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ENABLING INNOVATION IN THE DEPARTMENT OF NATIONAL DEFENCE

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Abstract

The Department of National Defence currently faces opportunities for improvements in innovation. Improving departmental innovation practices will improve efficiency and effectiveness while bringing credibility to the organization and enabling improved battlefield flexibility and corporate support. The department requires knowledge of the current state of innovation and a view of the steps required to advance if it is to improve innovative practices. This paper highlights industry successes and formulates these successes into means that can be applied to military and governmental applications. Key findings suggest that leadership support, attitudes towards risk, exposure to industry and academic innovation norms, and human resource practices will lead to cultural change and innovation success. Following these findings will improve the department, placing it as a leading-edge innovator if fully implemented.

CHAPTER 1 INTRODUCTION

> I'd like to believe that innovation is part of every role, every exploration, and every decision made in the company. It's in the way we think, the way we approach new circumstances, and the way we recognize opportunity.
>
> -Angela Yochem, BDP International, a global logistics company

General

Governments are often criticized by the public for not being innovative. While there have been historical cases of innovation in certain time periods and under certain conditions (e.g., the development of the tank or technology developed within NASA), the government as a whole can benefit from innovative practices which should be more frequently championed within its ranks.

The last federal election ushered in increased emphasis on innovation. The new government has been taking significant steps to be more innovative and encourage innovation within academia, government, and industry. As part of the Government of Canada's recent innovation initiatives, the Department of National Defence (DND) needs to increase and improve its innovation practices.[1] This paper is designed to establish a foothold by enabling DND leadership to assess their unit's current level of innovation and begin to navigate the department towards increased and improved innovation.

[1] Further details are still to be announced by the federal government, but an interesting read and additional information can by found at the University of Toronto http://www.theglobeandmail.com/report-on-business/rob-commentary/canadas-innovation-agenda-theres-such-a-thing-as-too-much-consultation/article29722903/

Background

Technological progress stops without innovation. Organizations that fail to innovate are doomed to decay and become extinct. In a military sense, if nations had not been able to technologically advance they would have been at risk of defeat and insecurity. Additionally, technological advancement with civilian applications would have also been stymied.

Innovation, however, is more than simply advancing technology or an arms race and it is far more than attempting to do more with less. Innovation is a mindset and part of an organization's culture that strives to advance and develop new processes, strategies, practices, and equipment. Above all, it provides flexibility to respond to ever increasing demands and to optimize the use of resources. Numerous business publications ranging from academic writings at MIT to popular reading materials all highlight the present drive and need for an innovative culture.[2] It is this culture that serves as a foundation for new ideas, improves processes, crafts human resource efforts, improves financial management, encourages creativity, demands efficiency, exacts effectiveness, and ultimately determines survivability. Almquist et al and Roth of Bain & Company in their research into innovative companies found that firms that were highly innovative experienced higher revenue growth, higher employee loyalty, and better decision-making.[3] DND may not be earning revenue but when it earns credibility in the public eye, it is well funded and respected while maintaining member loyalty and improving decision making. Therefore, these traits are also those sought in DND.

[2] Jay Rao and Joseph Weintraub. "How Innovative Is Your Company's Culture," *MIT Sloan Management Review* (online) (19 March 2013), http://sloanreview.mit.edu/article/how-innovative-is-your-companys-culture/

[3] Eric Almquist,Mitchell Leiman, Darrell Rigby, and Alex Roth. "Taking the measure of your innovation performance" Bain & Company, 2013 http://www.bain.com/Images/BAIN_BRIEF_Taking_the_measure_of_your_innovation_performance.pdf

In a military context, innovative thinking applies from the tactical level through the strategic political level. At the tactical level, innovative thinking can provide unique solutions across a spectrum from how to effectively and ethically fight insurgents all the way to how a logistic chain is laid out for maximum effectiveness in situations that are not addressed by doctrine.[4] At the operational level, innovative design thinking will help drive plan formation from orders given at the strategic level while balancing operational assets such as logistics hubs to support multiple theatres of operations. At the strategic level, programs such as renewable fuels for training fleets, equipment design for arctic operations, partnerships with industry and academia, licencing R&D discoveries to industry, recruiting, support to industry, and capability specialization are just a few areas for innovation. Across all levels, innovative thinking is required for joint organizations such as psychological operations (PSYOPS), civilian military operations (CIMIC), Intelligence, Logistics, and Engineering. Innovative thinking and design will be the future driver of resource efficiencies and help DND and the CAF become a world leader in military innovation and design thinking.

Opponents to massive innovative thought in government could argue that the government and public service are present to serve the people and innovation should take a back burner to core public services. These opponents fail to realize that innovation creates better service.[5] Innovation thinking helps counter this problem. Innovation is not designed to compete with government services, rather it should be a tool to enhance them. Likewise, innovation should

[4] A prime example of this is Maj Pouget in Algeria who saw significant success by applying ethical, innovative thinking to his sector. Unfortunately, his methodology was not adopted and the war in Algeria was lost. Multiple sources discuss these tactics. See Martin S. Alexander and J.F.B. Keiger (eds) *France and the Algerian war, 1954-1962: Strategy, Operations and Diplomacy*, (London:Frank Cass, 2002)

[5] Elenor Glor, "Challenges to Innovation in the Public Sector" *The Innovation Journal: The Public Sector Innovation Journal* 2(3), (1997)

play a major role in military development, departmental efficiencies, and combat effectiveness. Innovation and government services must be cohorts.

Other opponents to massive innovation initiatives or cultural changes could also argue that there is insufficient funding or resources to be innovative and that such changes would simply burden already over-tasked staff with more work. This issue will be addressed in this paper but, in short, it does not carry much merit.

DND's lack of emphasis on innovation is symptomatic of a larger Canadian culture that falls behind industry in terms of innovation development. In Industry Canada's *Canada's Inclusive Innovation Agenda* publication, the department highlights that Canada ranks well in social programming but is: Increasingly declining in R&D, 10th in the world at attracting top talent, 20th in business cluster development, and has significant space to improve in global value chains.[6] The department further notes that Canada ranks 22nd out of 34 OECD countries for funds spent on research.[7]

DND has an opportunity to improve its innovation against this national concern and contribute to the federal government's innovation agenda while improving the nation's military capabilities. Doing so will build credibility for DND, improve current offerings, develop more efficient and effective services, and provide better value for money for the taxpayer.

An innovation mentality in DND will help create a culture that is flexible and adaptable with second order effects on the battlefield as an ability to develop innovative solutions to

[6] Innovation, Science, and Economic Development Canada. "Canada's Inclusive Innovation Agenda." The State of Play, (Ottawa:ISED, November 2016), 6-10, https://www.ic.gc.ca/eic/site/062.nsf/vwapj/Inclusive_Innovation_Agenda-eng.pdf/$file/Inclusive_Innovation_Agenda-eng.pdf

[7] Innovation, Science, and Economic Development Canada. "Canada: A Nation of Innovators," (June 2016)

complex warfighting problems. Innovation is not exclusive to the development of new gadgets or tools, but applies to systems, doctrine, tactics, procurement, critical thinking, and even job fulfillment.

Opponents to significant innovation development in DND may argue that DND is too small for innovation development and should rely on industry or world power militaries to perform innovation development and Canada can simply purchase innovative products or services from these other entities. It is true that Canada does not have an economic ability to compete or compare with US military innovation development and DND will always have to rely on industry. But, a culture of innovation can have positive effects on the organization from the Private soldier and public servant heavy equipment operators to Director and General level staff. Some examples where DND needs direct innovation expertise in-house or in partnership with industry include: Supply chain management, support to the arctic, development of coalition and industry clusters, process improvement, procurement, clothing development (e.g., winter clothing), information technology, combat radios, and ship-to-shore communications.[8]

Problem Statement

The Canadian Department of National Defence needs to develop improved in-house innovation capabilities and practices in order to maximize the use of resources from the tactical to the strategic level in every aspect of its operations.

[8] The term cluster is used here in reference to language used by Innovation, Science, and Economic Development. The term refers to cross-network collaborations which can be between industry and government, within industry, or involving academia. The term is used in both industry and education. One of the Harvard references and the paper by Muro and Katz in the bibliography provide further details. See also Innovation, Science, and Economic Development Canada. "Canada's Inclusive Innovation Agenda." The State of Play, (Ottawa:ISED, November 2016). 6-10, https://www.ic.gc.ca/eic/site/062.nsf/vwapj/Inclusive_Innovation_Agenda-eng.pdf/$file/Inclusive_Innovation_Agenda-eng.pdf

Research Questions

The research questions that guided this study included:

1. Is DND an innovative organization?
2. If not, how can DND become more innovative and what barriers to innovation currently exist?
3. If so, how can its innovative practices be captured, enculturated, and shared?

The research for this project demonstrated that Question 2 vice Question 3 was the prevailing norm. Therefore, the focus was placed on the first two questions.

Thesis

DND needs to develop an innovation mindset in order to improve resource management and problem solving capabilities from the tactical to the strategic level. In order to do this, it must first recognize where it stands and then determine what actions are needed to develop itself as an innovative institution.

This paper will provide self-evaluation tools that commanders can use to assess the level of innovation within their organizations and determine what direction and what magnitude of change they must seek in order to become truly innovative.

Defining Innovation

> The use of imagination and innovation to be unpredictable has enormous potential benefits
>
> -NATO AJP-10(D) Allied Joint Doctrine

Innovation is not the same as change. Change can readily be present and not be innovative. Change can be administrative, change for the sake of change, change for career

advancement, or change in response to the environment.[9] It is important to make this distinction from the outset as too often change appears more career or personality driven than change for innovation improvement purposes.

The definitions of innovation are wide and varied. Famed management guru Peter Drucker states: "Innovation can be defined as the task of endowing humans and material resources with new and greater wealth-producing capacity."[10] Wealth-producing capacity in a military sense can mean improved efficiency in materiel usage, more effective warfighting, improved personnel training and management, and ultimately the optimization of available resources under given limitations. The value proposition then for the military is to bring to bear a wide range of effects in an efficient and effective manner by drawing on existing resources. Resources will always be limited so the need for innovation is even more important. Innovation in this context is taking scarce resources and creating unique, useful, or optimal uses for and from available resources.

Drucker further argues that innovation is not invention nor is it an amalgam of enterprising, intelligent, or managerial types coming together in an organization with or without a unified purpose. He notes that converting the public's needs into useful products and services is but one definition of innovation while he also implies that innovation is both a mentality and a function similar to marketing yet cross functional.

From the site visit to IDEO, innovation in the IDEO context could be defined as a corporate culture mentality that enables thought processes and actions resulting in both efficient

[9] Change in response to the environment can include: Technological adjustments, adoption of new processes or policies, change to tactics in response to an external or internal stimuli, etc. Change in response to the environment can be done completely without innovation so cannot be considered innovation.

[10] Peter Drucker, *The Essential Drucker*, (New York: Harper, 2001), 22-23

and effective use of resources leading to the development of products and services that solve problems.

Bringing a closer definition to how government innovation should work, the Organization for Economic Co-operation and Development (OECD) defines innovation as significant improvements in production, processes, techniques, equipment, design, promotion, or practices.[11] This definition is fairly broad, fitting most situations.

Drawing from these definitions and looking at a specific focus on DND, the definition of innovation for this project will be: The discovery, implementation, or development of new methods, processes, or tools which maximize the department's societal, economic, and warfighting contributions within its mandates. Defining innovation using this definition focuses innovation in a departmental context while encompassing the basic definitions of innovation found in industry as noted earlier. This creates a dynamic combination of innovation attributes that can centre on how DND should strive to innovate—something that is already implied by innovative organizations so not defined by them in these terms.

The breadth of the department must be captured using this type of definition. It is important that this definition encompass the entire department. Sufficient divides already exist between the CAF and Assistant Deputy Ministers (ADMs) offices in certain areas and success at the strategic level will only be possible if both halves of the department are enculturated into an innovation dialogue and practice.

At the operational and tactical levels, innovation can and should exist. Innovation must enable cross pollination throughout the department to both military and civilian staff. Civilians

[11] Organization for Economic Co-operation and Development, 2016, https://www.oecd.org/site/innovationstrategy/defininginnovation.htm,

need to embrace the innovation culture since so much of the department is comprised of civilians. A lack of civilian buy-in to innovation will cause friction between CAF members and civilians as one seeks mission success on the ground while the other enables mission success. Military members need to be innovative in order to be able to adapt to changing circumstances in the battlespace and changing conditions on the home front. The two are intertwined with a need for innovation on both fronts.

US military author William McRaven suggests innovation as a contributing element to special forces operations.[12] He states, "Innovation simplifies a plan by helping to avoid or eliminate obstacles…it is also the application of unconventional tactics."[13] Such comments are supported by additional US special operations doctrine which notes that special operations are conducted by "units who apply special skills with adaptability, improvisation, and innovation."[14] Canada has a small military and as such is required to do the same functions, perhaps in different ways or in a more conventional context, but the concept still applies.

The definition of innovation needs to be separated from three concepts, namely: Technology, evolution, and adaptation. Technological development is based in innovation and scientific discovery. However, the adoption of technology does not necessarily indicate that an organization is innovative. It may mean that the organization is simply evolving with the use of technology. Evolution is a change within the organization but also does not signal that an organization is innovative. Most businesses today operate using computers as opposed to carbon paper. The adoption of computers is an evolutionary change, not an innovation creation for the business that now uses computers even though efficiency and effectiveness are improved.

[12] William H. McRaven, *The Theory of Special Operations,* (Monterey, California, Post Naval School, 1993). 17-20

[13] Ibid., 20

[14] Joint Publication 3-05, *Special Operations,* Joint Chiefs of Staff, (16 July 2014), 1-2

Adaptation to a new environment, process, technology, or situation does not mean the organization is innovative either. Adaptation may be simply a survival mechanism or common response to a changing situation. A store may change its sales tactics to adapt to a competitor. The change should not be considered innovative unless it is something either unheard of or is at least new for the industry. Dropping prices or changing from commissioned to salaried employees is simply an adaptation, not an innovation. The differentiation between innovation and these other terms becomes important during the later discussion of organizational innovation evaluation.

Characteristics of an Innovator

> Innovation distinguishes between a leader and a follower
>
> —Steve Jobs

People are the basis of innovation, not processes, not frameworks, not libraries, not even intelligence—it is people. Many research studies have been conducted on the innovative characteristics of people. The importance of these characteristics contributes to the innovation development discourse since the basis of culture and results comes from what innovators do or how they behave.

Innovation is a leadership characteristic as noted above by Steve Jobs. However, within the leadership realm, there are specific characteristics that people have and can develop. Drucker provides an initial picture of what makes up the inner workings of an innovator.[15] He starts by indicating that innovators are people who think in conceptual and perceptual terms. They seek to

[15] Peter Drucker, *The Essential Drucker*, (New York: Harper, 2001)

observe and ask questions. They are inquisitive by nature as also discussed by various popular media writers.

Next, he declares that innovators are able to match opportunity with innovation. An inventor of a new widget that does not satisfy a need or desire may have an innovative product by definition, but without a practical application, the innovation is lost to the betterment of the organization. Since innovation begins with a problem or opportunity analysis, it makes sense that the innovation matches an opportunity or creates a new opportunity.

Following on from his discussion in creating something new and useful, he declares that a grandiose idea with the "aim at revolutionizing an industry [is] unlikely to work."[16] He argues that innovations that start small are more likely to succeed.[17] Therefore, the innovator needs to be someone that is both able to see the local picture while concurrently seeing the greater picture.

Bagley lists several different traits that apply to the characteristics of an innovator.[18] It is unlikely that all innovators will possess all these skills, but knowing them can help individuals and leaders to recognize them in themselves or others. Principally, these include:

1. Authentic leadership;
2. Networking abilities;
3. The ability to draw strength from diversity;
4. Adaptability to change; and
5. Willingness to break norms.

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[16] Peter Drucker, *The Essential Drucker*, (New York: Harper, 2001), 275
[17] Peter Drucker, *Innovation and Entrepreneurship,* (New York:Harper&Row, 1986), 136
[18] Rebecca Bagley, "The 10 Traits of Great Innovators," *Forbes,* (15 January 2014) http://www.forbes.com/sites/rebeccabagley/2014/01/15/the-10-traits-of-great-innovators/#428c74d5ed50

Several of these characteristics are supported by Chamorro-Premuzic writing for the Harvard Business Review. His findings suggest that the following characteristics are present in innovators:[19]

1. Insight. The ability to see the problem and then develop opportunity solution sets;
2. Education. Formal training or education is held by the vast majority of innovators. Contrary to popularized media stories, they are not often school drop-outs. They are often experts in their fields and this training helps them filter relevant and irrelevant data.
3. Proactivity. Innovators take action;
4. Persistence. Innovator's drive and resilience exceed that of their peers;
5. Prudence. The level of risk taking used in an organization is still debated by many scholars and practitioners. But, Chamorro's thoughts on caution and other authors comments on calculated risk taking support prudence as an essential characteristic of innovative people;
6. Social Capital and Emotional Intelligence. These features are highlighted by many other authors as attributes of successful innovators.

