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DISTRIBUTION, DISRUPTION AND FAILURE: BUILDING A CULTURE OF INNOVATION IN THE CANADIAN ARMED FORCES

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Master of Defence Studies

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Abstract

This paper addresses the importance of innovation in modern military organizations. It considers best practices and trends in innovation from business literature in order to understand some of the unique challenges of supporting innovation in military organizations. Historical cases are provided to illustrate examples of military organizations that have succeeded or failed to innovate. The discussion centers on the concept of building a culture of innovation and the relevance to the Canadian Armed Forces. The paper concludes that a strategy to build a culture of innovation must incorporate three guiding principles; distributing innovation, thinking disruptively and embracing failure.

Chapter 1 defines innovation and presents the fundamental concepts and characteristics of innovative organizations. Chapter 2 provides an overview of military innovation studies including a discussion of the main areas of research. Chapter 3 focusses on cultural factors and their impact on innovation in military organizations. Chapters 4, 5 and 6 describe the principles of distributing innovation, thinking disruptively and embracing failure. Distributing innovation refers to decentralizing the responsibility for initiating, developing and implementing innovation and empowering creative users at all levels. Disruptive thinking delivers the capacity to exploit radically new concepts that challenge the existing means of conducting warfare. Embracing failure in the pursuit of innovation encourages creativity in order to prevent failure at an institutional level.

The paper concludes by emphasizing the importance of innovation within the Canadian Armed Forces. It addresses current challenges and opportunities, and provides the practical application of distributing innovation, encouraging disruptive thinking and embracing failure as a catalyst for innovation.

Introduction

Prejudice against innovation is a typical characteristic of an Officer Corps which has grown up in a well-tried and proven system.

– Field Marshal Erwin Rommel

The word *innovation* conjures up images of secretive think tanks, high risk enterprises and cutting edge new technologies. In a military context, successful innovation can be the difference between a decisive victory and catastrophic defeat on the battlefield. Innovation becomes increasingly important in the modern age, as military leaders must address emerging threats, resource constraints, and rapid technological advances. *Adaptation* provides a mechanism for military organizations to evolve in response to changes in the technological, political, economic and social environments. However, *innovation* provides military organizations with the ability to profoundly transform capabilities, concepts and structures to counter future threats to national and international security. This paper will argue that cultivating a culture of innovation should be a strategic priority for the Canadian Armed Forces. In order to build a culture of innovation, three guiding principles should be considered; distributing innovation, thinking disruptively and embracing failure. Incorporating these concepts into an overall strategy will enable the Canadian Armed Forces to build and sustain a culture of innovation.

Chapter 1 introduces the fundamentals of innovation, beginning with a discussion of why innovation is important to in both business and military organizations.

Establishing a definition of innovation is critical to understanding the relationship between innovation and related concepts such as change, adaptation and transformation.

This basic definition provides the foundation for a discussion of the tenets of innovation

and common characteristics of innovative organizations. Chapter 2 provides an overview of military innovation studies focusing on the major areas of research beginning with the civil-military, interservice and intraservice models. These models consider innovation as being formally driven from the top of the organization, whereas the bottom-up model for innovation is a more recent and less developed area of study. The final area of research considers the impact of cultural factors on innovation and how organizational culture relates to the other models of innovation. Chapter 3 analyzes the cultural model in greater detail and outlines several proposed strategies that can guide the development of a culture of innovation within a military organization. This chapter concludes with a comparison of the cultural factors that affected innovation within Russia, the US and Israel during Cold War and post-Cold War eras.

Chapters 4, 5 and 6 describe three key factors that should be included in a strategy to build a culture of innovation; distributing innovation, thinking disruptively and embracing failure. Distributing innovation refers to decentralizing the responsibility for initiating, developing and implementing innovation. Encouraging information sharing and collaboration at all levels provides an opportunity to rapidly innovate new capabilities, concepts and structures. Secondly, in order to exploit radically new concepts that challenge the existing paradigms, military organizations rely on individuals that can think disruptively. In contrast to sustaining innovation, disruptive innovation profoundly changes the way in which warfare is conducted. Finally, embracing failure during force generation and force development activities is a critical component of a building culture of innovation. A willingness to accept risks, learn from mistakes and conduct critical analysis provides the foundation for revolutionary change in capabilities.

Chapter 1 – Organizational Innovation: A Primer

Like many lofty goals, innovation is often identified as a strategic organizational priority but rarely executed in practical terms. It is an objective which continues to elude even the most successful organizations. In a 2010 survey by Bloomberg Business, 72% of companies indicated that innovation was one of their ‘Top 3’ strategic priorities and the majority of these organizations were committed to increasing the funding allocated to innovation related activities.¹ Traditional studies of innovation theory have stemmed from business literature, but apply to a range of organizations. Terms like ‘creative destruction’ and ‘disruptive innovation’ have inspired extensive debate on how to harness innovation to deliver better products, increase profits, optimize efficiency, reach new customers, and exploit opportunities to grow.

