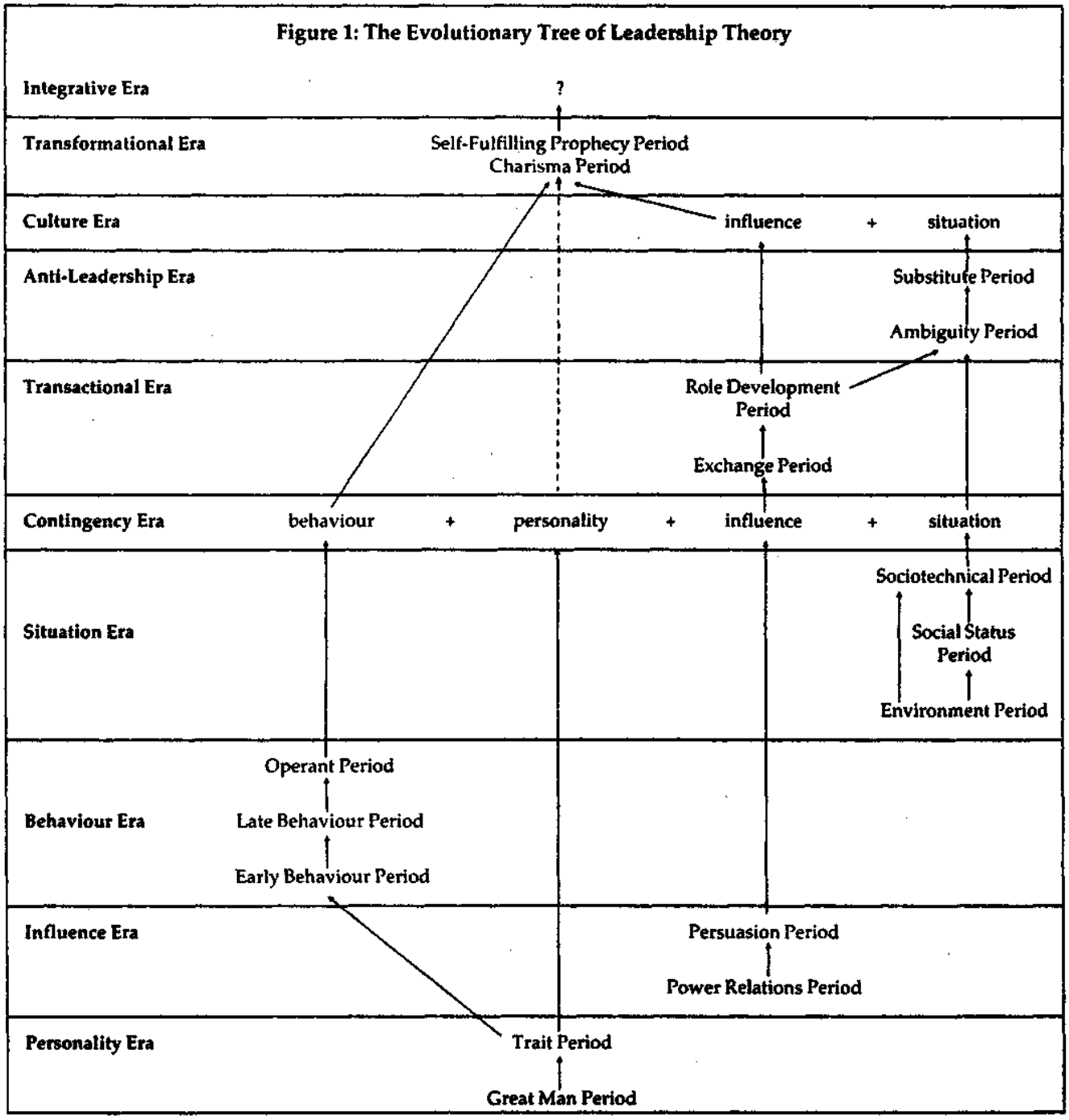

Figure B.1 – The Evolutionary Tree of Leadership Theory

ANNEX C – BASES OF SOCIAL POWER DEFINITIONS

Table C.1 – Bases of Social Power

Base of Power	Definition
Referent Power	Based on followers' identification and liking for the leader. A teacher who is adored by students has referent power.[252]
Expert Power	Based on followers' perceptions of the leader's competence. A tour guide who is knowledgeable about a foreign country has expert power.[253]
Legitimate Power	Associated with having status or formal job authority. A judge who administers sentences in the courtroom exhibits legitimate power.[254]
Reward Power	Derived from having the capacity to provide rewards to others. A supervisor who gives rewards to employees who work hard is using reward power.[255]
Coercive Power	Derived from having the capacity to penalize or punish others. A coach who sits players on the bench for being late to practice is using coercive power.[256]
Information Power	Derived from possessing knowledge that others want or need. A boss who has information regarding new criteria to decide employee promotion eligibility has information power.[257]

[252] John R.P. French, Jr., and Bertram Raven, "The Bases of Social Power," in *Studies in Social Power* (Ann Arbor: University of Michigan, 1959), 154-155, adapted by Peter G. Northouse, *Leadership: Theory and Practice*, 7th ed. (Los Angeles: SAGE Publications, 2016), 10
[253] *Ibid*., 155-156, *ibid*.
[254] *Ibid*., 153-154, *ibid*.
[255] *Ibid*., 152, *ibid*.
[256] *Ibid*., 152-153, *ibid*.
[257] B.H. Raven, "Social Influence and Power," in *Current Studies in Social Psychology* (New York: Holt, Rinehart, & Winston, 1965), adapted in Peter G. Northouse, Leadership: Theory and…, 10.

ANNEX D – LEADER BEHAVIOURS FOR BUILDING TRUST

- Demonstrate high levels of proficiency and professional competence in the performance of core functions and take advantage of opportunities to enhance their professional expertise and competence;
- Exercise good judgment in decisions that affect others and do not expose people to unnecessary risks;
- Show trust and confidence in their subordinates by giving them additional authority and involving them in decisions where circumstances allow;
- Demonstrate concern for the well-being of their subordinates, represent their interests, and ensure they are supported and taken care of by the organization;
- Show consideration and respect for others, treating subordinates fairly – without favour or discrimination;
- Be professional in bearing and conduct;[258]
- Focus on the mission, maintaining high standards and honest and open communications;
- Lead by example, sharing risks and hardships and refusing to accept or take special privileges; and
- Keep their word and can be counted on to honour their obligations.