He also argues that innovators are more than simply creative people. They are creative people that can take action and produce a workable result. Creative people can see a problem but may not know how to solve it while an innovator sees it as an opportunity for action. Innovators are passionate and use that passion opportunistically. Creative people possess a hungry mind while innovators seek to satisfy that hunger through execution. The culmination of these

[19] Tomas Chamorro-Premuzic, "The Five Characteristics of Successful Innovators," *Harvard Business Review*,(October 2013), https://hbr.org/2013/10/the-five-characteristics-of-successful-innovators

individual characteristics should form the basis for innovators in DND and ultimately the culture within the department.

Dissinnovation

This paper will use the term 'disinnovation' to describe practices that run counter to innovative practices. Disinnovation is not simply doing the reverse of innovation or failing to innovate; it is fighting against innovation. Contemporary bureaucracies by their current nature are disinnovators. A recent stellar example of disinnovation is the DND Travel Directive. Created in isolation at the strategic level on the corporate side of DND and made more restrictive than Treasury Board requirements, the DND Travel Directive resulted in significant increases in costs at the tactical training level with no cost savings.[20] Even if this program was a new and beneficial program it would still not qualify under the above definition of innovation but rather an administrative change since levels of approval are neither unique nor new.

Disinnovation is driven by stovepiping, myopic viewpoints, a lack of diversity, careerism, an unsuitable definition of risk, apathy, a lack of professional education, poor communication, bureaucracy, inappropriate hiring practices, poor innovation culture, and failure to make timely decisions. Dissinnovation occurs far too frequently and is stifling DND and arguably many western nations' ability to fully innovate. Using the self-assessment tool in Annex A, which will be discussed later, can help practitioners and organizations determine the level of disinnovation in their organizations.

[20] The full briefing note on the costs can be obtained from Transportation Company at 5 Canadian Division Support Group, Technical Services Branch

Misalignment Between Industry and DND

DND lags behind industry in many respects. While there are 'innovation dogs'—firms that lack innovation, but which are not disinnovative— there are many firms that are world class innovators.[21] Classic examples include: IDEO, the world's premier design firm; 3M, known for its 15% innovation project time; and Google, known for new products and 20% innovation time. Forbes lists Tesla Motors, Salesforces.com, Regeneron Pharmaceuticals, Incyte, Alexion Pharmaceuticals, Under Armour, Monster Beverage, Unilever Indonesia, Vertex Pharmaceuticals, and BioMarin Pharmaceuticals as the top ten innovative firms of 2016.[22] It is interesting to note that there is not one defense contractor in the top ten most innovative firms and likely only about three or four firms that military members would even recognize. Even cross referenced with the Bloomberg Top 50 Innovative Companies list of 2010, defense contractors were scarce (several companies supplied the defence industry but defense was not the main purchaser). [23] These examples seem to support the idea that not only are defence departments lacking in innovation, but so may the entire industry compared to other industries. This is troubling considering the investments being made in new technologies such as the F-22 and F-35 aircraft. It may also help partially explain the high cost of new military equipment when other industries are obtaining improved technology at lower prices.

[21] Clayton Christiansen is known for his discussion on disruptive innovation where larger companies with large R&D departments and competent senior managers have fallen prey to upstart firms that employ disruptive innovation.

[22] The World's Most Innovative Companies, 2016 Ranking, *Forbes*, 2016, http://www.forbes.com/innovative-companies/list/#tab:rank

[23] Bruce Einhorn, The 50 Most Innovative Companies, *Bloomberg Businessweek*, 15 April 2010 http://www.bloomberg.com/news/articles/2010-04-15/the-50-most-innovative-companies

Opponents to Adopting Industry Practices

Profit and Innovation

An innovative culture and profitmaking are not inextricably attached. Opponents to innovation in a public service, and something to which Drucker is staunchly opposed, argue that profit driven firms need innovation since they produce products and services that are profit oriented.[24] An organization can be innovative regardless of whether it is an NGO, government, public company, private firm, charity, or anything else. Innovation should not be driven by profit, rather innovation should be driven by needs. Profits follow needs being filled for private firms while for NGOs and government, effective and efficient services delivered with maximum effect is the result of innovation. This distinction is very important.

Opponents of seeking best practices from industry will say "they are seeking profit but we do not make a profit so this type of thinking does not apply to DND." Statements such as these create a mental block and demonstrate that the elocutionist is incapable of connecting the principles learned from industry to a DND situation. Profits are only one minor difference between DND and the private sector while there are many, many similarities from staffing, to procurement, to value for money, to contracting, etc. The most successful and innovative businesses do not discuss profit in their mission or vision statement. Consider the mission of 3M:[25]

3M technology advancing every company

3M products enhancing every home

3M innovation improving every life

[24] Peter F. Drucker, *Innovation and Entrepreneurship: Practice and Principles*, (New York: Harper & Row, 1985), 179-180

[25] 3M Investor Overview, http://s2.q4cdn.com/974527301/files/doc_downloads/2016/3M-2015-Investor-Overview.pdf

There is no mention of profit in this statement. The same lack of reference to profit mentioned was found at IDEO, Nestle, Apple, and others. Steve Jobs' original mission statement was: "To make a contribution to the world by making tools for the mind that advance humankind."[26]

When comparing industry with DND in the quest for best practices, the idea that firms are profit driven so they can be innovative while DND is not profit driven so it does not need to be innovative or does not need to adopt practices from industry are made by individuals who have never worked in industry or do not understand it. Innovative industry seeks to provide a product or service to the public that brings the public value. The public rewards that firm with sales which are translated into profits. DND does the same thing. It provides a service. If the public deems that service to be of little value or not credible, then DND gets cut even if there may be a future credible threat to Canadians. The process is parallel to industry. Granted, there are other factors in both industry and government with competing priorities and this example has been radically simplified, but at the base level the argument is valid.

Having individuals who argue against innovation or business practices in project management or leadership positions where innovative opportunities exist create a dangerous leadership situation and will stifle innovation within DND detracting from credibility. Akin to this attitude is the 'not invented here' mentality which is equally damaging. Innovation and innovative business practices are not well understood throughout DND.

[26] Investopedia, What is Apple's current mission statement and how does it differ from Steve Job's original ideals? http://www.investopedia.com/ask/answers/042315/what-apples-current-mission-statement-and-how-does-it-differ-steve-jobs-original-ideals.asp

Rostek argues that "many, but not all, of the problems associated with change in DND and the CF stem from the unfettered application of these private sector change methods to the public sector."[27] He argues that adoption of business practices is not applicable since DND is not profit oriented but rather a monopoly with significant downside risk.[28] He further declares that private industry can move in the shadows while the public sector must be open and transparent thereby creating inefficiencies. He states, "In other words government (public sector) and management (private sector) are not interchangeable concepts."[29] He continues, "change in the public sector is not so much about identifying solutions but rather working around unique obstacles."[30]

These arguments are not new. They are frequently heard throughout many ranks within DND on both the civilian and military sides and are red herrings that are not supportable as per the prior discussion. Additionally, change initiatives and fatigue from changes can be tiring. Unfortunately, the present culture that evaluates change management as an annual evaluation point encourages needless change aiming to create a 'look at me' scenario rather than seeking change through an innovative lens.

Education in Business Concepts

Opponents of adopting business practices into the public sector are often not versed in business practices themselves and have little to no experience running private companies, so it is easy to dismiss the unknown. Those that have worked in the private sector see areas for improvement, including innovation best practices. Many of these individuals see innovation in

[27] Michael Rostek, "Managing Change Within DND," *Public Management of Defence in Canada,* (Toronto: Queen's University Press, 2009) 217

[28] This risk he uses in the sense of failure but can be implied to be career risk or risk that the media will report failures

[29] Ibid., 218

[30] Ibid., 219

two areas. The first is to drive efficiency which drives the bottom line which, in the case of DND, is maximum results for minimum funds expended. The second is to create the best product or service available to satisfy a void or need. No successful company's mission or vision statement declares "to make money." A proper mission statement declares to stakeholders how the company will fill a need. The firm is rewarded by the purchasing public for filling that need. The same concept applies to wage earning doctors, dentists, lawyers, etc. They fill a need, then they get paid. Profit orientation is alive and well in industry but profits come as a result of following business practices and satisfying needs not the other way around.

The public-sector fills needs. In the case of DND, the need is security and security that is both efficient and effective and based on innovation. Having an innovative security entity helps maximize the service delivery of the department that fills the security need. If DND is unable to fill that need effectively, and innovation contributes to effectiveness, then it fails to have legitimacy and public support. The result would be closures or budget cuts. So, the argument that a profit focus destroys the use of business principles is not supported.

If the public sector is not about identifying solutions but rather just providing core mandated programs, then it needs a revamp. The public sector provides a service to citizens. Failing to streamline those services and find solutions to problems that impede fluid transactions and support automatically create an intolerable bureaucracy that excuses wasteful use of resources.

Transparency

Rostek's argument that transparency destroys private sector abilities when adopted into the government is also a weak argument. Why would the government not want to champion

innovation to Canadians and around the world? A culture where honest failures happen can be part of the open dialogue with Canadians and transparency can be leveraged for support to innovation. The current government appears to want innovation by renaming *Industry Canada* to *Innovation, Science and Economic Development Canada*. This department's website even states "we're committed to making Canada a global innovation leader."[31] This is only one part of the Federal Government's plan to bring innovation into the government and DND will not be exempt. Failures and successes will be a normal part of an innovative culture and an open and honest dialogue with Canadians will actually benefit the government and its departments. It may be true that a single failure could be broadcast to the world or be seen by a supervisor as a negative mark on the annual employee evaluation. However, this argument actually begs for an innovative culture where honest failure in innovation is not punished and could be, in many cases, rewarded for seeking to find solutions. If failure is publicly announced, so be it. Using open and honest dialogue with Canadians, failures can be surrounded with successes. Although not part of the research for this project, open honesty about attempts to improve through innovation is likely more valued and palatable by Canadians than cover ups or a bureaucratic status quo.

Purpose of the Study

The purpose of this study is to provide a roadmap to how the department's members and leadership can move to an innovation mentality based on the research questions. Knowing where the organization currently stands and recognizing key milestones to success will help practitioners develop this culture if the leadership within DND is receptive and takes positive action towards an cultural change. This includes combatting the aforementioned arguments

[31]Government of Canada, Canada's Innovation Agenda, https://www.ic.gc.ca/eic/site/062.nsf/eng/home

against innovation. For many, this may be a cataclysmic mental leap compared to the culture in which they were raised or have encouraged. For others, moving to an innovative culture is a natural evolutionally process that is expected but which has not been overly encouraged. In either case, whether it be a large leap or an incremental approach, an innovation oriented culture is necessary for DND.[32]

Limitations in this Study

This study will focus on institutional innovation rather than individual innovation. It will also focus on general innovation practices as opposed developing specific technologies or even the development of technology. The intent of this paper is not to drive DND to become a technology innovator but rather an organization that has improved flexibility, improved problem solving abilities, and an enhanced ability to use its resources more effectively. Championing these abilities to both the government and the public will help bring credibility to the organization and its people. Simple innovative steps in Gagetown with road brine, roof top beekeeping, and biodiesel all brought significant public and political interest with its attendant credibility to 5 CDSG Gagetown and those projects were homegrown and minor in nature.

Disruptive Innovation

Disruptive innovation, the term coined by Clayton Christensen of Harvard Business School in 1995, occurs when the existing status quo is rapidly displaced.[33] Examples include: Mini steel mills, the printing press, railways, the steam engine, the production line, the cotton gin, aviation transportation, and e-commerce. Although this term has applicability to this study,

[32] James Collins speaks to the fact that failure most frequently occurs in firms that try to make a great leap to a new culture or idea. His research finds that incremental movement rather than a great charismatic leap has the greatest probability of success. While this paper will not delve into details on whether DND should make a great leap or evolutionary, incremental step, such considerations should be made.

[33] Clayton Christensen, Disruptive Innovation, http://www.claytonchristensen.com/key-concepts/

DND is not in a position presently to engage in pan-organizational significant disruptive innovation with the exception of a few limited, but exciting, possibilities which will be mentioned. The concept will be mentioned as an area of future aspiration but the topic of disruptive innovation and the full gamut of opportunities are beyond the scope of this study and could be an area for future research.

Assumptions

There are several assumptions upon which this paper is predicated:

1. Culture can change with the proper leadership;
2. Hiring practices can be altered to encourage the hiring of innovative leaders; and
3. Current leadership is willing to adopt innovation practices.

Innovation Opportunities

The department has many opportunities to pursue innovation that can be a benefit to the nation and potentially allied forces. Areas include: Arctic Operations, Search and Rescue, improvements to various types of equipment such as LAVs, and even UAVs.[34] These areas are offered as potential suggestions to enable the reader to frame what types of activities DND can become involved in and start to set the level of innovation DND should be considering. Such concepts are within the capability of the department and the nation. Larger nations such as the US and China have significantly more resources to push towards technology development. Nevertheless, Canada's limited resources should seek to focus on niche innovations that can contribute to the international community.

[34] The example of UAVs is used here as it was used in another project to discuss how a small nation such as Canada can benefit from the use of UAVs and specialize in them due to their low cost, ability to operate under a variety of conditions, the limited investment required, and the need by other nations.

CHAPTER 2 LITERATURE REVIEW

There has been much written on innovation, in the last decade in particular. Unfortunately, much that has been written is not really innovation and many authors have attempted to ride the innovation wave while contributing little for the practitioner. For this reason, a detailed and exhaustive search for literature from reputable sources and authors that have actually applied or are attempting to apply concepts was needed. Since practical application is one of the goals of this paper, the filtering process was important. As practical application was required, the filtering process needed to encompass academic works but also case examples and practices from industry that were not always captured in academic literature. The literature search sought to find this balance.

The literature used in this paper is largely drawn from books and articles used in industry and written for practitioners. A literature search found that most scholarly innovation pieces were centered around new product development, technology development, and medicine. While the principles of innovation in these industries can have application to DND, the leap that would be required from this type of thinking to what DND needs is likely too much for most DND practitioners.

Literature Criteria

Works sought for this paper centered in the following subjects: Innovation culture, innovation development, creativity, design thinking, successful innovative companies, disruptive innovation, industry innovation practices, government innovation, military innovation, innovation and culture, and innovation development. These search terms tended to find information that was of sufficient breadth for DND innovation as opposed to specifics centred on

one industry or narrow scoped technology development. The information found was then compared against the research questions.

Innovation practices from firms and practitioners were sought for comparison purposes against a site visit to IDEO and other innovation leaders in California. A comparison between print literature and practice was desired in an effort to find both commonalities and outliers that could be realistically applied to DND. This balanced the literature with practice.

Foundational Literature

This literature review will only discuss several of the many writings used in this project with a particular focus on writings from organizations that have successfully implemented innovation programs. The success of these programs is a testament to the effective work of the organizations and authors and serves as a key learning tool from which DND can gain insight. DND has its own unique challenges but these writings serve as a launch pad from which to initiate a review of DND innovative practices and thought while providing recommendations on improvement.

IDEO

Tom and David Kelly of IDEO have published individually and conjointly several books about their experiences founding and working at IDEO—arguably the world's preeminent design firm. Works from these authors helped create a comparison between DND and private sector innovation to help determine if DND could be considered innovative. IDEO has had a number of significant project successes including being the developer of the mouse, multiple popular toys, award winning packaging, and ATM interactive screens. Odds are that every person in the western world has been influenced by IDEO products or services without even knowing it. Their

writings are found in many business publications including the Rotman Management Digest and Harvard Business Review.

The first book used for this paper was *The Art of Innovation* by Tom Kelly and Jonathan Littman.[35] Kelly and Littman describe how IDEO does brainstorming, employs principles of observation, focuses on humancentric design, and has refined the prototyping process. Referring to design thinking and innovation they declare: "It isn't something we dreamed up in a business school class. It's been tried and tested through hands on experience."[36] Seeking practical applications for DND is one of many reasons for using this book.

The second book used in this study is *The 10 Faces of Innovation: IDEO's Strategies for Defeating the Devil's Advocate and Driving Creativity Throughout Your Organization.*[37] It was written by the same authors and is based on the hiring practices and characters that help facilitate an innovative organization and can serve as a companion volume to their first book previously mentioned.

The third book is again related to the first two, *Creative Confidence.*[38] Written again by Tom Kelly but also his brother David Kelly, this book narrows down from IDEO the firm, to the team that makes up a creative endeavour, and then to the individual. All of these sources enable a comparative review of DND with industry.