In the business community, maintaining a competitive advantage and managing change is critical to survival. In contrast, the military exists within a bureaucracy that is designed not to change.² Military organizations have been described as “...inherently inflexible, prone to stagnation, and fearful of change.”³ While this may be the case, it is a poor excuse to avoid developing a strategy and accepting responsibility for innovation. In order to overcome these powerful forces resisting change, the military must find the impetus to innovate. This inspiration may come in the form of internal or external factors that act as drivers of innovation. Once it has been acknowledged as a strategic priority,

¹ James P. Andrew, “What Executives Make of Innovation,” *Businessweek.com* (15 April 2010). http://www.businessweek.com/magazine/content/10_17/b4175043789498.htm?chan=magazine+channel_special+report.

² Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca, NY: Cornell University Press, 1991), 2.

³ Adam Grissom, “The Future of Military Innovation Studies,” *The Journal of Strategic Studies* 29, No. 5 (October 2006), 919.

military organizations must take deliberate and transparent steps to overcome the institutional barriers to innovation.

So how is it possible to apply innovation theory from the business world to military institutions? The common thread is *competition*. Businesses compete against each other through a middle man – the customer, whereas military organizations compete directly against each other.⁴ Military organizations cannot afford to stagnate and risk catastrophic defeat at the hands of their adversary. Military organizations and businesses both exist in a climate of uncertainty and innovation is one mechanism available to organizations to address this uncertainty. In addition, military organizations must compete for resources and political support. This is a particular concern during times of peace, when shrinking budgets and the lack of a clear threat to national security seem to justify carving away at the resources allocated to national defence. Given these challenges, it becomes clear that military organizations must find ways to enable innovation or risk becoming irrelevant.

Innovation in a military context applies to the development of new capabilities, concepts, structures, processes and organizations. Unfortunately, as Williamson Murray observes, innovation “...like most complex human endeavors, occurs in military institutions in an opaque and unclear landscape.”⁵ Military organizations must innovate in the way they train, prepare, plan and fight. In other words, innovation plays an integral role in force development, force generation and force employment activities. While this

⁴ Gautam Mukunda, “We Cannot Go On: Disruptive Innovation and the First World War Royal Navy,” *Security Studies* 19, no. 1 (2010), 132-133.

⁵ Williamson Murray, “Armoured Warfare: The British, French, and German Experiences,” in *Military Innovation in the Interwar Period*, ed. by Williamson Murray and Allan R. Millet (Cambridge: Cambridge University Press, 1996), 45.

may seem a fairly straightforward statement, it is far more difficult to put innovation into practice. Considering the many barriers to innovation that exist within the military environment, innovation is unlikely to occur without a deliberate strategy. However, before addressing the problem of how to innovate, it is important to establish a clear understanding of what is meant by innovation.

Finding consensus on a definition of innovation is as complex as implementing the concept itself. Furthermore, while innovation is difficult to define, it is even more challenging to measure. This presents challenges for organizations that strive to be more innovative, yet struggle with developing the measures of effectiveness to assess progress in this area. A simple description considers innovation as the introduction of something new.⁶ This may result in a new product, service, process or organizational element. While this definition provides a starting point for discussion, it does not address the scope or complexity of the term, nor does it provide any grand vision for how innovation occurs.

The ‘newness’ which accompanies innovation indicates that something has changed which may be the result of either an internal or external influence. As such, innovation and *change* are inexplicably linked. Successful innovations inevitably result in a significant degree of organizational change. David Schmidtchen, a Lieutenant-Colonel in the Australian Defence Force (ADF) and author of *The Rise of the Strategic Private: Technology, Control and Change in a Network Enabled Military*, concludes that “[in] essence, innovation is about managing change. It is worth noting that although all

⁶ Miemie Winn Byrd, “The Anatomy of the Innovative Organization: A Case Study of Organizational Innovation Within a Military Structure” (Ph.D. dissertation, USC Rossier School of Education, May 2012), 20.

innovation constitutes change, not all change is innovation.”⁷ This spectrum of change covers what could be considered sustaining or evolutionary innovations on one extreme to disruptive or revolutionary innovations on the other. Perhaps a more utilitarian approach is to define innovation in relation to other key concepts such as adaptation and transformation.