[258] Department of National Defence, A-PA-005-000/AP-005, Leadership in the Canadian Forces: Leading People (Ottawa: DND Canada, 2007), 78. This behaviour is found in "Leading People" but not in "Doctrine." All other behaviours are found in both sources.

ANNEX E – A LEADER FRAMEWORK

Table E.1 – Leader Element Descriptions and Attributes

A Framework of Five Leader Elements	Sixteen Attributes (*in bold*) Within Five Elements Across the Leader Continuum The focus, scope and magnitude of competencies for responsibilities related to the leader attributes will vary with rank, leader level, position, etc., and usually increase with time in the CF, rank, seniority and credibility.
Expertise	Expertise consists of **technical** (clusters, e.g., combat arms, sea trades, aircrew) **and specialist** (Military Occupation Classification) proficiencies, an understanding and development of the **military and organizational** environments, and the practice and eventual stewardship of the profession of arms, with the capacities to represent and transform the system through applications at the **strategic and institutional** levels.
Cognitive Capacities	Cognitive capacities consist of a problem-solving, critical, **analytic**, "left-brain" competence to think and rationalize with mental discipline in order to draw strong conclusions and make good decisions; plus an innovative, strategic, conceptually **creative**, "right-brain" capacity to find novel means, "outside the box" ends, and previously undiscovered solutions to issues and problems.
Social Capacities	Social capacities consist of a sincere and meaningful behavioural **flexibility** to be all things to all people, with authenticity, combined with **communications** skills that clarify understanding, resolve conflicts and bridge differences. These capacities are blended with an **interpersonal** proficiency of clarity and persuasiveness, **team** relationships that generate co-ordination, cohesion, trust and commitment, and **partnering** capabilities for strategic relations building.
Change Capacities	Change capacities involve **self**-development, with risk and achievement, to ensure self-efficacy; **group**-directed capacities to ensure unit improvement and group transformation; and all with an understanding of the qualities of a CF-wide learning organization, the applications of a **learning organization** philosophy, and the capacity of strategic knowledge management.
Professional Ideology	Professional ideology consists of an acute awareness of the unique, theory-based, discretionary body of knowledge at the core of the profession, with an **internalized ethos** whose values and beliefs guide the application of that knowledge. The discretionary nature of military knowledge requires keen judgment in its use and involves **moral reasoning** in thinking and acting, shaped by the military ethos. Professional Ideology underpins a leader exemplar with **credibility/impact** who displays character, openness, assertiveness and extroversion that ensures the necessary effect by and from the leader.