Another unique source of information was from IDEOU, IDEO's professional development university. Their course offerings provide insight into various methods for

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[35] Tom Kelly and Jonathan Littman, *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm*, (New York: Currency/Doubleday, 2001)

[36] Ibid. 14

[37] Tom Kelly and Jonathan Littman, *The Ten Faces of Innovation: IDEO's Strategies for Beating the Devil's Advocate & Driving Creativity Throughout Your Organization*, (New York: Currency/Doubleday, 2005)

[38] Tom Kelley and David Kelley, *Creative Confidence: Unleashing the Creative Potential Within Us All*, (New York:Crown Publishing 2013)

innovation development for individuals and organizations and can be readily taken by DND members.

Peter Drucker

These three books are all centered on three authors and their experiences at two organizations (IDEO and Stanford). In order to obtain other opinions and practices, author and business Guru Peter Drucker was also used. Drucker has written much on government innovation barriers which helped answer the second research question. Drucker's many writings look at institutional innovation and its development. While somewhat different than those of the preceding authors and their experience, Drucker brings a needed institutional perspective to the problem of innovation development.

Harvard Business Review

Sources for academic and industry information included the *Harvard Business Review* (HBR). While mostly business related, this publication contained a significant number of writings and perspectives on innovation and design-type thinking. HBR created a balance between the aforementioned writers in helping compare DND to innovative organizations while also capturing information for research question three in culture and practices.

Forbes

Similarly, *Forbes* provides some useful articles on innovation in a superficial context while providing lists of innovative firms for further research. *Forbes* centres on practical application and current trends in industry for comparison and best practices in answering research question three.

Harvard Kennedy School

The Harvard Kennedy School, Ash Center for Democratic Governance and Innovation was used as an information source when specifically dealing with government. Innovation in government, other than some discussion on technology development at laboratories and research organizations such as NASA, paled in comparison to industry oriented information. Even this centre of excellence still failed to provide significant amounts of information on government programs, roadmaps, and successes. Although a US institution, use of an organization centered on government helped create a comparison between DND and other governments in innovation helping to answer the first two research questions.

Popular Press

The use of the popular press was limited in scope. A variety of examples of innovative firms was found but the depth of these articles was much more limited compared to trade journals, industry publications, or publications by innovative firms. However, this source of literature was not eliminated since practical application instances were found that tied to best innovation practices with research question three.

Innovation, Science and Economic Development

Innovation, Science and Economic Development, formerly Industry Canada, was contacted for this paper. They provided two documents that spoke to how Canada should become more innovative. Key themes from these documents included: How industry and government need to work together in clusters, that Canadian industry investment in innovation and R&D is lower than the US, and more investment in education is required to keep pace with other

developed nations. While these themes are important and one will be addressed in this paper, the information was not of significant relevance compared to other sources of information.

Innovation Canada: A Call to Action, also known as the Jenkins report, was reviewed but did not provide substantial recommendations that could improve innovation within DND.[39] It had several suggestions to help support industry such as the use of government purchasing power and industry partnerships between certain government agencies and entities external to government. These are important and could play a role but the report did not target onto the research questions used for this project. It should be noted that the approach taken in this report is contrary to those, such as McChrystal, that argue that top down initiatives seldom result in effective or wide sweeping innovation.[40]

[39] Industry Canada, *Innovation Canada: A Call to Action*, Expert Panel Report, (Ottawa:Industry Canada, 2011), http://rd-review.ca/eic/site/033.nsf/vwapj/EecutiveSum-sommaireExe-eng.pdf/$FILE/EecutiveSum-sommaireExe-eng.pdf

[40] Stanley McChrystal, Tatum Collins, David Silverman, Chris Fussell, *Team of Teams: New Rules of Engagement for a Complex World*, (New York:Random House, 2015), ix, 144

CHAPTER 3 ORGANIZATIONAL PRACTICES

Govindarajan and Srinivas state, "organizations create the structure, systems, and culture to enable their people to think and do things differently in order to achieve extraordinary success."[41] They cite various examples, many of which are centered on 3M, of how culture, attitudes, and calculated risk taking plays a significant role in the level of innovation within an organization. Does DND have this same level of innovation in its culture? The argument presented here is no. Counter arguments may postulate that DND does not need to be as innovative as private firms that are profit driven and need to be innovative or ones that have a reputation to maintain. While it is true that DND's main driver is not innovation as it is at firms such as 3M, Dupont, GE, or Gore Industries, the argument that innovation and profit are exclusively connected is weak as previously discussed. Too often the argument against significant innovation is based in underlying currents of inability, excessive administrative tasks, a resistant culture, or lack of exposure to innovation.

Risk Taking and Innovation

A significant difference between DND and innovative firms is the view of risk. The term 'risk' in DND is used ubiquitously without much thought given to the definition in the daily vernacular and has come to be far overused. *The Capability-Based Planning Handbook* issued by the Chief of Force Development (CFD) defines risk as "the probability of failure and consequence of failure."[42] The CFD definition is pervasive across DND and arguably affects the innovative process yet the definition found in the operational planning process as the probability of loss against the magnitude of loss is possibly more appropriate. The problem with the way

[41] Vijay Govindarajan and Srikantha Srinivas, "The Innovation Mindset in Action: 3M Corporation," *Harvard Business Review*, 6 August 2013, 4

[42] Canada, Department of National Defence, *Capability-Based Planning Handbook*, Ottawa: Chief of Force Development, (2014), 56-57

many in DND see risk is that the consequences are not well understood, are in reality not significant, or are based on career advancement rather than institutional improvement.

Aswath Damordaran of NYU provides an external viewpoint of risk. He notes that uncertainty should not equate to risk.[43] The unknown number of basic training candidates moving on to phase training is not risky, it is uncertain. Jumping out of a 20-storey high-rise onto the street below is not risky either. The outcome is certain. But by the DND definitions, the magnitude of loss in the latter case is great so jumping is considered risky.

Damordaran provides three definitions of risk. First is the "risk verses probability" of an outcome occurring. In some circles, this outcome sometimes factors in the consequences, he notes. This is the CFD definition. The second definition is the "risk verses threat." There may be a high probability of an event occurring but if the threat is low, then risk is low. This definition is similar to the operational planning definition. His third definition, and the one which he teaches, is: "All outcomes verses negative outcomes."[44] He cites Chinese thought on risk to support this definition. The Chinese view risk as a potential for crisis or danger but also an opportunity at the same time. This definition is better suited to the discussion of innovation than the aforementioned definitions as innovation is designed to bring positive rewards, not just avoid negative outcomes. Weighing all positive and neutral outcomes against negative outcomes demonstrates what could be lost compared to what could be gained.

Risk by this definition has characterized business for centuries argues Damordaran. Innovation in the form of insurance and financial derivatives took place to reduce the potential negative outcomes to spice traders. From the Chinese influenced definition, innovation occurred

[43] Aswath Damordaran, *Strategic Risk Taking: A Framework for Risk Management*, (Upper Saddle River:Wharton School Publishing/Pearson, 2008). 1-9

[44] Ibid., 4

as a positive outcome to a potentially negative situation. This definition helps drive innovation and exploit opportunities.

From a practical application standpoint, the term 'risk' applied to potentially losing money in an innovation endeavour is actually not risky unless that loss contributes to catastrophic budget failure. The outcome is uncertain but has been assessed as having a potential upside. Is losing an entire budget a catastrophic failure? Perhaps, but there was no loss of income, life, or limb so is it really that risky to invest time and money into innovation projects which have a potential to fail but also have a significant upside potential for the institution? Could it be risky when factoring an annual review for career advancement? Is that the real risk?

Project managers and leaders in DND do not want to see failure for a variety of reasons; arguably career advancement may be the principal one. The risk of failure has become so great in an institutional context that decision makers may: Not make decisions, request information until the problem is watered down or dies by continuously seeking more and more information, continue to seek perfect information before deciding on a course of action, or defer their decision making to another level.[45] Taking only minor risks or demonstrating change without risk-taking is a career safe move in the annual evaluation system. It could be argued that taking larger risks only come with a minor incremental improvement in the annual evaluation whereas 'playing it safe' with change management will net similar career results for a non-innovator. Kotter adds that,

> Managers are loath to take chances without permission from superiors. Part of the problem is cultural: People cling to their habits and fear loss of power and stature—two essential elements of hierarchies. And part of the problem is that all hierarchies, with their specialized units, rules, and

[45] Each of these examples comes from first hand observation by the author.

> optimized processes, crave stability and default to doing what they already know how to do.[46]

These consequences of a risk adverse environment run counter-culture to innovative organizations. If innovation is to be implemented within DND, this mental dichotomy has to be broken and failure in certain areas accepted. Certainly, failure on the battlefield as a result of innovation cannot exist but, in innovation, failures are the steps that lead to a better solution and can exist in pre-deployment training, project management, and education. This is not to say that innovation and experimentation should never occur on the battlefield, but an innovative culture and mentality with experience developed prior to deployment will aid with decision making to reduce loss and enable decision making that is effective in theatre.

The CEO of IDEO, Tim Brown, notes that failure is a learning tool.[47] As a learning tool, failure should be expected in corporate DND and seen as an acceptable risk when performing innovation type activities. In order to accept the risk of failure at home through experimentation and then not accept it on the battlefield necessitates DND leaders to be able to possess a dyad mindset that can be switched on or off as the situation dictates. If failure is punished or will be perceived to be punished, then innovation will be seen as personally risky and the culture will fortify itself against an innovation mentality—similar to the status quo. Therefore, corporate risk taking should be embraced by leadership within reasonable limits at home but reigned in during operations where failure can be exceptionally costly. Such a mindset ties to command theory in models that require members to adapt.[48]

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[46] John P. Kotter, "Accelerate!" *Harvard Business Review*, Online Version, 90(11), (November 2012), https://hbr.org/2012/11/accelerate

[47] Tim Brown, Design Kit, Learn From Failure, http://www.designkit.org/mindsets/1

[48] Models include: The Balanced Command Model by Bennett, the Edge Model by Albert and Hayes, and the Cohen and Gooch Model with failures to adapt are all examples of these models

Risk in innovation may require its own definition within the context of the desired end state of a specific project. Risk of financial loss is omnipresent in industry yet, without risk-takers, innovation would be muted and the technology that society uses today would be nowhere near the current level. With calculated risk comes gain. An expenditure of funds with the risk of not generating a return is likely the most common risk in DND but if a DND organization can lose those funds without significant impact, then is that project really that risky? If that organization is a research organization, then loss is expected. Risk is better factored against losses that could significantly and negatively impact operations, life or limb, morale, or training over the long term. Loss of funds in a well-designed innovation initiative is not as risky as in industry due to the difference between short-term shareholder demands and long term taxpayer expected success. This view of loss ties to Damordaran's third definition of risk.

Why Public Service Institutions Lack Innovation

External Viewpoints

Drucker cites three reasons why public service institutions are not innovative. DND with the CAF can be included in his analysis even though he does not specifically state 'military' as a public service institution. Drucker provides three reasons that government institutions think they do not have to be innovative.[49] His declarations are based on his observations and practice in industry.

First, he suggests that public institutions see themselves as budget driven as opposed to monetary driven. The higher the budget the more prestige the manager has. The more innovative the organization, the less funding the organization needs and the lower the prestige of the

[49] Peter F. Drucker, *Innovation and Entrepreneurship: Practice and Principles*, (New York: Harper & Row, 1985), 179-180

manager. In a monetary organization, profits would drive prestige as opposed to expending money as is found in government.

His second rationale is that of the veto power of constituents. The concept of the government is to serve everyone. Business serves the most profitable clients. Failing to provide a service to a small minority would be seen as having an ineffectual government organization—so even the small groups could be seen as having veto type power. However, this also spells out the argument as to why governments need to be innovative—to ensure they can cost effectively or efficiently serve these minority markets.

He argues that the public services exist to 'do good' and see themselves on a moral absolute mission rather than an economic one. In this case, the cost-benefit is discounted in favor of perceived higher morals. He states, "The optimal level for most organizations is 75-80%" in reference to serving profitable clients.[50] In other words, to serve 100% of clients, as the government does, it costs significantly more money with vastly diminishing returns. He continues,

> The problem with satisfying the desire to do good to all is that the costs rise exponentially while the benefits drop exponentially. The harder it works to achieve its objectives by doing what it currently does the more frustrated it becomes while concurrently consuming increasingly higher amounts of resources.[51]

The moral plane view sees significant effort with diminishing returns. This actually argues the need for innovation in government. If the government seeks to serve all people on a moral plane, then it needs to be innovative in order to reduce the resources needed to serve the most consuming 20% of society.

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[50] Ibid., 179-180

[51] Peter F. Drucker, *Innovation and Entrepreneurship: Practice and Principles*, (New York: Harper & Row, 1985), 179

Forbes contributor, consultant, and author Steve Denning provides a related perspective on why the public sector's image is not seen as innovative. He provides five elements that are related to Drucker's but adds to the discussion.[52] His concepts include:

1. Public sector entities frequently have no clear mission. He argues that government entities have too many stakeholders and no one gets satisfied. This may not be the case with the CAF, but in some instances in other parts of DND this could be the case.
2. Politics interferes with projects. Fighting between political parties over projects prevents innovating in a healthy direction.
3. Survival of a government agency is at the forefront of its agenda. He cites NASA as an example of a large expenditure organization that constantly fights for survival. While he does not mention it, credibility and results are a factor of this point.
4. Managers in public sector organizations are subject to management fads imposed on them. Fads often come from higher levels without a level of understanding of what the bottom does. Implementation of the DND Travel Directive, DRMIS, and the Phoenix pay system were rife with these types of problems. DND has had its fair share of such fads, however, it does beg the question 'if innovation was a part of the culture would these management fads that are poorly implemented still exist?'
5. Management turnover at the political level causes churn and lack of staying power for innovative projects. This could be a symptom in the CAF as managers and

[52] Steve Denning, "How to Make Government Innovative Again," *Forbes,* (6 March 2012)

> leaders are only in positions for up to two years and seek to get the 'check in the box' for change on their PER. Their replacements then seek to do the same thing. New initiatives by one leader that are not popular can get delayed by subordinates until that leader leaves or popular initiatives may be quashed by a new leader in favor of his or her own ideas. These concepts may not involve elected officials, although many procurement issues do, the politics of position and career advancement play a role.

Denning argues that the public sector has grown significantly without a perceived benefit—alluding to Drucker's comments on the exponential increase in resources to serve a smaller segment of society and the need for self-justification using the moral plane as a means of justifying growth. This is the antithesis of innovation and an innovation killer.

Public Manager Viewpoints

An unintended counter to these arguments was found in a 2011 Deloitte & Touche study on the Canadian federal government. The report's writers interviewed 100 public sector leaders about the challenge of driving innovation in government. This report is particularly interesting as the leaders interviewed were from within the government and provide a good view of how innovation is seen from the inside of government as opposed to the aforementioned authors who work outside government or as consultants to government. Respondents gave vastly different perspectives than outside observers. The report lists five general observations.[53] These include:

1. "Political direction is required for successful innovation to occur;"
2. Policy reforms are needed as innovation is currently only in operations;

[53] Deloitte & Touche, Innovation in government? Conversations with Canada's public service leaders, Public Policy Forum, 3 https://www.ppforum.ca/sites/default/files/11-916G%20PS%20PPF-Innovation-Strategy-report-EN-WEB.pdf

3. "The level of public service innovation in Canada appears low. A defined innovation process and strategic approach is required;"
4. A lack of collaboration and sharing of information across government is present;
5. "The capacity to execute an innovation agenda needs to be strengthened. New skills and talent are required;" and
6. A 'not-invented-here' attitude is prevalent.

The internal perspective could also be seen as excuses for failing to innovate and is biased since admitting a failure to innovate would be on the shoulders of these leaders. It is interesting to note that in each of the five instances, the reasons for not innovating are the result of someone else, not the leader. Counters to each of these ideas were prolifically seen in non-governmental literature.

Kalev Leetaru, a Senior Fellow at George Washington University and one of Foreign Policy Magazine's Top 100 Global Thinkers of 2013 notes that innovation in government most often comes from lower levels upward.[54] He also indicates that government leaders are often far removed from reality citing unrealistic technology fixes for problems found in the US government. But the same premise could be noted for Canada (e.g., DRMIS, Phoenix, Shared Services Canada). This concept runs counter to the notes in the Deloitte study in Canada wherein public service leaders wanted political direction.