Adaptation and innovation are closely linked, however, adaptation can be viewed as a process that does not result in the same degree of impact on the organization as an innovation.⁸ From another perspective, “[adaptability] is the ability to rapidly cope with novelty, while innovation is the inception and production of novelty.”⁹ Adaptation occurs most frequently at the tactical level when new technology, tactics and procedures are developed to exploit an opportunity or minimize a threat. As such, adaptation does not directly impact operational level doctrine, and is unlikely to result in profound or enduring changes to the way a military conducts warfare. This observation should not be considered to diminish the critical importance of adaptation in military organizations. In times of war, adaptation is a means of making rapid adjustments to new threats or technologies. Recent conflicts such as Iraq and Afghanistan clearly highlight the need for battlefield adaptation. Examples included developing counter-insurgency tactics, responding to the threat of improvised explosive devices (IEDs) and integrating new mobility platforms and weapon systems without the availability of supporting doctrine. Adaptation manages the risks that accompany organizational change, by making

⁷ David Schmidtchen, *The Rise of the Strategic Private: Technology, Control and Change in a Network Enabled Military* (Australia: Land Warfare Studies Centre, 2006), 265.

⁸ Robert T. Foley, “A Case Study in Horizontal Military Innovation: The German Army, 1916-1918,” *Journal of Strategic Studies* 35, No. 6 (December 2012), 802.

⁹ Richard J. Allain, “Innovation in a Small War,” *Small Wars Journal* (13 Jun 2012), 8.

incremental improvements as part of an evolutionary process. As such, adaptation does not result in the type of revolutionary advances that achieve superiority on the battlefield. Adaptation may give the illusion of progress, where in reality it is more about keeping pace with adversarial capabilities, technology, politics and social changes. In contrast, innovation is about radical changes and translating these to the operational and strategic levels.

Major innovations are the driving force behind radical transformation of military concepts, processes, capabilities and structures. It is difficult to imagine a military institution undergoing any degree of transformation without the innovative ideas that provide an alternative to previously held principles. Transformation is exactly that: a change so significant that it renders the current paradigm obsolete. Any military innovation in this respect fundamentally changes the way in which campaigns and wars are fought.¹⁰ James Russell is an Associate Professor at the Naval Post-Graduate School who has written on the emergence of innovation and transformation during the wars in Iraq and Afghanistan. He summarizes the common elements of military innovation, including, "...changed standard operating procedures; different relationships between and among combat arms; the blending of combat and noncombat capabilities to achieve battlefield "effect"; and the eventual development of different missions for military units not previously envisioned in doctrine."¹¹ It is important to distinguish an innovation as a process rather than a product, service or endstate. In the hierarchy of change, from adaptation to transformation, innovation is the catalyst for change in the conduct of

¹⁰ Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military...*, 7.

¹¹ James A. Russell, *Innovation, Transformation, and War: Counterinsurgency Operations in Anbar and Ninewa Provinces, Iraq, 2005-2007* (Stanford: Stanford University Press, 2011), 29.

warfare. As such, innovation becomes a means to an end rather than the end itself. This importance of accepting this perspective is that it deters leaders from viewing innovation as a new technology or tactic, and shifts focus to the process of initiating and implementing major organizational changes.

Adam Grissom, a senior political scientist at the RAND Corporation, defines military innovations according to three criteria. First, Grissom states that "...an innovation must change the manner in which military formations function in the field."¹² This criterion emphasizes that the innovation must deliver an operational effect, such as a significant increase in combat power, in order to be considered as an innovation. Secondly, Grissom defines an innovation as being "...significant in scope and impact."¹³ This element reinforces the difference between innovation and adaptation based on the scope of resulting changes in the organization. It also stipulates that innovations must represent more than just incremental change that would otherwise occur as part of a natural evolutionary progress. Innovations result in radical and revolutionary advancements that render current capabilities obsolete. Finally, Grissom stipulates that military innovations are "...equated with greater military effectiveness."¹⁴ As such, innovations that do not provide positive effects and enhance military operational capability are not considered. This criterion must be taken with some measure of caution since many innovations will not always deliver an immediate operational effect. In defining innovation, the rate of change is significant but not the sole determinant of

¹² Adam Grissom, "The Future of Military Innovation Studies," *The Journal of Strategic Studies*..., 907.

¹³ *Ibid.*, 907.

¹⁴ *Ibid.*, 907.

whether it is an innovation. Accepting this, it is necessary to conclude innovations may require a period of investment to fully exploit their potential. The change may not be rapid, but the impact will dramatically and permanently alter how future wars are conducted.¹⁵ This concept will be discussed in Chapter 5 as one of the characteristics of disruptive innovations and why many organizations fail to exploit opportunities to change.