Source: Adapted from Department of National Defence, A-PA-005-000/AP-006, Leadership in the Canadian Forces: Leading the Institution (Ottawa: DND Canada, 2007), 130.

ANNEX F – LIST OF DIRECTOR GENERAL CYBERSPACE APPOINTEES

Table F.1 – Director General Cyberspace Appointees

Year Appointed	Year Replaced	MOC & MOSID[259]	Education and Training[260]	Applicable Employment[261]	Name & Rank[262]
2018[263]	-	Combat Engineer (00339)	- Bachelor of Civil Engineering - Master of Defence Studies	N/A	BGen A.R. Jayne
2017[264]	2018	Naval Warfare Officer (00207)[265]	- Bachelor of Arts, Political Science - Master of Defence Studies	N/A	Cmdre R. Feltham
2015[266]	2017	Communications and Electronics Engineer (00340)	- Bachelor of Science (Honours), Statistics - Master of Defence Studies	- Operations Officer, Information Protection Centre; - Commanding Officer, Canadian Forces Network Operations Centre; - Commander, Canadian Forces Information Operations Group	BGen F. Allen
2013[267]	2015	Naval Warfare Officer (00207)	- Bachelor of Administration - Master of Defence Studies - Master in Defence Policy and Management	N/A	Cmdre D.C. Hawco
2011[268]	2013	Communications and Electronics Engineer (00340)[269]	- Bachelor of Science.in Electrical Engineering[270] - Master of Electrical Engineering[271]	- Commander, Canadian Forces Information Operations Group	BGen G.D. Loos

[259] Prior to promotion to General/Flag Officer rank.
[260] At time of appointment.
[261] Employment, prior to appointment, that would require one to demonstrate the technical proficiency attribute of the expertise element of the "Leader Framework," for the cyberspace domain, such as positions in cyber defence, computer network security, or information security.
[262] At time of appointment.
[263] CANFORGEN 034/18 CMP 018/18 012203Z MAR 18, Promotions and Senior Appointments 2018 – General and Flag Officers, para 2.Q.(2)
[264] CANFORGEN 022/17 CMP 014/17 262032Z JAN 17, Promotions and Senior Appointments 2017 – General and Flag Officers, para 2.G.(2).
[265] Prior to the creation of the Naval Warfare Officer occupation, he was a member of the Maritime Surface and Sub-Surface (MARS) Officer occupation.
[266] CANFORGEN 104/15 CDS 029/15 011916Z JUN 15, Amendment to Promotions and Senior Appointments 2015 – General and Flag Officers, para 2.C
[267] CANFORGEN 022/13 CDS 011/13 052106Z FEB 13, Senior Appointments 2013 – General and Flag Officers, para 1.G.5.
[268] CANFORGEN 055/11 CDS 011/11 251751Z MAR 11, Senior Appointments 2011 – Generals and Flag Officers, para 1.AG. This is the first record in CANFORGENs of the appointment of someone to the position of Director General Cyberspace.
[269] EventSmart, "Depart with Dignity: Bio of MGen G.D. Loos, OMM, CD," accessed 16 May 2019, https://dwdloos.eventsmart.com/bio-of-mgen-loos/.
[270] *Ibid*.