The second observation that policy reforms are needed ties to the former idea as well. Nowhere in successful companies or other organizations was policy reform needed before innovation could start or be present. Policy can be largely viewed as a bureaucratic hamstring

[54] Kalev Leetaru, "Why Does the Government Struggle so Much with Innovation," *Forbes,* (26 July 2016), http://www.forbes.com/sites/kalevleetaru/2016/07/26/why-does-the-government-struggle-so-much-with-innovation/#8995c8a46e84

and was not observed at IDEO or other locations visited. Therefore, the requirement for policy changes to spur innovation is a weak argument or one lacking an understanding of the reality of the ground situation as argued by Leetaru.[55]

The leaders are accurate in their observation that innovation is low but the argument that a defined innovation process and strategic approach is needed is questionable. Who will define an innovation process or approach if not top leaders, which the interviewees were? The debate is still raging on whether top down or bottom up innovation is required, but this element could largely be seen as an excuse for a lack of innovation.

Collaboration is needed in innovation. However, at what level in government and what information needs to be shared. The study failed to cite specific examples but noted that efficiencies could be gained by collaborative sharing of information. More clarity as to why innovation is failing due to problems with information sharing would be an area for further research to validate this claim.

If new skills and talent are needed, then why are these leaders and their subordinate managers not hiring the people they need to kick start innovation? Sources from co-operative education students to contracted professionals to new hires can all be found.

The 'not-invented-here' attitude was seen by the researchers. When this attitude is prevalent, it signals a cultural shift requirement and is something Jack Welch, former CEO of General Electric fought during his tenure.[56] This attitude needs to be crushed by leadership.

[55] Ibid
[56] Jack Welch and John A. Byrne, Jack: Straight from the Gut, (New York: Warner Books, 2001)

There may be yet other reasons not found in literature but come from observation from within DND that could also explain why DND is lacking innovation. The first reason is that few leaders are exposed to innovation. Officers are most frequently derived from RMC, direct entry application, and commissioned from the ranks (CFR). Many university graduates are not exposed to mid or high level innovation projects in university. Their first career job is as a platoon commander or equivalent. Some direct entry officers (DEOs) come from industry and may be outside that norm, but DEOs that come with a decade of experience where mid-level innovation begins are few in number. CFR officers do not receive any innovation training through the ranks. The deduction from this is that innovation exposure within DND is much lower than in industry where individuals change employment several times throughout their careers and industry needs innovation to survive. Likewise, NCMs are not trained or exposed to innovation anywhere in their training. Even the Canadian Armed Forces Junior Development program (CAFJOD) does not contain any critical thinking, innovation, or design thinking.[57] Without exposure, innovation will not be at the forefront of the minds of military members.

There are also implicit limitations with the public service. Many public servants are hired for specific roles with a specific skill set.[58] Innovation is not a hiring requirement and no introduction to innovation training for new hires exists. Senior public servants with a larger scope of influence are seldom known for innovation best practices.[59] Their experience growing up in the public sector faces the same obstacles to innovation as it does for military members that progress through the promotion system.

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[57] Government of Canada, National Defence and the Canadian Armed Forces, *Officers, Canadian Armed Forces Junior Officer Development*, 23 January 2017 http://www.forces.gc.ca/en/training-establishments/recruit-school-officers.page

[58] This is based on first hand observation by the author as a trained member of hiring panels.

[59] The Bank of Canada may be one instance that differs. Governors are often selected from industry.

In both cases, interview questions and job requirements ask nothing of innovation unless a manager is specifically looking for innovation.[60] Young university graduates will have limited experience in innovation and public servants are not hired for innovation. This leaves two options, the first is to develop innovation from within while the second is to hire more people that are older and later in their careers and have been exposed to innovation. The role of consultants could be applicable, but that in itself comes with another problem set.

The second element not mentioned significantly in literature but was discussed during lecture discussions in the JCSP program is the structure of the reward system and viewpoints of risk. An innovative individual within DND is starting at ground zero in many cases with staff that have never been exposed to innovation as noted by the aforementioned discussion. Starting from a ground zero perspective means that the culture is not likely innovative and there will be significant resistance to changes that are innovation oriented. Therefore, starting innovation projects takes significant time and energy even if they are not resource intensive. Implementation of innovation practices in Transportation Company at 5 CDSG Gagetown found initial resistance and those projects were small in scope. Resistance to biodiesel production was raised by the firehall without supporting substantiation, the use of brine was resisted by employees that used it based on rumour and no supporting evidence, resistance to environmental initiatives that were supported by Base Environment and initiated by Transportation Company members were resisted by individual members of the infrastructure group (formerly Construction Engineering).

Innovation awards are rare in DND and are advertised even less. In a search in the 2014 annual Honours and Recognition listing, the word ‘innovation’ or ‘innovative’ appeared three

[60] This observation comes from the author having taken public service hiring courses and been a member of hiring panels. This experience was limited to tactical level job fills. Results may differ at higher levels. However, when innovation hiring was cross referenced against the Deloitte & Touche report *Innovation in Government: Conversations with Canada’s Public Service Leaders,* hiring for talent related to innovation was seen as a problem.

times in over 500 awards and citations being issued.[61] Using Google searches as a means to find innovation awards quickly to see where publication of innovation awards rank in the public view, another DND internet site was found on the Communications and Electronic Branch site noting one award for innovation, but the link was broken so details could not be confirmed by the public.[62] A more detailed search finally brought up the Public Award of Excellence 2016 recipients which included innovation award recipients. Across the entire federal government four organizations were awarded innovation awards totalling 38 people in all. Of these, nine individuals were doctorate holders and one organization was a DND office totalling 15 of the 38 recipients.[63] If public rewards are a sign of innovative efforts, there is a long way to go.

It is important that the innovative efforts be recognized in the public eye. The public demands a government that seeks to employ tax dollars appropriately and advance the quality of life of Canadian residents. Championing and public recognition would serve departments well to build legitimacy and credibility.

In terms of career rewards, there is no career progression for public servants to seek to implement innovative practices for the vast majority of them. Senior managers vying for new positions within the government may be able implement innovation to showcase skills for future employment but this is insufficient to positively affect culture while at the same time those hiring are not seeking innovation talent as a hiring or right fit criteria. While there are some awards that are given for government employee success and these are a good start, they are not popularized sufficiently and are again insufficient to change culture.

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[61] DND Honours & Recognition, 2014, http://forces.gc.ca/assets/FORCES_Internet/docs/en/honours-history-medals-chart/honours-recognition-achievements-pub-2014.pdf

[62] Communications and Electronics Branch Awards 2013-2016, http://www.forces.gc.ca/en/caf-community-branches-comm-elec/awards.page

[63] Public Service Awards of Excellent 2016 Recipients, Employee Innovation. https://www.tbs-sct.gc.ca/psm-fpfm/modernizing-modernisation/arp/aepe16-eng.asp#toc3

The result of the reward system and exposure to innovation boils down to personal factors and internal locus drivers that come from within the individual to drive innovation and ultimately culture within an organization. The internal personal locus may be an intentional disregard for careerism (a positive trait), an internal drive for improvement, a desire to experiment, or something else, but it should be cultivated within DND.

Fountains of Innovation

The basis of organizational innovation is currently under debate.[64] Ovans highlights the debate that rages between three parallel fields of thought: People, Processes, and Culture. She notes that Ed Catmull of Pixar polls his staff to determine their thoughts on the source of Pixar's creativity—hiring great talent or processes to find creative ideas. His polls show a 50/50 split even for this highly innovative organization.

Collins suggest that the right people with good leadership will produce stellar results regardless of the path.[65] Atkins refers to this as leadership with a vision for innovative energy.[66] In his example, he defines the right people not so much in terms of talent, although that is part of it, but rather people that are driven to succeed in a team based environment that want the firm and the team to succeed.

Further discussion with Atkins showed that when practical innovation is required, there are several key factors that help military organizations excel at innovation. His example stems

[64]Andrea Ovans. "Is Innovation More About People or Process?" *Harvard Business Review.* (27 February 2015), https://hbr.org/2015/02/is-innovation-more-about-people-or-process

[65] Collins, James C, *Good to Great: Why Some Companies Make the Leap ... and Others Don't.* (New York, NY: HarperBusiness, 2001)

[66] Sean Atkins, "Staff Sergeant Disruptor: Observations on Leading Innovation," *War on The Rocks,* (2 November 2016), https://warontherocks.com/2016/11/staff-sergeant-disruptor-observations-on-leading-innovation/

from USAF innovations with the RC-135 reconnaissance aircraft.[67] He noted that finding innovators generally occurred by taking a deep dive into the organization. Seldom were innovators the same as those around the conference table. True innovators were found at all rank levels in the organization but were few and far between. Empowering people became a tipping point for further innovation by others in the organization and was facilitated by a unifying vision. These elements were also enabled through flexibility, networking with like-minded innovators from external organizations, and open communication.

Processes, as argued by Hargadon and Sutton, are the primary drivers for innovation. Having a process of innovation based on idea generation and testing will provide innovative results, they suggest. They argue that building on old ideas and using a systematic method of testing and building will make firms innovative.[68] Their proposed process includes four steps: "capturing good ideas, keeping ideas alive, imagining new uses for old ideas, and putting promising concepts to the test."[69] Thomke suggests a similar process for improving R&D in the financial services industry. He proposes a five-step process to include: Evaluating ideas, planning and designing, implementing, testing, and recommending.[70] Testing is a key feature for both of these elements. Testing is also common in organizations that are culture vice process driven. How does DND compare to these three debatable drivers of innovation and are there similarities between what industry is doing and what DND could do? Yes, and it starts with culture.

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[67] Sean Akins, "Innovation Example," Email 5 February 2017

[68] Andrew Hargadon and Robert I. Sutton, "Building an Innovation Factory," *Harvard Business Review*, Online version, 78(3), (May-June, 2000), 157-166

[69] Ibid.

[70] Stefan Thomke. "R&D Comes to Services: Bank of America's Pathbreaking Experiments," *Harvard Business Review*, 81(4), (April, 2003)

Bill McEvily, of the Rotman School of Business, suggests that innovation comes from a social network structure.[71] He cites great innovators as having significant social networks or catalyst individuals who greatly contribute to the background of innovation thinking. McEvily outlines several types of people within a network that contribute to innovation and the passage of information. These individuals may be brokers who connect their contacts and have an overarching view of information pools. There may also be catalyst individuals who act as support enablers to others. Catalysts bring knowledge diversity or enable innovation in other ways which could include acting as sounding boards but do not themselves innovate. McChrystal et al support this concept when they state "the greatest innovations have not come from a lone inventor or from solving problems in a top-down, command-and-control style…[rather they came] from a "team of teams" working together in pursuit of a common goal."[72] Atkins, while writing from experience as opposed to an academic perspective, also supports this claim on networking.[73] DND has a culture of networking and so has an existing system that can help develop innovation culture through social networks. This is an advantage of a small military.

The Role of Culture

Shanker and Bhanugopan state that "employee's perception of climate affects the extent to which creative solutions are encouraged, supported and implemented." [74] Their work suggests that creating a climate for innovation is closely tied to employees being innovative and organizational success. Research from industry practices and first hand observation when visiting

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[71] Karen Christensen, "The Social Aspects of Innovation," *Rotman Magazine,* (Toronto:2015), 97-100

[72] Stanley McChrystal, Tatum Collins, David Silverman, Chris Fussell, *Team of Teams: New Rules of Engagement for a Complex World*, (New York:Random House, 2015), viii

[73] Sean Atkins, "Staff Sergeant Disruptor: Observations on Leading Innovation," *War on The Rocks*, (2 November 2016), https://warontherocks.com/2016/11/staff-sergeant-disruptor-observations-on-leading-innovation/

[74] Roy Shanker and Ramudu Bhanugopan, "Relationship between Organizational Climate for Innovation and Innovative Work Behavior in Government-linked Companies." *International Conference on Human Resource Management and Professional Development for the Digital Age (HRM & PD). Proceedings*, (2014), 21

innovative firms confirmed these findings in that culture is the preeminent success factor in developing an innovative organization. Looking at DND, military/government culture and innovative culture are not mutually exclusive.

In conversations with IDEO staff, the number one reason it is so innovative is due to a constant redeeming culture of innovation. Its employees are driven to design better products, better services, and improved processes. The books written by IDEO staffers and the Kelley brothers support what the employees stated during the site visit. Jaruzelski, Loehr, and Holman state, "more important than any of the individual elements, however, is the role played by corporate culture."[75]

Hiring at IDEO plays a major role in forming culture. Culture is then created by the passion of the hires within the framework of mission accomplishment, processes developed by the founders, and an attitude of exploration and experimentation. Motivation comes from within the individual in their drive to create. The effect of culture as a driver for innovation is also observed and reported by author Michael Schrage.[76]

Drucker notes that "successful entrepreneurs, whatever their individual motivation – be it money, power, curiosity, or the desire for fame and recognition—try to create value and to make a contribution."[77] This describes the culture behind IDEO and other renown organizations such as 3M, Google, Microsoft, DuPont, Pixar and many others. Making a contribution is fundamental to DND. Its narrow scope in warfighting and support to political aims and foreign policy is the

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[75] Barry Jaruzelski, John Loehr, and Richard Homan. *Strategy+Business Magazine*, Booz & Company, Preprint 11404. http://www.strategyand.pwc.com/media/file/Strategyand-Global-Innovation-1000-2011-Culture-Key.pdf

[76] Michael Schrage, "Playing Around with Brainstorming." *Harvard Business Review*, 79(3), (March, 2001), 149-154

[77] Peter F. Drucker, *Innovation and Entrepreneurship: Practice and Principles*, (New York: Harper & Row, 1985) 31

way in which DND creates value and makes contributions. Developing a culture of innovation helps improve DND's product offering.

The research suggests that there are two types of cultural perspectives that organizations should contemplate when looking at innovative culture. First are actions that a firm can take to build culture. The second type of actions are those that destroy culture.

Schaeffer suggests five actions that kill innovation.[78] The first innovation killer is punishment for initiative when problems arise. Punishing initiative and failure is anathema to IDEO practices both in literature and seen through a site visit. Punishing failure when in experimental stages eliminates initiative, grows distrust, and creates fear. In a military context, punishing failure for initiatives or when plans do not materialize due to unforeseen events is far different than punishing a soldier for failure to uphold a legal or lawful command or requirement. Creating a culture of trust and confidence is required to build innovation and advance the organization and to do so may require reasonable risk, not punishing failure, and using failure as an opportunity to grow. Some may argue that accepting failure could result in battlefield losses or a failure in acceptance to take responsibly for domestic procurement problems or be used as an excuse to not perform. There is merit to these arguments, but when taken in a leadership context, it is leadership's responsibility to make the correct balance which, from experiences seen in DND, is not difficult to do.

In a CAF context, failure before a mission should be treated as a learning opportunity as the risks compared to full-fledged warfighting are significantly higher than in training. A failure to execute a mission in a deployed scenario after training may require changes and risk

[78] Patricia Schaeffer, "Five Cultures That Kill Innovation," *IEEE Engineering Management Review* Vol 44(3), (Third Quarter, September 2016)

management beforehand. Innovation on the battlefield will require experience before deploying and a risk assessment plus a strong foundational understanding of doctrine and history. Using these criteria against risk assessments for loss of manpower, credibility, or equipment may deem battlefield innovations too costly if there were to be failures. Such a flip between failure and learning and between training and the battlefield may be a difficult juxtaposition for some leaders to internalize—which begs the question why they are leaders in a contemporary battlespace. However, in the proper culture this switch should be able to be flipped. By creating an innovation culture, innovation on the battlefield backed with training knowledge from doctrine and practice will have a greater positive impact than the current status quo of limited innovation across the board.

In terms of civilian operations domestically, failure to ensure support is advancing to satisfy the needs of the fighting force is unlikely to be a result of a lack of innovation as it is a result of complacency or bureaucracy. However, innovation in procurement or other forms of support may actually accelerate it.

Schaeffer's second killer is micromanaging projects or assignments. Part of the developmental process of leadership permits the assigned person the freedoms they require to do their tasks. Arguably, micromanagement also redirects failure and responsibility towards the supervisor while killing innovation. To kill micromanagement, she recommends leaders not second-guess or overrule staff.[79] Exceptions to this would be in extreme circumstances or when the leader's intent is not being met.

[79] This would be the case barring safety or significant risk to which the employee is not well versed. However, if an employee needed to be overruled, they should be provided with the reasons why and encouraged to continue to carry out innovative activities. Repeat overruling suggests a cultural, experiential, training, or leadership problem.

Her third innovation killer is a lack of a continuous improvement mentality. She argues that too many people hide behind policies and procedures using them as a scapegoat for failing to innovate. Encouraging people to regularly assess their practices and seek novel ways to improve should be part of the culture. Opponents would argue that in a military culture rules, policies, and procedures exist to enforce discipline and organization. This is certainly the case as is the case for all laws in society. It would be ridiculous for drivers, for example, to continually reassess if driving on the right side of the road is still required. However, there exist significant opportunities for military and civilian personnel to either learn why the policy exists and, if found to be an impediment, to make recommendations to change it. An organizational culture that does this will eradicate unnecessary procedures, policies, and rules or become highly informed as to why they exist with valid reasons. The education element is similar to how the CAF writes its mission statement, commanders' intents for two levels up, and scheme of manoeuvre—they tell the receiver how they fit into the picture and what the common goal is. Recognition should be made for those who challenge the status quo with true intention in an effort to improve the situation.[80] Challenging the status quo was a common theme also found in a multitude of innovative companies and cultures.