Chapter 2 – Military Innovation Studies

The study of innovation in military organizations reveals many contradictions. Innovation has been described as a mechanism for addressing the uncertainty and volatility of war.¹⁶ On the other hand, the innovation of new capabilities, concepts and structure can also create uncertainty, such that “[unexpected] events, inevitable failures, and a fundamental lack of control are inherent to the process.”¹⁷ Innovation can be used to manage change, or alternatively, drive change within an organization. Innovation cannot be constrained by process, but exploiting innovative ideas requires a process that recognizes opportunities and is able to connect the requisite people, resources and strategies to foster development. Innovation is not a specialist skill and cannot be institutionalized.¹⁸ However, institutions including the military, are actively seeking ways

¹⁵ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel* (Stanford, CA: Stanford University Press, 2010), 1.

¹⁶ Robert T. Foley, “A Case Study in Horizontal Military Innovation: The German Army, 1916-1918,” *Journal of Strategic Studies*..., 800.

¹⁷ Soren Kaplan, “Leading Disruptive Innovation,” *Ivey Business Journal* 76, no. 4 (Jul/Aug 2012), 1.

¹⁸ Williamson Murray, “National Security Challenges for the 21st Century,” Strategic Studies Institute, U.S. Army War College, October 2003, 31.

to cultivate a culture of innovation in order to develop new capabilities, concepts and structures.

Discussions regarding innovation in military organizations naturally migrate towards technology. While innovation may be a response to advancements in technology, innovation requires more than technology to fundamentally create a new style of warfare. Technology without intellectual rigor and conceptual analysis will not result in revolutionary changes within an organization. Barry Posen, a Professor of Political Science at MIT observes that new technology "...will normally be assimilated to an old doctrine rather than stimulate change to a new one."¹⁹ In this case, technology is simply integrated into the existing methods and processes, rather than creating a new capability. This response to technology reflects an adaptive rather than an innovative approach to change.

Barry Posen provided the foundation for military innovation studies in his book, *The Sources of Military Doctrine*, published in 1984. He recognizes that military organizations are inherently rational and "...place a premium on predictability, stability and certainty."²⁰ Modern western military organizations are highly structured, hierarchical, risk adverse and are subject to the same bureaucracy as government. They rely heavily on formalized doctrine, standard operating procedures (SOPs), interoperability, complex sustainment systems and robust command and control (C2) networks. While these characteristics may be optimal for the conduct of operations, they significantly impede innovation. However, regardless of these barriers to innovation,

¹⁹ Barry R. Posen, *The Sources of Military Doctrine* (Ithaca, NY: Cornell University Press, 1984), 55.

²⁰ *Ibid.*, 46.

historical cases have shown that military organizations have been able to innovate under certain conditions. Again, it is important to differentiate between the continual process of evolutionary change and organizational innovations that result in major changes in the way a military force conducts war.

To date, there have been three main areas of military innovation studies. These are described broadly in terms of the source of innovation, specifically top-down, bottom-up and culture. Top-down models include civil-military relations, and interservice and intraservice politics. Culture has traditionally been considered a top-down source of innovation, however for the purposes of this paper, it will be considered separately. Recently, bottom-up innovation has emerged as another important area for further study. In developing these models, researchers have attempted to identify the key factor or ‘forcing function’ that determines the degree of innovation within the military. The objective of defining these models is to provide leaders with an ability to better predict and optimize innovation within military organizations.

The first model of military innovation addresses the role of civilian intervention and degree of political-military integration. This reflects a top-down process whereby civilian leaders direct military innovation in order to align developmental efforts with defined strategic objectives. According to Barry Posen, organizational theory provides two conditions where large organizations are able to innovate. He observes that these organizations innovate when they have failed and they innovate when civilians intervene.²¹ Failure at an organizational level in the military likely means defeat in a major battle or campaign. Failure in this operational environment often results in

²¹ Barry R. Posen, *The Sources of Military Doctrine...*, 57.

catastrophic loss of life, equipment, resources and the corresponding devastating political, social and economic impacts. As such, failure at this level forces military organizations to challenge fundamental principles, assumptions and doctrine in order to find opportunities to innovate. However because of the potentially devastating consequences, militaries cannot wait for such a failure to occur at an organizational level as the only means of enabling innovation. Perhaps failure cannot be accepted at an operational level, but failure is an important concept within the study of innovation. The relationship between failure and innovation will be further explored in Chapter 6.

The civil-military relationship model is based on the assumption that military organizations do not have the impetus or resources to initiate major change without political intervention. According to the balance of power theory, civilian leaders will often intervene in response to a recent threat to national security or the perception of an impending future threat. Civilian leaders may also be motivated by the potential of new technologies to enhance or expand capabilities.²² An historical example of civilian intervention that led to military innovation was the role that Hitler played in guiding the German capability development in World War II. Specifically, Hitler was directly involved in the development of German armoured warfare and the blitzkrieg style of war.²³ However, Rosen has argued that historical analysis demonstrates that civilian political leaders have typically had a minor influence on military innovation.²⁴ While he recognizes the role that civilians played in the development of policies to enable strategic bombing, more technical innovations such as the tanks, and organizational innovations

²² Barry R. Posen, *The Sources of Military Doctrine...*, 77.