ANNEX G – LIST OF PRIVATE SECTOR CISOS

Table G.1 – Director General Cyberspace Appointees

Name	Company	Applicable Employment and Experience[272]	Education and Training[273]
David Cass[274]	IBM	- IBM Chief Information Security Officer Cloud & SaaS Operational Services, IBM (2015-Present) - Senior Vice President & Chief Information Security Officer, Elsevier (2011-2015) - Senior Director of InfoSec Risk and Governance, Freddie Mac (2009-2011) - Vice President – Director, JP Morgan Chase (2006-2008) Appointments and Memberships: - Global Cyber Institute Steering Committee Member[275] - Official Member - Forbes Technology Council[276] - Adjunct Faculty, Drexel University[277]	- MBA, MIT – Sloan School of Management - M.S.E., Technology, University of Pennsylvania - MS, University of Pennsylvania – The Wharton School - Supply Chain and Technology Management, The Hong Kong University of Science and Technology - B.S., Lebanon Valley College Certifications: - CGEIT (Certified in Governance of Enterprise Information Technology), ISACA - CISM (Certified Information Security Manager), ISACA - CISSP (Certified Information Systems Security Professional), ISC^2 - CRISC (Certified in Risk and Information Systems Control), ISACA - Certified Information Privacy Manager, IAPP - Certified Information Privacy Professional/Europe, IAPP - Certified Information Privacy Professional/United States, IAPP - NSA - INFOSEC Assessment Methodology (NSA-IAM), National Security Agency

[271] LinkedIn, "Greg Loos," accessed 16 May 2019, https://ca.linkedin.com/in/greg-loos-23656717.
[272] Employment, prior to appointment, that would require one to demonstrate the technical proficiency attribute of the expertise element of the "Leader Framework," for the cyberspace domain, such as positions in cyber defence, computer network security, or information security.
[273] At time of appointment.
[274] LinkedIn, "David Cass," accessed 25 May 2019, https://www.linkedin.com/in/dcass001.
[275] Global Cyber Institute, "About Us," accessed 25 May 2019. The Global Cyber Institute is the first institute of its kind to address the critical threats of a cyber world by focusing on the intersection of law, business, policy, and technology.
[276] An invitation-only organization comprised of world-class CIOs, CTOs, CISOs and technology executives.
[277] Professor of IT Risk Management, Audit, Assurance, and Information Security.

Faisal Malik[278]	Deloitte Canada	- Chief Information Security Officer, Deloitte Canada (2015-Present) - Senior Manager, IT Security, Deloitte & Touche (2008-Presnt) - Manager, Security and Privacy Group, Deloitte & Touche (2001-2008) - Senior Consultant, CGI (1998-2001) - Team Leader, Dow Jones (1997-1998) - Technical Engineer, AST Computer (1994-1997)	- Campion School Certifications: - CISA (Chief Information Systems Auditor), ISACA - CISSP (Certified Information Systems Security Professional), ISC[2] - ISO 27001 Lead Auditor - ITIL v3
Adam Evans[279]	Royal Bank of Canada	- Vice President Cyber Operations & Chief Information Security Officer, RBC (2018-Present) - Vice President Information Security Services, RBC (2017-2018) - Vice President Global Technology Infrastructure & Risk Management, RBC (2016-2017) - Director, Security Operations Centre, RBC, (2014-2016) - Director Cyber Security & CSIRT, Scotiabank, (2013-2014) - Senior Manager Security Operations Centre & Director of CSIRT, Scotiabank (2010-2014) - IT Specialist, IIROC (Investment Industry Regulatory Organization of Canada) (2002-2004)	- Ryerson University, CISSP, Information Security Certifications: - CISA (Chief Information Systems Auditor), ISACA - CISM (Certified Information Security Manager), ISACA - Information Security and Controls, ISACA

[278] LinkedIn, "Faisal Malik," accessed 25 May 2019, https://www.linkedin.com/in/faisal-malik-b7a6061/.

[279] LinkedIn, "Adam Evans," accessed 25 May 2019, https://www.linkedin.com/in/adamevansrbc/?originalSubdomain=ca. In my current role I manage a team of security and risk professionals that provide Security Operations Centre, Threat Intelligence, Security Analytics, Incident Response, Risk Management, Supplier Management, Security Tooling and Identity Administration services for RBC globally. I am also the Global CISO for RBC responsible for execution of the Enterprise Cyber Strategy.

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