Schaeffer's fourth suggestion is to avoid seeing innovation as a fad. Innovation for some organizations will become the 'flavor of the day' and will consequently fail. Staff will see fads and ideas will not likely be actioned. If leaders think that innovation will be a one time or short term shift, they are misguided. Culture takes time to build. Trust in innovation takes time to create. Ideas and experimentation may take days, weeks, months, or years to produce results.

[80] There is one caution here. There are those who seek to grieve every policy and who would seek to abuse this step under the guise of attempting improvement while they in fact are seeking to harass the institution or management. Such people are poison and should be removed as they will not fit into an innovation culture or team environment.

Alternative hiring used at 5 CDSG Gagetown with co-operative education students took a year. The biodiesel project is still continuing months later and these were short term innovative projects.

Finally, Schaeffer suggests that "the organization [that] favors aggressive internal competition" will undermine the objectives of innovation. Competition must be balanced against a sense of community in the workplace. Opponents would argue that competition in the military is an existing cultural trait that is highly desirable in warfighting. This is true, but is it required for corporate operations? Competition can be used in developing innovation if the competition is centered on improving the institution and not for personal gain such as career progression. Career progression can be a benefit but not the end state in developing innovation. A simple example of effective tactical level quasi-innovation in the CAF is RCEME's buggy races at the Corporal-Private level wherein junior military members have an opportunity to construct a racing buggy to demonstrate their skills and innovation abilities. These buggies are then raced and judged against peers' buggies. The objective is to demonstrate and take pride in skill sets and innovation, not self-aggrandizement. Leveraging the service culture that exists in the CAF, and should exist in DND as a whole, will help foster proper competition.

Kriegesmann, Kley, and Schwering suggest that a current zero-error culture exists in industry that is adversely affecting how organizations encourage innovation.[81] They highlight that most businesses do not sanction deviations from established protocols. While quality in manufacturing is required, much like the maxim in the Royal Canadian Regiment of "never pass

[81] Bernd Kriegesmann, Thomas Kley, and Markus G Schwering, Making Organizational Learning Happen: The Value of "Creative Failures," *Business Strategy Series,* 8(4), 270-276

a fault," this mentality, they argue, runs counter to innovation where errors will be made and used as learning tools.

They further declare that organizations that are rigid in error prevention too often pay lip service to innovation as the incentive structures create risk aversion. Building on this concept, compliance to implicit and explicit organizational norms is what is rewarded in DND. DND is rife with publications, rules, and doctrine with entire sections producing increasingly larger amounts of the same. There is certainly a requirement for much of this information and direction in order to prevent unnecessary injury and death in the profession of arms and significant expense to the crown. However, Kriegesmann, Kley, and Schwering note that the escalation of such structures coupled with incentive programs that reward risk aversion or compliance creates an "innovation stalemate" and that "corporate cultures that are developed promote past patterns without being open to change and innovation. Jumping on the bandwagon of lemmings is regarded (erroneously!) as safer than swimming against the current."[82]

The result of risk averse incentivization is further summarized as:

> Although enterprises need innovation, the breakthrough to new areas does not occur if risk aversion and fear of making mistakes prevents experiments from being made, learning processes are avoided and there is no desire for innovation. There is thus a contradiction between the rhetoric of innovation and a culture of fear and unease in the context of change.[83]

These authors further contend that this dilemma can be broken down through cultural change that accepts errors within a tolerance zone. The zone of error acceptance on one side cannot accept risks that are careless, negligent, or intentional. On this bookend, errors resulting from a lack of action, over estimating an organization's capabilities, ignoring health and safety

[82] Ibid. 271
[83] Ibid. 271

regulations or guidelines, failing to learn from historical errors, or failing to weigh costs appropriately are not acceptable types of errors. "An inappropriate (or falsely understood) tolerance for errors is dangerously close to a lack of concern, and must therefore be studiously avoided."[84] These errors can be punished but errors in legitimate experimentation from trial and error (e.g., how many errors do pharmaceutical companies make before they have a working drug) and trying new concepts to improve a system should be embraced.

Kriegesmann, Kley, and Schwering additionally state

> He who leaves the herd of lemmings and deliberately undertakes an innovation process with a calculated risk, should, in the event of failure, not be mocked and derided, but rather encouraged to undertake further, sensible risks in a spirit of optimism.[85]

They term these types of errors as 'creative errors.' In one case, they cite an organization having a 'Flop of the Month' initiative, which they prefer to more accurately term 'Creative Error of the Month.' Employees were recognized for their innovative drive in spite of failures. This type of cultural change helped create a climate of innovation in that organization.

Hiring and Personnel Roles

The role of culture is clearly significant in developing innovation within an organization. But how does the culture begin and change over time as the organization grows and is that an important factor for DND? IDEO staffer Mollie West provides some insight to the role of hiring and culture. She states: "Hire for the right roles."[86] While founders and senior leaders may have espoused core values and set the original culture, culture changes over time (which is important

[84] Ibid. 272
[85] Ibid. 272
[86] Mollie West, "IDEO: The 7 Most Important Hires for Creating a Culture of Innovation," *Innovation by Design*, (19 March 2016)

if trying to implement a culture of innovation). She indicates that the culture will be influenced by six roles within the organization. These could well apply to DND.

The first is referred to as The Gardener. The Gardener inspires, nurtures, encourages, and cultivates ideas from others ensuring task execution happens. The second is The Sage. The Sage is someone with experience who has been around similar circumstances before, much like a senior experienced commander in the military or even an Honorary Colonel in a few instances. The Sage provides a sober look at what is happening and advice on how to react to junior people. The Empathizer often works in recruiting but can act as a mentor elsewhere when projects start to go off the rails or they can get the right people aboard a project. Counter to this is the Talent Guru. The Guru works in the HR arm of an organization. Rather than hiding behind policy and procedures, the Guru seeks to match talent to where it is needed with the right soft and hard skills. Firms often refer to this position as a Talent Officer.

The Dean fosters creativity, teamwork, and collaboration on projects that require significant innovation. Some Deans, including Ed Catmull at Pixar or Randy Nelson at Apple, create professional level training such as the programs found at Apple University and Pixar University. The Dean uses programs such as these to intermix personnel, creating additional exposure to the organization in a manner similar to JCSP mixing trades and elements in syndicates and student attendance at social functions.

The Storyteller is an individual who shares stories about the firm and its successes and what works and does not. IDEO does this extensively with its leaders publishing numerous books, articles, doing interviews, and posting innovation helps online. This has not detracted from IDEO’s business but has, in fact, attracted even more talent making the organization

stronger. In a military context, showcasing more publicly what Canada's military does, how it is a world class organization, and how women and minorities fit into it would be a role for the Storyteller.

Innovation: A Flash of Genius or a Disciplined Practice

Drucker notes that "systematic innovation…consists in the purposeful and organized search for changes, and in the systematic analysis of the opportunities such changes might offer for economic or social innovation."[87] Systematic innovation requires a culture that has an underlying ability to use investigation and has a drive for improvement.

He postulates that innovations that come as rapid flashes of inspiration are rare. Rather, 90% of innovations are the result of analysis, appropriate systems, and hard work.[88] Analysis, he continues, starts with his seven sources of innovation. The precise source of innovation will be situation dependent. The analysis stage can be broken down into two parts. First is the search stage where ideas and concepts are sought based on the seven sources. These sources include:

1. Unexpected successes and failures;
2. Incongruities in a process, system, distribution, or with customers;
3. Process needs;
4. Changes in the industry or market;
5. Demographical changes;
6. Perception changes; and
7. New or additional knowledge.

[87] Peter F. Drucker, *Innovation and Entrepreneurship: Practice and Principles*, (New York: Harper & Row, 1985), 31

[88] Drucker 272-279

These sources apply to DND and are needed. In particular, the CAF and the procurement system needs to be able to rapidly adapt to changing world conditions. These seven elements can be transcribed into both the battlefield at the tactical level to the strategic level with procurement, recruiting, and training. The second part is the evaluation of the merit of each of those ideas.[89]

Dechamps confirms that sudden inspirational or charismatic leadership arriving at a new innovation is rare. Rather, his research suggests that there are several imperatives that should be in an organization to improve the probability of successful innovation.[90] These five pertain to military use and include:

1. The appetite and motivation to try new things;
2. An obsession for value seeking;
3. Courage to take risks;
4. The capability to manage risk; and,
5. Speed in recognizing and capitalizing on opportunities.

The appetite to try new things is a preeminent sign of an innovator. Challenging the status quo is a common action seen in these innovators. The obsession to find value is seen in several aspects. First, innovators seek to use innovation to satisfy an existing need or want. They consistently seek to make their environment and the actors around them more efficient and effective. They have the courage to take risks knowing that risks will result in failure at some point in time. This is not to suggest that uncalculated or unnecessary risk is taken, as this forms part of the ability to manage risks. Speed in recognizing opportunities and capitalizing on them is a factor of military planning so should, therefore, be able to easily translate to innovation.

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[89] Ibid. 273-274

[90] Jean Philippe Deschamps, "Innovation and Leadership," in *The International Handbook on Innovation*, Ed. Larisa V. Shavinina, 815-832, (Oxford:Pergamon, 2003)

Recognizing and capitalizing on opportunities can be challenging. A diverse organization with training and education that is not always military specific combined with the other tenants noted above will help drive opportunity recognition.

CHAPTER 4: INNOVATION FOUNDATIONS IN DND

The preceding chapter investigated various means and methods that companies employ to improve innovation with concepts that are fairly general in nature. Key highlights included innovation imperatives, disciplined efforts, the role of culture, the drive to innovate which was rewarded by profit and not the other way around, and the debate over culture vice processes vice talent. These organizational practices are invaluable for DND, but how can they be applied? This chapter will narrow down the focus into practical applications that DND should consider in developing innovation with a specific focus on whether to take big leaps or small steps, the role disruptive innovation could play in DND, tools for self and unit assessments involving innovation, and an introduction to the innovation pyramid model.

Big Leaps or Small Steps

Drucker argues that successful entrepreneurs do not wait until they are hit with a big idea to start the innovative process. Neither do they possess get rich quick type ideas. Such thoughts will result in failure. As a proponent for innovation in the public sector and realist, he states:

> An innovation that looks very big may turn out to be nothing…and innovations with modest intellectual pretensions…may turn into gigantic, highly profitable businesses. The same applies to nonbusiness, public service innovations.[91]

Drucker confirms that single massive changes may not be the best way to develop innovation. Collins supports a similar view in discussing companies that have become great due to incremental innovation.[92] Innovation can start with individuals and individual units.

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[91] Peter F. Drucker, *Innovation and Entrepreneurship: Practice and Principles*, (New York: Harper & Row, 1985), 31

[92] Collins, James C., *Good to Great: Why Some Companies Make the Leap ... and Others Don't*, (New York, NY: HarperBusiness, 2001)

Innovative projects can start locally while the strategic levels concurrently initiate innovative projects for organizational wide profit.

Coordination and cross pollination with open communication would help share failures and successes and avoid duplication of efforts. To affect such coordination means that a communication system championing and facilitating interaction for innovative purposes would be beneficial to DND.

Based on the discussion of diversion of opinions between public servants and private sector professionals, it is evident that there is neither a roadmap nor a known starting point for innovation in DND. The research suggests this problem can also exist in the private sector. For this reason, managers and leaders need to know their starting point before attempting to launch an innovation initiative. Much like the Cheshire Cat responding to Alice, if leaders do not know how or where to lead the organization in innovation, how do they know when they have arrived?

The Role of Disruptive Innovation

Disruptive innovation occurs when a new technology changes the present dynamic so extensively, that it can undercut the current practices in price and effectiveness. The Deloitte approach suggests one significant innovation adoption: UAVs. They note that the Predator costs $4.5M USD (version 1) which is just a fraction of the cost of manned aircraft or satellites. The report notes that the current capability of UAVs creates a near match to present manned aircraft and in one instance in Iraq, enemy soldiers even surrendered to a Pioneer UAV. This example of low cost technology adoption into a traditional role is a classic example of disruptive innovation and could be an area in which DND could excel as a world leader due to the low procurement costs, Canada's large landmass, areas for testing, access to the technology, and low costs to train UAV operators and technicians. UAVs could form a significant part of sustainment to the North and be contributors to coalition efforts around the globe. Such early innovation adoption in Canada would not only benefit the CAF in operations but can aid with WOG operations and advance Canada's defense industry creating jobs and expertise.

Figure 4.1: Disruptive Innovation and UAVs in Canada

Source: Deloitte & Touche. *Innovation in Government? Conversations with Canada's Public Service Leaders*. Public Policy Forum.

'Disruptive Innovation' was first coined by Clayton Christensen of Harvard. He explains that "Disruptive innovation is not an innovation that makes good products better" rather, it is innovation that drops costs and improves accessibility smashing the current paradigm by improving a process by such a degree that competitors cannot recover or the organization prosecuting the innovation is launched well ahead of others in the same field.[93] A classic example of pending disruptive innovation is the development of unmanned aerial vehicles as noted in the accompanying Figure 4.1. Deloitte & Touche use UAVs as an example of disruptive innovation within a military context to illustrate how disruptive innovation can work. This technology is disruptive because of its low cost, simplicity, usefulness, flexibility, and adaptability.

[93]Clayton Christensen, Disruptive Innovation Explained, http://www.claytonchristensen.com/key-concepts/

While disruptive innovation was originally coined for business as a method to usurp customers from entrenched firms by offering better products at better prices, the term now applies to military procurement and government practices. The Avro Arrow was a form of disruptive innovation and unmanned aerial and submarine technology is poised to do the same. Such examples serve as 'low hanging fruit' to exercise innovation and help launch a cultural change within the organization.

Presently, however, DND has yet to recognize its innovation levels and to know where it is in the innovation pyramid. Until it knows where it is and where it can go into a co-development scenario with enhanced innovation culture, disruptive innovation is likely a long way off. However, there are opportunities on the horizon for disruptive innovation. If DND does not seek to move into this realm, it will end up reacting to opponents that do employ disruptive innovation.

A second study in the US by Deloitte argued that the US government saw daily innovations and that the argument that the government is not innovative was a myth.[94] However, the study notes that innovation in government is hampered by costs of government projects that are rising faster than the rate of inflation while many private sector projects (e.g. computing) have improved performance while costs have significantly decreased. They specifically cite security and defence and education as two significant areas where costs have increased dramatically. To counter these costs, Deloitte argues that disruptive innovation practices are needed as opposed to other forms of innovation (e.g., slow methodical). This research suggests

[94] Deloitte, Public Sector Disrupted: How disruptive innovation can help government achieve more for less, https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Public-Sector/dttl-ps-publicsectordisrupted-08082013.pdf

there are opportunities for improvement. DND could look at disruptive innovation opportunities as a means to improve the department and help engender an innovative culture.

The Deloitte report highlights three key components that foster disruptive innovation. The first is a focus in both long and short term planning. This must be done concurrently. The second is a shaping phase where organizations decide where to start and begin developing a plan. Finally, protection and nurturing the innovation rounds out the process. In this process, the report suggests that "disruptive innovations impacting the public sector will typically originate outside of large government organizations."[95] The reason for external development is that the current government paradigms seldom permit autonomy and internal development threatens the status quo. Although the report does not highlight that these threats to innovation are a culturally rooted problem, based on the aforementioned works, status quo culture is an innovation killer. The Deloitte report outlines that the government official's job, when presented with a disruptive innovation opportunity, is to protect it from being killed by regulation and bureaucracy. A supportive culture of disruptive innovation does not seem to exist presently in DND as a whole, but rather in small pockets throughout the organization.

The authors at Deloitte indicate that efficiency in government is not doing more with less and across the board budget cuts. Rather, the report argues that governments need to seek innovative opportunities and use disruptive innovation as a tool to reduce and eliminate antiquated practices. The result could see accomplishing more with current budgets.

Opportunities for Canada in disruptive innovation are limited at this point in time as the subject requires more study and most organizations in DND need to know where they exist on

[95] Ibid.

the innovation pyramid and what opportunities are present. Immediate areas that could be pursued for disruptive innovation include: Biofuels, renewable or self sustaining energy in austere locations, UAVs, arctic clothing development including footwear, and support to the North.[96] Even if these areas cannot be disrupted significantly, innovation development in these areas is something Canada, as a small nation, can pursue.