²³ *Ibid.*, 74.

²⁴ Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military...*, 255.

such as submarine warfare doctrine were the product of military leadership. This observation leads to the next two models which focus on the military organization itself as the main driver of innovation.

The interservice model identifies competition between the different Services within the military institution as the major determinant of innovation. According to Stephen Rosen, successful innovation in peacetime circumstances will only occur “...when respected senior military officers formulate a strategy for innovation, which has both intellectual and organizational components.”²⁵ This approach observes the reality that the Navy, Marines, Air Force, Army and Special Operations Forces (SOF) must compete for budget allocations, control over resources and ownership of emerging capabilities. Clearly in times of force reduction and restructure, the independent services must innovate in order to demonstrate value and accountability, and thereby preserve funding and resources. It remains to be determined whether the current global financial situation will increase the relevance of the interservice model to explain military innovation as defence budgets face increasing scrutiny. A historical case study which demonstrates competition for emerging capabilities is the development of attack helicopters in the US. The competition to innovate resulted in the US Army challenging the US Air Force’s dominance of aviation. The result of this interservice competition was the birth of an entirely new organization, the Army’s aviation branch, and the

²⁵ Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military...*, 21.

development of radically new capabilities such as the AH-64 Apache and its associated doctrine.²⁶

It should also be noted that many of the examples that were used to formulate this model were taken from periods of time when the services still conducted major independent operations. However, many modern forces have recognized the need to optimize for joint operations, in order to integrate land, air, sea and Special Forces capabilities across all dimensions of war. In this environment, the evolution of joint operations may either reduce or enhance the source of competition that fostered the source of innovation described by the interservice model. In the Canadian context, an example of where the interservice model has not been entirely successful in fostering innovation is the development of an Unmanned Aerial Vehicle (UAV) capability within the Canadian Armed Forces. Despite involvement by all three services, these efforts have yet to result in an enduring capability. However, the creation of the Canadian Forces Special Operations Command (CANSOFCOM) and the Canadian Joint Operations Command (CJOC) brings the different services together and provides an opportunity for the services to interact at the operational level. Under the proper conditions, this direct interaction has the potential to inspire the type of competition that is described by the interservice innovation model.

The third approach to military innovation studies considers the role of intraservice competition. In this case, the innovation is a direct result of competition between the branches of the same service. Similar to intraservice competition, the branches compete

²⁶ Adam Grissom, "The Future of Military Innovation Studies," *The Journal of Strategic Studies*..., 912-913.

for the allocation of resources and ownership of new capabilities. The intraservice model is described extensively in Stephen P. Rosen's book, *Winning the Next War*. Rosen contrasts innovation during peacetime and war, and also analyzes the role of innovation in the development of new technologies. He draws primarily on studies of US and British military innovations from the early 20th century including the beginning of the Cold War. He argues that "[rather] than money, talented military personnel, time and information have been the key resources for innovation."²⁷ In this case, it is the ability of independent services to grow leaders that will ensure the long-term support for innovations. Based on his research, Rosen also concludes that civilian political leaders and scientists play a relatively minor role in influencing and managing innovation in the military.²⁸ The intraservice model still prescribes a top-down approach, but specifically credits senior military leaders within each of the services for initiating and implementing innovation.

All of the models as described above, civil-military, interservice, and intraservice consider innovation to be a top-down driven process. In all cases, innovation is the result of action initiated or directed by senior military or civilian leaders. These models of vertical innovation do not address innovations that are initiated at the lower levels of the organization, often described as bottom-up innovation. Grissom identifies this as one major area of military innovation studies that has only recently starting to garner attention.²⁹ There are a number of historical cases where bottom-up innovation has been a major factor in organizational change. Grissom cites the development of the German

²⁷ Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military...*, 252.

²⁸ *Ibid.*, 255.

²⁹ Adam Grissom, "The Future of Military Innovation Studies," *The Journal of Strategic Studies...*, 920.

88mm Flak anti-aircraft cannon in the anti-tank role as an example of bottom-up innovation.³⁰ This represented a battlefield adaptation that grew into a major operational capability that had a dramatic effect on the conduct of armoured warfare during WWII. Other examples provided include the innovation of Marine Corps doctrine in small wars and the development of German stormtroop tactics in WWI.³¹

The final model considers organizational culture as a major enabler of military innovation. Culture has implications for all of the other models previously described. As a field of study, the cultural model has gained significant interest since it was formally introduced in the 1990s. Elizabeth Kier, author of *Imagining War*, defines organizational culture as "...the set of basic assumptions, values, norms, beliefs and formal knowledge that shape collective understandings."³² Dr Dima Adamsky, an Assistant Professor at the Lauder School of Government, Diplomacy and Strategy at the IDC Herzliya builds on this definition, adding how organizational culture is able to "...shape collective identity and relationships to other groups, and which influence and sometime determine appropriate ends and means for achieving security objectives."³³ Although the culture of a military organization is founded on the culture of its nation, there are unique characteristics that differentiate it from the larger society. These unique characteristics often determine whether a military organization will be able to successfully innovate.

³⁰ Adam Grissom, "The Future of Military Innovation Studies," *The Journal of Strategic Studies*..., 920-922

³¹ *Ibid.*, 922-924.

³² Elizabeth Kier, *Imagining War: French and British Military Doctrine Between the Wars* (Princeton, NJ: Princeton University Press, 1997), 28.

³³ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel*..., 7-8.

The cultural model of innovation draws a link between organizational norms and the willingness of individual members to accept risk, foster creativity, challenge the status quo, and engage in critical thinking. These are all concepts that contribute to innovation and are directly influenced by the organization culture. The cultural model also explains the tendency towards top-down or bottom-up innovation. High power, high context cultures tend to prevent delegation of authorities resulting in a top-down innovation process. Low power, low context cultures encourage the open distribution of responsibility, thus creating favourable conditions for bottom-up innovation.³⁴

Organizational culture can evolve based on a number of influences. In *The Sources of Military Change*, authors Theo Farrell and Terry Terriff argue that organizational culture evolves as the result of “planned cultural change”, “external shocks” and “military emulation”.³⁵ Of these three factors, military leaders can directly participate in planned cultural changes to meet strategic organizational objectives. The cultural model of military innovation will be described in greater detail in the following chapter.

Chapter 3 – A Culture of Innovation

"The achievement of excellence can only occur if the organization promotes a culture of creative dissatisfaction."

– Lawrence Miller

Building a culture of innovation has emerged as a key strategic priority within many modern military organizations. As stated in *Designing Canada's Army of Tomorrow*, “[to] remain a legitimate instrument of national power in the 21st century the

³⁴ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel...*, 18.

³⁵ Theo Farrell and Terry Terriff, “The Sources of Military Change,” in *The Sources of Military Change: Culture, Politics, Technology*, ed. by Theo Farrell and Terry Terriff (Boulder, CO: Lynne Rienner Publishers, 2002), 8-9.

Canadian Army must institutionally commit to developing a robust and sustained culture of perpetual innovation.”³⁶ Building this culture of innovation requires investment in “intellectual and corporate”³⁷ organizations; however the focus is still on technological and engineering efforts rather than on advancing organizational concepts and structures. Similarly in Australia’s Force 2020 doctrine, “[our] ambition for 2020 is simple: we will be a highly capable force whose culture of innovation will allow us to adapt to change.”³⁸ This statement acknowledges the critical need to capitalize on creativity and collaboration to innovate new capabilities that are needed to counter future threats.

The requirement for a culture of innovation has also been embraced as a strategic priority within the US military community. According to Brigadier-General David Fastabend, the United States Department of the Army has “...tentatively defined a culture of innovation as one in which people at all levels proactively develop and implement new ways of achieving individual, unit and institutional excellence and effectiveness.”³⁹ This statement highlights the critical role of innovation in maintaining military superiority. In January 2013, the United States Special Operations Command (USSOCOM) hosted a conference titled “Building a Culture of Innovation”. According to Admiral William McRaven, Commander USSOCOM, this conference was founded on the guiding principle that a culture of innovation “...will enhance and improve the entire SOCOM enterprise, improve the knowledge and capabilities of our workforce and continue to

³⁶ Department of National Defence, *Designing Canada’s Army of Tomorrow* (Kingston, ON: Directorate of Land Concepts and Designs, 2011), 49.

³⁷ *Ibid.*, 49.

³⁸ Department of Defence, *Force 2020* (Canberra: Commonwealth Department of Defence, 2000), 17.

³⁹ David A. Fastabend and Robert H. Simpson, “Adapt or Die: The Imperative for a Culture of Innovation in the United States Army,” *Army Magazine*..., 16.

make us the most agile and effective warfighting organization in the world.”⁴⁰ The conference invited leaders from government, academia and industry, including representation from innovative companies such as Google and IBM, to share their insights regarding the conditions required for a culture of innovation. Participation in working sessions focused on elements of innovation related to people, structure, process and systems. The conference was conducted in an environment of openness, transparency and collaboration in order to build relationships and leverage many different perspectives on innovation. Hosting a conference with such a specific focus clearly demonstrated the important role of culture in enabling innovation within the special operations forces community.