The Deloitte study skirted around the culture issue and implicitly suggested that building innovation practices outside the cultural norms was an effective way to spur innovative practices. Skirting around culture could be a good start to influencing culture. However, for the department to really flourish, a cultural change is required. Using the Innovation Level figure found at Figure 4.2, disruptive innovation would be a component of 'Combined Development.' To start looking at where DND currently stands, a self-assessment tool has been formulated and provided in Annex A as a tool to guide managers and leaders to know where to start. When combined with the innovation pyramid discussed shortly, managers and leaders can see what areas require further development in order to achieve a higher level of innovation.

Self-Assessment Tool

In order to determine where DND and individual leaders are in reference to innovation, Annex A is designed as a self-assessment tool to facilitate this evaluation. However, a self-assessment tool based on industry best practices through the observations and research for this paper is insufficient. A model to show the path to ultimate levels of innovation is also required and shown at Figure 4.2. This paper will provide these two tools to help determine the current

[96] The Toronto Rehabilitation Institute-University Health Network currently tests winter boots for traction and service and is an example of an opportunity for DND to co-develop and test arctic footwear in conjunction with other organizations and civilian partnerships in developing improved technology for the arctic, which could be licenced to industry. Although licencing is not a mandate of DND, there is nothing wrong with developing technology to use internally and profiting from licence arrangements.

level of innovation in an organization which will help capture the low hanging fruit previously mentioned.

The first tool at Annex A allows for leaders to rate the level of innovation within their organizations and themselves. This self-assessment tool can be used throughout a developmental period where innovation is being encouraged within an organization and can serve as a calibration tool as innovation begins to take flight. It serves as a means to help determine the robustness of the current innovation discourse.

The categories enable managers to focus in on specific problem areas that affect the level of innovation in an organization. Questions under each category are scored according the provided criteria. To be a truly innovative organization, the average of each category should be eight or higher with no one subcategory ranking below a five.

Using an example of innovation in recruiting, a recruiting organization can take Annex A and apply the checklist to the organization and its leadership. In this example, the officer responsible would look at each of the categories (Communications, Risk Taking, Leadership, and Attitudes) and score his or her viewpoints on the scale.[97] Subordinates would also be given an anonymous opportunity to do the same. The scores would then be compared and targeted changes sought in low scoring areas. Some key areas that a recruiting organization may decide to encourage could be experimentation under the risk-taking category. The organization may decide to seek design theory principles guided by experienced experts to experiment with new ways of recruiting. If subordinates have identified this as an area of improvement on their checklists, they

[97] The term 'officer responsible' is used here as it could be a commander, commanding officer, officer commanding, detachment commander, or equivalent position. It could also be an officer assigned by the commander to gather the information which in that case would mean that the officer's opinion on the survey would be one of a subordinate's position vice commander's.

may also have ideas on how to improve. Likewise, industry best practices should also be used as one comparison criteria.

The use of the checklists is only a starting point to determine at what level an organization is at regarding innovation. It does not provide the means to improve innovation, this is a topic for another significant research paper. The level of innovation needs to be known since it sets a starting point. To change to an innovative organization, low scores on the checklist show what areas need to improve but not necessarily how to improve them. Improvements can be made through the use of experts, creating an innovation roadmap, design theory, or a myriad of other means. The checklist serves as a starting point only. The pyramid then complements the checklist to see how far the organization needs to go to be truly innovative.

The Innovation Pyramid Model

This second tool is a model designed to show what levels of innovation exist and each level's characteristics. This model is based on the research for this project and includes first hand experience, observation of current practices in DND, and comparisons with observations made first hand at IDEO and other organizations with innovative industry practices. The model will show managers where they need to go and what signs they should expect to see as they develop innovation within their organizations.

The model can be used for small organizations such as platoons or be applied to larger organizations such as an Assistant Deputy Minister's organization or the entire department. It is highly feasible that smaller organizations could be innovators while larger ones within DND may not be innovative at all. It is also feasible to have a low-level unit such as a subunit be innovative within its realm but its higher headquarters may be far from innovative.

The heart of the pyramid is culture. A culture of innovation will drive innovation upwards while a culture of disinnovation and ‘same as last year,’ ‘not invented here,’ ‘I can’t,’ or ‘not my job’ attitudes will prevent upward progression. It is important to recognize that culture is a driver towards Strategic Engagement. The model starts with the lowest level of innovation—essentially none or at the very most limited innovation on a small scale by some individuals but not as an organization. This level may see the score from the self-assessment tool well under an average score of five with some individual scores falling below three.

Innovation starts when individuals start looking to use innovation as a tool. Learning begins by researching what lessons others have learned in a particular domain. Using the example of alternative fuels for commercial military fleets, inquisitive innovators start by searching out what other organizations have developed or used. At this stage, there is simply an interest in researching basic information regarding a specific topic. There is likely no research question to answer and significant resistance to innovation in the culture.

Figure 4.2 – Innovation Levels

Source: Author

Finding lessons learned is important but there needs to come with it a three-part acceptance solution. The first is to have a system to capture corporate innovation practices and lessons learned. Whether this is a DND innovation library, bulletin, or something else is beyond the scope of this paper but the point is that a method to capture, disseminate, and champion internal and external learning is needed. How often have staff had to create briefing notes on subjects that were previously briefed a year or two prior or corporate knowledge lost due to postings or retirements? An innovation information repository that is regularly reviewed as part of education and training and championed through the DND media (e.g., Maple Leaf, regional papers, technical bulletins, DND wide emails, portal site with alerts to a subscriber list, etc) is required to facilitate adoption. Such a task could fall to the NDHQ library, RMC, VCDS with the

Deputy Minister's Office, or another joint organization that can champion innovation across all elements of DND. Such a program can be inexpensively created with wages starting at only $14/hour and stood-up and maintained using co-operative education students from business, computer science, and library science programs. Such hiring has worked at 5 CDSG Technical Services Branch and 4 Wing Cold Lake.

At the best practices stage, the innovator—which may or may not be a formal leader within his or her organization—branches out to find out what best practices are available internally to the organization. These practices at their base level may be practices that should have been accepted but are not or are practices that are being used without significant fanfare. Best practices should consider both short and long term elements concurrently as noted by Deloitte.[98] Best practices can be developed through two means.

The first is exposure to innovation training through formal course work and professional development and is found at the internal best practices level. The CAF, for example, should incorporate innovation and design thinking into junior officer development. Managerial courses for the public service should also encapsulate innovation and design thinking. Both of these are examples of internal best practices that could be developed. Exposure to innovation in external best practices would include the use of training opportunities outside DND and government. Many courses are available online, through residence programs, and from universities or consultants.

Second, is sharing innovation successes publicly both internal to DND and external to the public. Development of shear pins in Gagetown at Technical Service Branch and shared in the

[98] Deloitte, Public Sector Disrupted: How disruptive innovation can help government achieve more for less. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Public-Sector/dttl-ps-publicsectordisrupted-08082013.pdf

departmental media as a best practice is a clear example of an Internal Best Practices level activity. If an organization limits itself at solely Internal Best Practices, it sets an arrogant attitude that it is the best and no one can match it. This is a dangerous perspective.

Innovation at this level brings with it the start of insight and education as noted by Chamorro-Premuzic.[99] Chamorro-Premuzic's other aspects of social capital and emotional intelligence, prudence, and proactivity begin to blossom at this stage. Research questions may also start to form.

Without the willingness and ability to learn from one's own organization, there is most likely an inability to find best practices externally. The 'not invented here' (NIH) mentality creates an organisational mindset block preventing a move to this level. In the case of GE, Jack Welch sought to tear down the NIH mentality. At this point in time, GE was losing market share and would not have been considered an innovative company—it was certainly not anywhere near the innovative firm it was when Welch retired. Without a willingness to learn best practices internally or externally, the organization will be unable to develop an innovative culture. There is little point to progressing with an innovation plan if the organization is unwilling to learn best practices from other organizations.

Logistics support to the arctic is a key area in which DND could benefit greatly by seeking best practices from industry and other countries. DND cannot become an innovator in the arctic if it does not find best practices internally (e.g., the Rangers, staff who have lived in the arctic) or externally (e.g., mining companies, oilfield exploration firms, foreign governments,

[99] Tomas Chamorro-Premuzic, "The Five Characteristics of Successful Innovators," *Harvard Business Review*,(October 2013), https://hbr.org/2013/10/the-five-characteristics-of-successful-innovators

researchers, foreign militaries). The department would be remiss to assume that it can find all its solutions internally or internally to its existing contractor base.

Both best practices stages are enabled by management ensuring employees have the tools they require to be innovative. Tools include both the proper equipment, potentially some funding, but most importantly leadership support as outlined by authors Wunker and Farber.[100] Again, this also ties to not punishing failures in innovation activities but creating safe spaces for innovation.[101] Support to the North will not be solved without this stage of innovation at a minimum.

The second part is to put best practices into place locally. The requirement to adopt, on a local level, advances the possibilities for further innovation. Learning lessons and applying them once does not constitute adoption. Adoption is founded in the permanent practice of using innovative practices routinely. Too often, lessons learned for small scale or limited scope activities are forgotten. Some lessons learned are not wide in scope or scale and may be in a limited sphere of influence only. Lessons learned and applied do not constitute a cultural shift towards innovation either until it is a regular part of training, briefings, handovers, and captured in a corporate repository.

Adoption includes the implementation of best practices including lessons learned across DND. This is part of the reason why a centralized information repository and dissemination system is required. But adoption is more than simply capturing information and applying it on a limited basis. Adoption is accompanied by changing cultural attitudes towards innovation and advancing the level of innovation in the organization. In the case of shear pins on industrial snow

[100] Stephen Wunker and David Farber, 5 Strategies Big Business Use to Build a Culture of Innovation, *Forbes*, (2015), 1
[101] Ibid, 2

blowers the implementation at bases across the department would constituted a solid adoption practice, but not necessarily a cultural paradigm shift. Therefore, the in-house manufacture of shear pins without the culture change would be just the start of the adoption stage.

Adopting innovation means accepting and applying principles and practices from other sectors including outside the department. Adoption sees concepts taken from others and modified to suit the organization's needs. Using road brine concepts from industry and adapting the system to accept locally procured tacifiers is an example of adoption. This project from Gagetown looked at lessons learned from corrosion damage to equipment to environmental considerations and then sought to find solutions. The solution of best fit at the time was the use of brine which is typically used on highways. Modifications to the system were made to encompass local procurement which meant lower raw material delivery costs and lower carbon emissions for the raw product. Modifications also improved the commercial product to enable it to overcome operator training concerns.

An excellent example of the adoption stage from industry is Jack Ma of Alibaba. He followed the same innovative principles as eBay, only he used it for business-to-business sales rather than between consumers or businesses to consumers. Ma's adoption of essentially an eBay for business occurred four years after the start of eBay and two years after eBay officially become 'eBay.' By the time Alibaba was founded, eBay had already sold over one million items and had gone public.[102] The result is Alibaba stock being valued near that of Walmart and revenue of over $10Bn annually—all from an adoption perspective. This example of massive value earned demonstrates how much improvement and value can be generated by organizations

[102] Timelines were compared between Alibaba and eBay's history at https://www.ebayinc.com/our-company/our-history/ and http://www.alibabagroup.com/en/about/history

that employ the adoption stage of innovation. For DND, the value may be cost savings, improved use of materiel and equipment, public credibility, improved flexibility, or more output generated with a steady level of resources.

A second example of innovation adoption with improvement is entrepreneur Norm Brodsky. Brodsky seeks out underserved industries, learns what players are doing poorly and well, then improves upon those concepts with his own business using the lessons learned while adopting a variety of better practices which may or may not come from that industry. This formula has helped ensure his businesses are in the top two for service in a given geographic region.[103] The result has been a high degree of success and improved customer service.

Adoption could be seen as imitation wherein practitioners are not yet fully creating their own ideas and concepts but are imitating what has been done elsewhere. Adoption of a wide variety of practices was observed as a cultural success point at IDEO in Palo Alto. The difference between DND and IDEO in the adoption stage is the scope of adoption practices and cultural attitudes. Adoption allows further development and innovation to occur whereas just identifying lessons learned does not establish a foundation for future progression to the same degree.

Combined Development starts when the organization is beginning to adopt a regular practice of innovation culture well into product or service development. Combined development is well manifested in the medical community with the US military. A clear example comes from Colonel David McCune of the Regional Health Command-Pacific Team when he stated, "First, I wanted to increase collaborations with civilian private sector innovators to benefit our military's

[103] Norm Brodsky and Bo Burlingham, *The Knack*, (New Orleans, LA:Cornerstone, 2009)

readiness mission" and "I also wanted to increase the academic output of research."[104] Colonel McCune then continues to cite numerous regional innovation partnerships in the Seattle area. Similar information was gleaned from a Canadian military medical student posted to the US for training. Additional examples of combined development were found at the US Defense Advanced Research Projects Agency (DARPA)—the agency responsible for working with innovators both internal and external to the department. DARPA annually publishes its research findings and information about its partnership programs.[105] The use of such an agency is not necessarily a starting point for an innovation culture change across DND, but both the DARPA and medical innovations within and in a partnership with outside experts serve as an example of how DND can influence its innovation practices. If such collaborations existed across the organization, DND could be considered to stand at this level.

An example of an effective innovation partnership is found at 5 CDSG Technical Services Branch. Transportation Company hired co-operative education students to conduct research and fact find on a variety of projects—a low cost method to generate innovation and one generally available but largely underused in DND.[106] One such project was biodiesel. The result saw a low-level partnership with the University of New Brunswick which had previously partnered with private industry to develop cold weather biodiesel from waste cooking oils. The initial project, excluding co-op student salaries, was well under $10K and will not likely exceed $40K. The end state will see the production of waste cooking oil from DND kitchens processed into useable green fuel for the commercial fleet in Gagetown. While the testing continues, this

[104] Sharon D. Ayala, Research partnerships benefit military readiness, medical education, (7 November 2016), https://www.army.mil/article/177993/research_partnerships_benefit_military_readiness_medical_education

[105] By comparison, the DRDC website had little information on its projects and external relationships other than generic statements on working with others. On 29 November 2016 under the "Priorities" section of its industry page it listed 16 Days of Activism Against Gender-Based Violence, Flood Preparedness, and nominations for volunteer awards. http://www.drdc-rddc.gc.ca/en/partnerships-partenariats/industry.page

[106] Wages were around $14-16/hour depending on the level of experience and education of the student.

example demonstrates that combined development can occur at the tactical level at low cost just as well as at the strategic levels found with DARPA. This example nests with the federal government's innovation agenda bringing credibility to DND with the government, the public, and the environmental sector. From this example, combined development can see multiple stakeholders all benefiting with positive public perception.

With the biofuel case, DND becomes recognized by the environmental community as striving to establish better practices, the government sees its innovation agenda developing, the local economy sees respect for the environment, the finance community sees cost savings in waste reduction, the University of New Brunswick advances academic trials and increases access to resources benefiting students and staff, and DND obtains lower cost fuel. Innovation in this case makes for a winning solution for multiple entities.

Lead development in the model is the sub-pinnacle of innovation. Leading innovation means that the culture has been transformed from one of little or no innovation to an organization that leads in a particular sector. Just a few examples of what DND could lead in based on current successes or present areas of development could include: Arctic sustainment, biofuels, human centric combat clothing, combat feeding, and humanitarian support to name a few. Leading development requires interaction with outside agencies which could include: Industry, allies, academia, and think tanks. DND could find niche areas in which to contribute to defense related research and innovation at this level. This is where US military research and development rests, but not necessarily the entire organization.

It is not necessary for lead development to be only strategic. Identifying opportunities at the unit or command level can also initiate a lead development project. Lead development on a

consistent basis, however, requires a culture change. When consistent projects are sustained and results garnered, or innovative lessons learned and applied from failures, development flows with multiple organizations, and new development happens—only then can the organization be considered to have achieved a lead development status.

Professor Miikka J. Lehtonen, a professor at the University of Tokyo and Markus Paukku from the Amsterdam Business School, demonstrate how design thinking and innovation are developing at All Nippon Airways (ANA), Japan's largest airline.[107] The airline industry has typically been risk adverse and limited in growth, with few exceptions (e.g., JetBlue, Southwest Airlines, Westjet). ANA leadership stood up a five-member diverse team of internal innovators called the 'ANA Digital Design Lab.' With the help of an additional 20 ambassadors positioned throughout the company, the team members act as sensors in the organization. The team senses problems and opportunities and seeks to find areas of growth. For example, the team recently started collaboration projects with NPO XPRIZE creating new products and offerings for ANA customers.[108] This is an example of the combined development stage in the innovation pyramid. The advances over the last eight months by the design team has begun to lead ANA to approach the lead development level of the model as an innovation leader in air transportation.

Finally, the pinnacle of innovation is the Strategic Engagement Level. At this level, the organization has embraced an innovation culture even if the projects and solutions are low cost and low key. The vast majority of members within the organization are in an innovative mindset and are thinking about how to improve their individual and collective realms of responsibility. The strategic engagement level then takes these collective thoughts and practices and engages

[107] Miikka J. Lehtonen and Markus Paukku, Be rebellious! How ANA is Utilizing Design Thinking to Connect its Past with its Future. http://thisisdesignthinking.net/2016/12/ana-design-thinking-japan/

[108] Ibid.

and leads other entities outside the normal partnerships. Strategic engagement may result in high level innovations including: Patent filings; revamping of policies and procedures for the department, nation, and allies; mentoring other organizations on how to become innovative; and demonstrating high levels of efficiency and effectiveness. At this level, failures are accepted and overcome in training and development. As discussed earlier, Steve Jobs noted that innovation makes the difference between a leader and a follower. If DND wants to be a leader in any realm, then according to Jobs, it needs to be innovative, which is end state of the Strategic Engagement level.

The use of the innovation pyramid across an organization can be broken down into four planes: Processes, Talent, Training, and Culture. The aspect of culture will form the next chapter but the remaining three will be touched on here.

The first plane seeks innovative improvements to current processes. Examples of improvements could include changes to recruiting and procurement. The first step in improvements to these areas would be to follow the innovation pyramid and determine where the organization currently exists in its processes—a form of introspection. Are processes based on any form of innovation? Are they based on lessons learned or best practices? If 'No' is the answer, or even if the answer is unknown, there is room for investigation to determine why processes exist and how they can be improved.

The next plane is talent seeking. DND should seek to hire talent that is ready to innovate as opposed to be seeking a pension. Project and procurement leaders need to be hired for their abilities to demonstrate innovative thinking, not because they are priority hires or for the sole reason of knowing a system—although these aspects are important. IDEO hires for diverse

abilities and attitude. Employees come from varied backgrounds, frequently leave the firm, but are often hired back after several years of absence. Collins reports similar actions by successful companies.[109] Talent in innovation is more than hiring a person with a strong background in a specific field, it is hiring someone that can learn, think, and act and can employ the authority provided with an innovative direction. Rule following staff will keep the organization within the parameters needed to keep an organization on track, but they are seldom able to provide advice or course corrections when situations change. The DND Travel Directive is a classic example of this. Problems ensued as a result of a lack of design thinking approach that failed to capture user input. Claims were unable to be finalized and costs at some subunits soared for interest on travel cards, administration time, additional staff required to be employed completing claims, additional errors on claims, and late flight bookings that drove costs up.[110]

Civilian innovation training is required well before an individual arrives at the director level and, at a minimum, anyone hired in a sub-director role should have demonstrated a degree of innovation. Without innovation training or experience before arriving at this level, DND diverges from industry significantly and risks adopting and reinforcing antiquated or inefficient processes and attitudes that are not conducive to efficient or effective operations. Progressive firms would never hire senior executives without some type of innovation background in today's professional environment.[111]

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[109] Collins, James C, *Good to Great: Why Some Companies Make the Leap ... and Others Don't*, (New York, NY: HarperBusiness, 2001)

[110] The full gamut of these costs is captured in a 5 CDSG Technical Services briefing note on the Travel Directive. The author was the officer that ordered a study to determine the effects of the Travel Directive.

[111] Evidence to support this comes from the what could be called the start of the innovation hiring era with Jack Welch as he recounts his success with innovation in his book *Straight from the Gut*. More recent evidence was gleaned at IDEO during a site visit, and again in discussions with a CEO (who prefers to remain unnamed) of a major Canadian financial institution on their hiring and training practices. He revealed a drive to recruit innovation minded employees.

Training is the fourth plane. Innovation training needs to commence at the Master Corporal level and continue upwards. Innovation techniques will be different between non-commissioned members and officers but a common understanding and early training or at least exposure to innovation will help align both groups in innovation practices. The development of innovation training within DND could help the department become a leader in corporate innovation training. Civilian leadership positions, as mentioned, require a degree of innovation experience before being hired. New leadership hires in DND should be expected, as part of their job descriptions, to organize and lead innovation and have that as an evaluation requirement. Reporting higher on innovation practices taken and training completed is a requirement here to jump start innovation within the civilian side of the department. Innovation practices should center first on problems within the organization in which a new hire is employed. The aggregate effect of many new hires across many organizations within the department will have a net positive effect on the entire department. The specific techniques are outside the scope of this paper but hiring criteria that assess innovation and then using those hires to tackle large to small problems will help change culture.

As for support positions, such as drivers and clerical workers, innovation training is less of a requirement than for managerial level individuals but it still should be encouraged at this level. Examples of innovation by MDO (civilian drivers) in Gagetown included the development of low cost shear pins and heavy equipment parts that saved the Crown thousands of dollars. Examples such as these should be publicly shown across Canada. Popularization of success mirrors that of IDEO and can aid in changing culture and push the department to an innovation acceptance tipping point.

Training can also take the form of mentoring, innovation clusters to solve problems, professional development at the unit level, or organized and funded national training.[112] Leadership buy-in is needed by both military and civilian leaders for training to be successful.

Minimum Standard Levels

At a minimum, units should be at the Best Practices External level and progressing to the Adoption level. Any level less than this means there is significant room to progress for the unit and there exists an opportunity loss for improved operations. At levels above the unit level including formations and ADMs, adoption is the minimum standard. Adoption is particularly important for sections that are involved with procurement and process establishment. In an innovative organization, such as DND, Combined Development in many areas should be the norm with Lead Development being found in specific areas where research and strategic problem solving is required. Sharing what DND has learned and using that information, those processes or practices, and the results with allied nations would be the pinnacle of Strategic Development.

The Downside and Caveats of Innovation

There are several downside factors or caveats to discuss when looking at innovation practices and adopting innovation. First, not all innovative initiatives will work. Some will have consumed a significant amount of manpower and even funding and will fail or need to be cancelled. This is normal and should be expected by those participating in innovation activities.

Second, innovation needs room to breathe. It will be difficult for some leaders to leave space for innovation to take effect and see results. Micromanaging or meddling will cause

[112] Caution should be taken if innovation training is to be conducted exclusively online. There are too many examples of poor training put online with the expectation of success. IDEOU does online training with the interaction of facilitators. Interaction is a pre-requisite for successful training. Therefore, the training cannot follow the usual types of online training DND currently uses.

innovation practices to fail. Leaders need to have the emotional and mental capacity to recognize when their interference has destroyed or will destroy an innovation initiative. They need to recognize when to execute mission command and when to step in.

Third, some innovations may drift or not commence being aligned with the organizational objectives. While these projects may be interesting and engaging, they may have to be quashed as they do not align with government or departmental objectives. 3M has experienced this. It is a fact of innovation.

Fourth, although innovation engages employees, it cannot distract them from their primary duties. Innovation should supplement or enhance their duties, unless in a specific job that is 100% innovation based. Leaders need to ensure that there is space for innovation but not at a long-term cost of support.[113] However, this should not be an excuse for failing to implement innovation practices. Based on the current state of DND, it is unlikely this problem will be overwhelming or significant.

Some personnel in certain positions will be able to engage in more innovation than others and not everyone will be won over to the innovation agenda. Getting the best people 'on the bus' when the opportunity exists can help this. However, sometimes there will be employees or individuals that will balk at and hamper innovation. The best option may be termination. If this is not an option, reassignment may be preferred.

There will be other cases where individuals would participate in innovation but due to the nature of their work, it would only be low key. These individuals should not be dissuaded from

[113] The phrase 'long term' is used here. Sometimes investment in innovation will cause short term frustrations or distractions from present duties but will come with long term gain in improved processes, methods, or products.

participating in innovation and can be employed elsewhere in temporary innovation groups as part of a diverse participant background. Simply because someone does not have an immediate role, does not mean they cannot participate. IDEO hires a diverse group of innovators and has found this practice to be successful.

CHAPTER 5: A FOCUS ON DND CULTURE AND INNOVATION

The previous chapter focused on foundational concepts that need to be considered in order to determine where a unit within DND is at. Determining the foundational basis of risk taking, communications, attitudes, etc that can contribute to success is a required parallel. The last chapter provided two tools to help assess the current level of innovation. However, the largest influence on innovation is culture. As Collins has illustrated with many other academics in support and backed by first hand observation at innovative firms, culture will be the heart that drives innovation regardless of the type of organization or its talent.[114] The effects of culture cannot be understated and for this reason an entire chapter is dedicated to culture.

When asked what Alibaba's core competence is by interviewer Charlie Rose, entrepreneur and billionaire Jack Ma declared, "It is culture. It's not technology. Technology is a tool."[115] His comments are reiterated by many other business leaders and writers and help set the stage for arguably the most important driver of organizational innovation. Although misattributed to Drucker, the phrase "culture eats strategy for breakfast" well describes the importance of culture.

Culture

As the world, and in particular the west, moves farther and farther towards a knowledge economy and high technology environment, innovation will play an increasingly important role in the progression of the CAF as a fighting and problem solving force with DND as the training and sustainment package behind that force.[116] Canada is not a world power but can leverage

[114] Collins, James C., *Good to Great: Why Some Companies Make the Leap ... and Others Don't* (New York, NY: HarperBusiness, 2001)

[115] Charlie Rose, Jack Ma of Alibaba, https://www.youtube.com/watch?v=i86zGhEbjVs

[116] Philip Cook, Bojorn Terje Asheim, Ron Boschma, Ron Martin, Dafna Schwartz, Franz Todtling, *Handbook of Regional Innovation and Growth,* (Stockport, Cheshire, UK:Edward Elgar Publishing, 2011) 28

regional style innovation similar to that of regional industry dynamics argued by Cook et al.[117] In this regard, DND does not have to be an innovation expert at everything but can be selective in niche innovations and innovative in the current processes and activities it presently performs. This starts with culture.

DND needs to face a significant culture shift. This culture shift should occur concurrently from the top down and bottom up. It requires leadership buy-in. But how can this be performed and what needs to change?

There are several activities members and leaders need to commence. These include:

1. Leadership buy-in to innovation;
2. Conducting unit self-assessments to determine where on the innovation pyramid units are (the self-assessment tool will help);
3. The encouragement to seek innovation opportunities in various forums;
4. Learning to accept failure;
5. Incorporating innovation learning into officer and NCM training;
6. Rewarding innovation publicly and frequently;
7. Seeking out innovators in the organization;
8. Hiring for innovation; and
9. Mirroring industry behaviors in a defence context.

Leadership Buy-in

In order to commence the process of a cultural innovation change, which is arguably needed, leaders need to buy into the concept. Buy-in includes learning about industry and public

[117] Ibid

sector best practices and disseminating that information. Although the tactical level is outside the scope of this paper, Commanding Officers can develop low cost, quick, and simple innovation projects with their staffs by employing design thinking methodologies to solve problems that currently exist. Design thinking will also aid in warfighting as it teaches different methods of critical thinking that can have military applications. Examples started in Technical Services Branch at 5 CDSG Gagetown that grew from a design thinking and innovation professional development session included: Methods to reduce cutting edge costs on heavy equipment, optimizing 24 hour work teams, reconfiguring paint booth work flows, and reducing snow removal equipment on-road time.

Self-Assessment

If an organization does not know where it is going, any road will take it there. To determine the level of innovation that currently exists, self-assessment is required. The tools found in this paper—the self-assessment tool and the pyramid—will help determine where the organization is and where it needs to improve and go.

Encourage Innovation Opportunities

Leaders and supervisors should be actively seeking innovative opportunities and encouraging their subordinates to do the same. While there is some direction needed to ensure that the innovation pursuits are legitimate, a lack of encouragement will prevent the organization from achieving the Best Practices level of innovation.

Encouraging innovation also comes with hiring the right people. Desperation in hiring will not lead to success. Finding officers and civilians that want to learn and experiment and have the capacity to know how to balance rules and regulations with the freedom of innovation

and design thinking will become a most valued asset in DND. Most tech companies hire people that can be trusted to do innovation with minimal supervision but ensure everyone is focused on the goals of the firm. Does DND's hiring practices take this into account? There is room for improvement.

Organizations within DND can seek minor opportunities to innovate before launching on larger projects. Small steps can help condition the organization, practice failure acceptance, and provide encouragement to members to innovate. Showcasing these successes will add fuel to the innovation fire. Showcasing is a means to create increased exposure to innovation which can act as a catalyst to further innovation.

Learn to Accept Failure

Encouragement of innovation tacitly implies that failures will occur. Innovation will cease if failures are punished. In a DND construct, failure should be embraced as a learning tool at all levels but minimized in theatres of war—in the latter case testing failures should have occurred in training.

Examples at 3M saw innovation projects cancelled when increasingly higher levels of efforts were made without results. These failures do not stifle innovation—it continues. The case is the same with IDEO, failure is a learning opportunity as noted by Tim Brown. He declares, "the learning that came from that unexpected failure was maybe more valuable than the success might have been."[118] He also notes that the scientific method, which is closely related to design thinking and innovation, is based on failure. Brown suggests not to think of failure as failure but rather a medium to learn. Avoiding punishments for failure and changing attitudes towards it in

[118] Tim Brown, Learning from Failure, DesignKit at IDEO, http://www.designkit.org/mindsets/1

peace times and training before engaging in an operation will improve the mental capacity and advancement of the institution and is in reality another method of leading the institution.

Training

Incorporation of innovation training into officer training will go a long way to emphasizing innovation within DND and making a long run culture change. Innovation and design thinking is still nascent at many universities. However, DND has an opportunity to lead in professional innovation education if it acts now.

Nevertheless, tactical level training such as basic training or common army phase training is not an appropriate venue for innovation training. The timing of innovation education is problematic and merits further consideration.

Junior officers are moulded at the tactical level and are already facing steep learning curves and heavy schedules for the first two to four years of their careers. Innovation and design methodology will benefit senior Captains and Majors, but are inefficient habits already instilled by the time officers reach these ranks? Gradual innovation thinking could be introduced throughout time, but who would deliver it at low to no cost? Expertise seldom reside or are sparse in tactical units and efforts for second language training will likely take precedent due to the career progression requirements for second language studies over institutional success with innovation thinking. The answer for officers is likely in training at the rank of senior Captain or Major even though there may be disinnovation habits already starting to form.

For non-commissioned members, training in tactical level innovation needs to start at the Master Corporal level and be reinforced before the rank of Warrant Officer to ensure poor habits are not solidified. As members near retirement, it is likely that the introduction of new thinking

methodologies will be harder to create.[119] QL6 and the Master Driver Course (or related similar level courses in other trades) could prove to be a suitable time to implement such training. Training, however, is only one way to influence culture or generate effects.

Rewarding Innovation

Reward systems can encourage innovation. However, accomplishment of the mission or internal feelings of achievement, as were observed with California tech companies, appear to be the greatest reward and employee satisfier. Intrinsic recognition or supervisory recognition of individuals and teams appeared to carry significant weight. Additionally, public acknowledgement can go a long way to help transform a status quo culture to one of innovation.

If the intrinsic rewards of development and success in innovation are present, then the time granted to innovation projects could not only improve employment satisfaction but also contributed to the institution by solving problems on the 'bug list.'[120] Providing time for members at all levels to take innovation training and look at problems to solve using innovation techniques is necessary even if the intrinsic rewards are not yet fostered. Many units contest that they have no time as they are over tasked. To make time will force a reduction in administration and bureaucracy in order to free up time to do innovation projects. There is a two-fold benefit then as disinnovation is hunted, killed, and replaced with time for innovation and opportunities. Inefficiencies are then reduced to produce the time to do innovation causing improved overall outputs.

Eliminating time wasting processes needs to start at the top of the organization and work its way down. A feedback system is needed where members can formerly or anonymously

[119] This has been the author's experience.

[120] The term 'bug list' is used here as a term which refers to the list of things that bug people. The term is regularly used in army vernacular.

contribute suggestions to eliminate inefficient practices (e.g., misguided travel directives, inappropriate levels of approvals, etc). Leadership by example in this area will also help change culture and preserve time.

Reward systems require follow-up. Commanders need to both encourage innovation opportunities and lead professional development. Then, innovation successes, or even failed attempts, need to be shown to commanders who can champion innovation and add momentum to the innovation ball. Rewarding innovation in public can be one tool to help push DND to a tipping point where innovation becomes readily accepted and part of the cultural norm. Rewarding innovation ties well to self-assessments.

Cultural Self-Assessment and the Self-assessment Tool

Regular innovation self-assessments will help units determine where they are at on the innovation pyramid and how innovative the unit culture is. The self-assessment tool previously discussed and found in Annex A provides a tool for commanders, managers, and leaders to employ to assess the current innovation culture.