According to Williamson Murray, “[military] leadership can affect the [innovation] process through long-term cultural changes rather than short-term decisions.”⁴¹ He provides a historical case regarding the efforts of General Hans von Seeckt to create a culture of innovation within the German Army in the 1920s. According to Murray, von Seeckt encouraged the study of World War I and instilled values within the officer corps that “...placed a high value on the analysis of changes in doctrine, tactics and technology.”⁴² As a result, von Seeckt created a culture that fostered critical thinking, detailed analysis and the development of new concepts of warfare.

⁴⁰ Ryan O’Hare, “SOCOM Sharpens Spear, Hosts “Innovation” Conference,” *USSOCOM News*, 1 January 2013, <http://www.socom.mil/News/Pages/SOCOMSharpensSpear,Hosts%E2%80%9CInnovation%E2%80%9DConference.aspx>

⁴¹ Williamson Murray, “Innovation: Past and Future,” *Joint Force Quarterly* 12 (Summer 1996), 52.

⁴² *Ibid.*, 53.

Murray argues that it is not possible to create a specialized military occupation, or institutionalize innovation. Instead, he proposes that military organizations enable innovation through cultural changes. Murray provides six recommendations for building a culture of innovation. These are summarized in the following:

- Think in terms of fighting real enemies and conducting exercises using realistic scenarios;
- Influence operational tempo and exercises in order to allow commanders the opportunity to think;
- Use lessons learned to challenge doctrine rather than simply validating it;
- Give consideration to the development of measures of effectiveness at all levels;
- Look for opportunities to continually enhance Professional Military Education (PME); and
- Encourage non-linear analysis and conceptual thinking.⁴³

David Schmidtchen argues that the rapid pace of technology is a major factor in capability growth in modern military organizations. He describes how an organizational culture that is grounded in the institutional history can be very resistant to change, and as such has the potential to be an “enemy of innovation”.⁴⁴ Schmidtchen points out that the different services have their own unique sub-cultures which must be considered when defining the culture at the operational and strategic levels. Specifically, Schmidtchen cites the differing perspectives of the Army, Navy and Air Forces in regards to the relative importance of technology vice human factors. He discusses the importance of culture in the evolution of Network Centric Warfare (NCW) stating that “[in] seeking to foster innovation and entrepreneurship through NCW, Defence must also foster the

⁴³ Williamson Murray, “Innovation: Past and Future,” *Joint Force Quarterly* 12 (Summer 1996), 59-60.

⁴⁴ David Schmidtchen, *The Rise of the Strategic Private: Technology, Control and Change in a Network Enabled Military...*, 13.

culture that feeds them: a culture of openness, meritocracy, democracy and adaptive institutions.”⁴⁵

The key challenge in cultivating a culture of innovation is to set the conditions for the discovery, development and implementation of new capabilities without compromising operational excellence and readiness. Schmidtchen outlines four strategies that can be pursued in order to cultivate a culture of innovation within a military organization. First, he describes the need for a “more complete philosophy of learning” that synchronizes efforts to educate and train the individual, with an approach to developing the relationship between the individual and the organization.⁴⁶ Secondly, Schmidtchen highlights the need to embrace a culture that recognizes the social forces of both competition and cooperation.⁴⁷ Third, he recommends adopting a policy of federalism in order to exploit social networks and socialization as a mechanism of addressing power sharing, decision making, integration and independence. Socialization is a critical concept as “...it expands the role of mission command from a method for managing decentralised organisations to a moral principle within a wider organisational philosophy.”⁴⁸ Finally, Schmidtchen emphasizes the role of trust as a key ingredient of social, enabled by peer-to-peer communication and feedback. He states that “[in] particular, peer production opens the way to better fostering and harnessing the talents of the workforce.”⁴⁹ Considering these strategies in broad terms, it can be concluded that

⁴⁵ David Schmidtchen, *The Rise of the Strategic Private: Technology, Control and Change in a Network Enabled Military...*, 98.

⁴⁶ *Ibid.*, 292.

⁴⁷ *Ibid.*, 292.

⁴⁸ *Ibid.*, 292.

⁴⁹ *Ibid.*, 292.

building a culture of innovation within a military organization needs to foster trust, collaboration and open communication. This culture needs to build innovation networks and align the professional development in order to inculcate innovative behaviours within future leaders.

In his book, *The Culture of Military Innovation*, Dima Adamsky contrasts the military revolution that occurred in Russia, the US and Israel since the end of World War II. Specifically, he presents an analysis of the cultural factors that contributed to changes within the three military forces. Adamsky argues that technology provided a foundation for a revolution in warfare but was insufficient to explain the innovations that occurred. Instead, it was the strategic culture in each nation that determined the ability to innovate.⁵⁰ He observes that technology alone is insufficient explain innovation. Cultural, political, social, economic and technological factors interact and combine to enable innovation, but organizational culture is the “...pivotal intervening variable that conditions innovation’s path of development.”⁵¹ While many would view technology as the driving force of change during the Cold War and Post-Cold War periods, Adamsky argues that the relationship between culture and technology was not “deterministic”; rather it was the interaction of these two factors that decided the path of innovation in each of the three military organizations.