Failure Acceptance

Failure acceptance will be one of the most difficult hurdles to overcome. To encourage innovation implicitly means to accept failure. The dichotomy in DND is that failure on the battlefield should be minimized. The cultural change between these two extremes will require significant mental power from many to be able to make the switch. However, it can be done by parcelling out when and where failure is acceptable in an innovation context and where it is not. Potential examples of where failure is not acceptable include: Warfighting when training has been successful and the environmental conditions are conducive for success, logistics support

when resources are available, serviceability of equipment when technicians and parts are available, procurement mistakes, negligence, and disciplinary issues. Examples of where failure can be acceptable include: Defense Research projects, experimentation and testing, innovation projects (e.g., biofuels, UAVs), training, technology development, and cost savings initiatives to name a few.

Seeking Out Innovators

Seeking out innovators in the organization can help leadership emphasize the positive elements of innovation. Using current innovators can help form social attitudes towards innovation. Finding innovators in industry as mentors or mirroring their behavior by leaders can help move culture into the innovative realm. Atkins notes that finding internal innovators was a key success component with the RC-135 project.[121]

Hiring Practices and Culture

Firms that specialize in innovation and design seek out people with varied skillsets. DND already does this to a certain degree. A key contributor to culture is hiring the right people. As previously discussed, executives should have innovation experience or training—this is rapidly becoming the industry norm and in some industries, it is a bare minimum requirement. Hiring for innovative attitudes and experience can help remove entrenched attitudes that are disinnovative while contributing to a positive culture change.

At a subunit level, hiring co-operative education students can bring innovation into the organization quickly on several fronts. First, students bring a unique perspective and recent

[121] Sean Akins, "Innovation Example," Email 5 February 2017

industry best practices from their post-secondary schooling. They also have contacts through their university for additional research partnerships.

Second, students are a low-cost labor source that can focus on innovation projects. 5 CDSG Gagetown, Technical Services Branch successfully employed students to do research and development for innovation projects—and it was very successful at an hourly wage of less than $17/hour. These students acted as force multipliers in innovation development. Projects included: Biodiesel, in-house training program development, MSE Safety improvement, a more efficient use of labor, higher efficiencies, and green projects. Did all projects materialize as planned? No, they did not, which serves as an example of risk taking with the potential for failure or suboptimal results. But, the overall effect was highly positive. Co-op students are then exposed to DND operations and their experience can help vet them as potential hires that have experience in innovation adding yet another benefit to DND. Several students have now either applied to join the military or are considering the military or the public service as employment options.

As a caveat, many universities do not have an innovation program and co-op education programs are wide in scope. Some innovation practices and training may need to be conducted in-house with students or in conjunction with their post-secondary institution. However, the level of innovation projects that students will require is low compared to hires at the executive level. Student hires will require potentially more supervision than experienced staff, but this is manageable with proper time management.

CHAPTER 6: CONCLUSION AND ROADMAP

Presently, DND lags industry in innovation development. As industry rockets forward with innovation at unprecedented rates, DND risks becoming a dinosaur organization that will be forced to rely on external consultants and contractors at increasingly high rates while it loses the initiative in innovation development. Innovation is a requirement for DND if it wants to be credible in the eyes of the public, effective with its resources, a leader in a coalition environment, efficient with its materiel, a green governmental organization, or an innovation leader that is aligned with the new federal government agenda. Fighting against innovation development or neglecting it will not place DND in favor with the government and will result in lost opportunities and waste and a loss of credibility in the eyes of the public and government.

The paper began with discussing best practices and innovation killers including disinnovation practices that work against innovation initiatives. Industry best practices and perspectives on innovation were sought as were the qualified opinions of academics. The combination of understanding where innovation thrives and where it dies through neglect or disinnovation framed the study.

The role of disruptive innovation in DND was discussed as was the debate between taking small steps or big leaps. Advancements in technology and global industry are opening the door to disruptive innovation by Canada's opponents. To avoid this, DND can seek to become innovative now. To do so is likely best achieved through taking small steps rather than trying to do great innovative leaps in a single bound.

DND requires formal innovation support from senior leadership as a priority as well as informal innovation seekers throughout the organization. Examples of innovation practices at the

subunit level were given as success stories and proof that innovation can not only thrive but contribute to DND from the battlefield to the corporate side of the department was noted. The given examples demonstrated that both senior leadership and lower level innovation seekers were present resulting in success.

This paper has compared innovation practices with those of industry and other governments. From this research comes a concluding roadmap that commanders can take to enable innovation. The road map, found at Figure 6.1, will help move DND into the innovation arena.

The first element in innovation development is leadership support. Without exception, every innovative organization visited during the research for this project and found in literature had effective leadership which initiated and supported innovation. Company founders such as those at IDEO led with innovation while other firms such as General Electric and 3M became innovative due to leadership that encouraged and implemented innovation opportunities. Leadership attitudes towards risk were and are such that failure is a learning tool. The only difference in DND would be less risk tolerance when dealing with immediate or catastrophic loss of life or equipment.

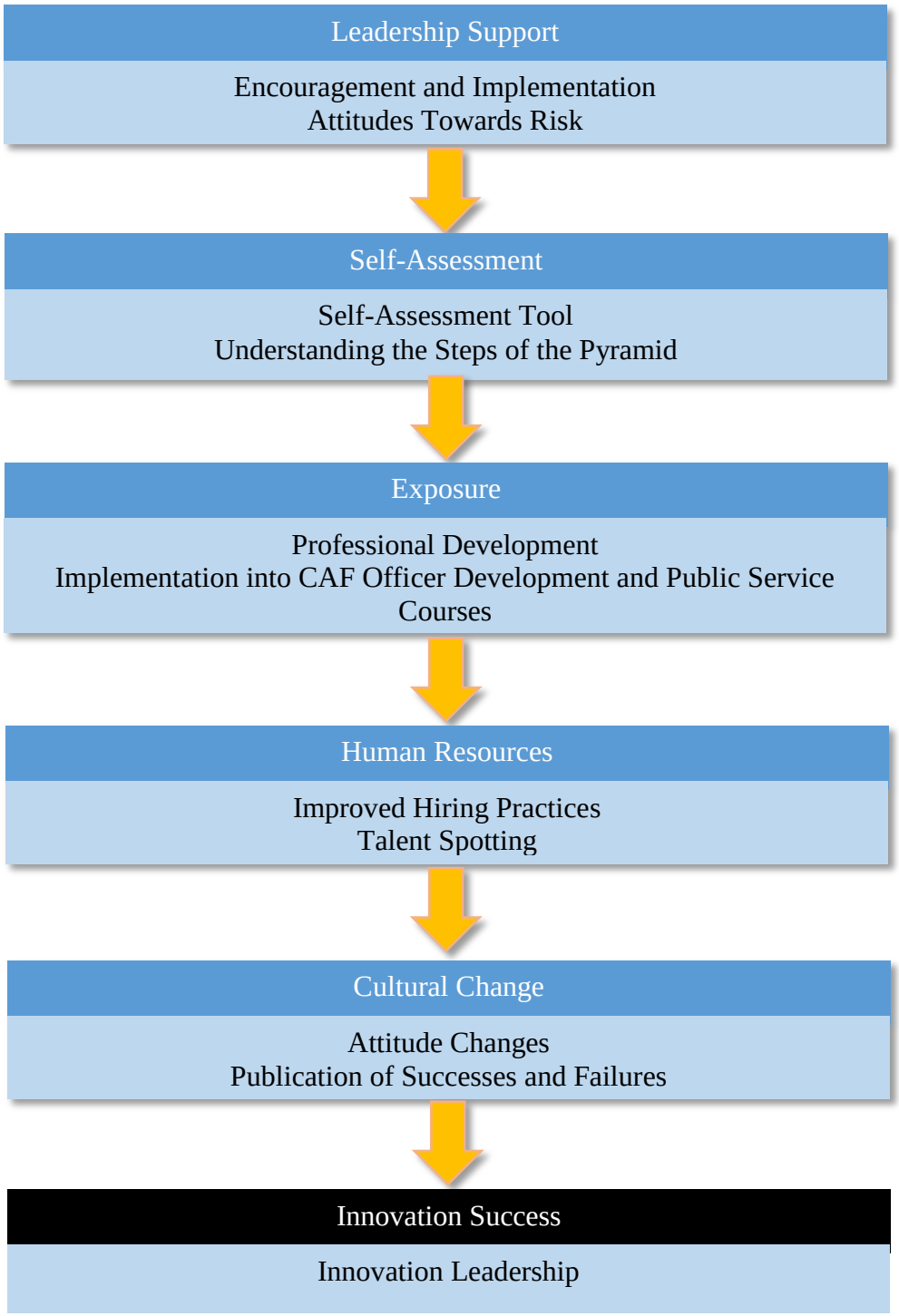

Figure 6.1: The Innovation Roadmap
Source: Author

This paper provided two tools leaders can employ to determine where they and their organizations currently fit on the scale of innovation. The first tool was a self assessment questionnaire found in Annex A. Knowing an organization's starting point will help formulate a

plan to become innovative. The pyramid outlined the progressive levels of innovation an organization can experience. The pyramid provides a sequential list of steps to achieve innovation leadership. If lessons are not being learned and disseminated from a base level, it is unlikely that organization will reach any significant level of innovation.

The self-assessment tool showed four areas for innovation development. These areas included: Attitudes, Leadership, Risk Taking, and Communication. The self-assessment tool was developed to help spot how culture sits or is forming and how it aligns with the levels of the pyramid.

As leaders begin to understand the pyramid levels and ascertain where they are at, they can implement exposure programs. Professional development starting at the junior officer level is required and should continue throughout officer and senior non-commissioned member careers. Likewise, courses for DND civilian managers and employees need to be implemented. These efforts should seek to align innovation thinking with that of industry and expose DND members to innovation, a practice they may not have previously experienced.

Innovation thinking and its sister, design thinking, needs to be developed in formal training with repeated exposure. Doing so will not only aid sub-departmental missions but develop problem solvers that are required in coalition forces and in campaign design. Training can complement hiring practices and help develop culture.

Best practices and successes need to be championed more thoroughly throughout the department. A communication strategy, whether this is through publications such as *The Maple Leaf*, or other means needs to be made and accompanied with public rewards and recognition. Best practices and innovations also need to be captured in a central repository for future

dissemination and review. This knowledge sharing mechanism can catalogue innovation practices potentially enabling other innovators.

This paper demonstrated that innovation culture was influenced by hiring tendencies and practices that should be adopted into DND. In addition to hiring innovation talent and experience, talent development and spotting, and training internally also need to occur. One rapid, low cost talent area that can work on innovation projects as noted in the paper is co-operative education students from local universities. This process worked very well for 5 CDSG Gagetown and 4 Wing Cold Lake and should be adopted across DND.

While there are pockets of innovative individuals, as an institution, DND needs to seek to hire leaders and managers in mid-level to senior positions who have an innovation mentality. The innovation mentality is wide in scope and can range from research and development to business process and design thinking. Improving hiring practices and internal talent spotting for internal hiring and promotion are necessary to affect a cultural change.

Simply stating that innovation is important or having the occasional townhall where a senior member of the department notes that innovation is important is simply not sufficient. A cultural change in the department is needed. Cultural change employs existing innovators as champions of innovative projects. Successes and failures are publicized to encourage measured risk taking and animate others to develop an innovation mentality. With cultural change comes cross-pollination opportunities across the organization.

This paper provided a number of methods to introduce innovation as a cultural component of DND. Culture provides a contributing force to the levels of innovation shown in the innovation pyramid. As the organization progresses up the pyramid, culture will enable

progression while progression will be enabled by culture in a symbiotic relationship. In order to progress up the pyramid, cultural attitudes towards innovation and risk need to change. Learning to accept a culture of failure, under certain conditions, while encouraging innovation and conducting training will help form culture and improve operations. Successes and failures can be rewarded publicly as a means to encourage culture.

By following this roadmap, innovation can begin to blossom within DND and, in spite of being a small military, opportunities will arise wherein Canada can become recognized as a world leader in niche areas while improving the force and ameliorating materiel management. Doing so will bring credibility to the department on the national and global stages.

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ANNEX A: CULTURAL ASSESSMENT CHECKLISTS

The intent of this checklist is to help assess organizational levels of innovation as a supplementary tool to the Innovation Pyramid. There are four categories: Communications, Risk Taking, Leadership, and Attitudes and Culture. The checklists provided will help leaders narrow down innovation issues in these four categories and generate a better idea of specifically what is lacking.

The Organizational Checklist

Criteria	**Scale (1 for low agreement 10 for high)**									
	1	2	3	4	5	6	7	8	9	10
Communications										
Superiors request feedback and take action or return useful feedback.										
The chain of command encourages innovation through open communication with subordinates										
Subordinates can identify what the DND strategy for innovation is										
The organization for which I am responsible has had at least one article published in a military or civilian publication (newsletter, doctrine manual, Maple Leaf, local paper) in the last 12 months. (Score 9 for one article and 10 for 2 or more, all others, zero).										
Our formation recognized at least three individuals for innovation in the past 12 months. Score 8 pts for 3 or more, a 6 for 2, or a 5 for 1.										
Our division or equivalent has submitted nominations for Public Service Employee Innovation Awards (score 10 for 1-3 nominations, 3 for no nominations)										
Lessons learned are taken and applied as a matter of routine										
The formation and subordinate units seek to develop innovative projects with external organizations										

Innovation is a routine discussion point in formal and informal meetings										
Risk Taking										
The chain of command does not punish mistakes in a learning or training environment										
Experimentation is encouraged										
Failure at innovation will not have negative career implications										
Innovation is as important as established policies and procedures										
The chain of command helps mentor innovators										
Leaders at all levels are familiar with at least two ways to assess risk										
Risk taking is defined in the unit										
Leadership										
Innovation and institutional advancement is more important than career advancement in my organization										
Leaders in the immediate organization encourage innovation by reducing less efficient tasks (e.g., unnecessary staff work, inefficient tasks, elimination of non-value added work, excessive editing of documents)										
Leadership in the organization sends its subordinates for innovation training or conducts PD sessions on innovation										
The unit's leadership has showcased innovation examples in the unit or formation to junior leaders										
Attitudes										
There is little opposition to innovation one to two levels above										
There is little opposition to innovation one to two levels down										
The procurement process at the unit and formation level supports innovation										
The informal leadership of both military and civilian members in the unit supports and encourages innovation										
Innovators in the immediate organization are supported by peers										
Administration is seen as less important than innovation										

Supervisors regularly encourage innovation										
Civilian employees are supportive of innovation										
Officers seek innovation opportunities										
Senior Non-commissioned members support innovation initiatives or start their own										
Junior Non-commissioned members welcome and get involved in innovation opportunities										
Members at all ranks seek innovation opportunities or better ways of doing what they do										
Members are encouraged and approved to take higher level education and training opportunities. Score 1 pt for every 10% of the organization's population that has completed formal educational improvements in the last 12 months										
Proactivity is alive and well in the organization										

A Leader's Individual Checklist

Criteria	Scale (1 for low agreement 10 for higher)									
	1	2	3	4	5	6	7	8	9	10
Communications										
Score 1 point for every time you have encouraged someone in your organization to pursue innovation in the last 90 days										
I have outlined the importance of innovation to my immediate subordinates either during a meeting or formal document at least twice this year (5pts for twice, add 1pt increments for the number of times discussed in the current 12 months to a maximum of 10)										
I often discuss innovation opportunities with my subordinates										
My subordinates frequently discuss opportunities to innovate with me or their peers										
Risk Taking										
The chain of command I lead does not punish mistakes in a learning or training environment										
I regularly encourage experimentation										
Failure at innovation will not have negative career implications for my subordinates										
I feel equally comfortable with innovation as I do with established policies and procedures										
When an innovative effort failed, I did not mark that person lower on their annual evaluation than someone who had a successful innovation project or no project										
I am comfortable knowing that I may lose money on some innovation projects										
I am willing to acknowledge and accept that some innovation projects will fail										
My career advancement will not be										

harmed if I pursue innovation projects										
Leadership										
My subordinates routinely seek better methods at doing the tasks we repeatedly have to fulfill										
I recognize inefficient work processes and strive to eliminate them										
I send subordinates for innovation training or conduct PD sessions on innovation										
I seek opportunities to learn about innovation in a variety of settings (readings, courses, online forum subscriptions, PD sessions, etc)										
I have taken time in the last 12 months to review lessons learned from a unit or external unit source (6pts for one time and one additional point for every time you reviewed a source)										
My subordinates have not resisted and or disregarded my innovation initiatives										
My procurement staff support innovation by finding better ways to create the effects I need										
I, one of my subordinates, or my supervisor has personally sought innovation best practices external to the unit (could still be within DND)										
Innovation is a hiring criteria I often seek										
Attitudes										
I think innovation should be a top three priority in DND										
CAF members do not need much innovation as we get most of our technological support from industry (2 pts if you agree, up to 10 if you disagree)										
Experimenting with new ways of doing what we do is important to me										
Administration is less important than innovation in our unit										
DRDC is not the only innovation leader the department needs										
I make time for innovation										

Innovation applies to my trade										
Innovation applies to my job										