⁵⁰ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel...*, 9.

⁵¹ *Ibid.*, 10.

Through his analysis, Adamsky points to the casual relationship between culture and military innovation. He illustrates how the Soviets were able to ‘think big’⁵² at the operational level, however they lacked the political, economic and cultural support to fully implement these innovations.⁵³ They believed that technology would progress at roughly the same rate among world powers and therefore, the way to achieve superiority was to conceptualize changes in the conduct of war on a large scale. The Soviet military culture recognized “...the value of understanding an issue as more important than action.”⁵⁴ The Soviet approach emphasized creative and conceptual superiority rather than fixating on technological solutions.⁵⁵ This interpretation of Soviet military culture is supported by Former Director of the National Security Agency, William Odom who observed that the “...Soviet Union does take into serious account what weapons the West builds and fields, it does not start with that factor. Rather, it proceeds from deeply held political assumptions and then looks at what technology makes possible for military means.”⁵⁶ As a result, the Soviets were able to understand the potential of deep reconnaissance and strike capabilities on a level that was well beyond what the US was able to envision at that time.⁵⁷ However, in addition to the lack of political and economic support, the Soviets struggled to implement their own innovations due to their collectivist culture. Within this high context culture, the Soviets did not empower junior commanders and failed to encourage innovation at this level of the organization. As such, the Soviet

⁵² Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel...*, 60.

⁵³ *Ibid.*, 37.

⁵⁴ *Ibid.*, 41.

⁵⁵ *Ibid.*, 46.

⁵⁶ William E. Odom, “Soviet Military Doctrine,” *Foreign Affairs* 67, no. 2 (Winter 88/89), 132.

⁵⁷ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel...*, 34.

military culture successfully enabled top-down innovation, but did not have the corresponding organic innovation required to implement these operational concepts.

In contrast with the Soviet experience, the US had technological superiority, but did not have the type of organizational culture that supported the intellectual and conceptual debates required to exploit these innovations. The Soviets first acknowledged and studied the concept of a Military Technical Revolution (MTR) well before the US recognized their own Revolution in Military Affairs (RMA). For example, the US Training and Doctrine Command (TRADOC) published details of an operational concept called the AirLand Battle, which was formally entered into the doctrine manual FM 100-5 (Operations) in August 1982.⁵⁸ This concept called for the exploitation of air support, firepower and manoeuvre across the entire depth of the battlefield. However, the Soviets had studied these concepts as early as the 1920s.⁵⁹ Adamsky cites the development of Precision Guided Munitions (PGMs) as an illustration of how the US failed to innovate operationally in order to develop employment concepts for this technology. The technical culture within the US failed to acknowledge the revolutionary potential of PGMs for future conflicts.⁶⁰ The culture within the US military began to shift with the creation of the Office of Net Assessment (ONA). Under the direction of Andrew W. Marshall, the ONA recognized the deficiency of operational level thinking within the US. In two reports published in 1992 and 1993, the ONA recommended a critical need for change within the US military, specifically a focus on the development of operational concepts

⁵⁸ John L. Romjue, "The Evolution of the Airland Battle Concept," *Air University Review* 35, no. 4 (May/June 1984), 4.

⁵⁹ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel...*, 61.

⁶⁰ *Ibid.*, 62.

and organizational innovation⁶¹. This conflicted with the individualistic culture of the US military at that time which “...emphasized systematic and analytical thinking which does not set conditions for holistic conceptual approaches to problem solving.”⁶² This illustrates how organizational culture was a barrier to the innovation of new concepts needed to exploit the technological superiority possessed by the US.

The military culture within Israel favoured techno-tactical excellence, but lacked the operational and strategic innovation to advance the capabilities of the Israeli Defence Force (IDF). As a result of the strategic environment characterized by isolation and constant security threats, IDF was consumed by a siege mentality that constrained their ability to develop a long-term operational vision.⁶³ The leadership of the IDF was unable to conceptualize at the operational level and relied on improvisation at the tactical level to achieve success. Until the early 1970s, the predominance of high intensity (HIC) conflict facilitated Israeli innovation at the operational level. This era was characterized by non-linear thinking, creativity, imagination and audacity. Innovative thinking at the operational level was “manoeuvre-enabled”⁶⁴, with “experience-based generalship and a decentralized command system.”⁶⁵ The 1973 October War marked a transition from HIC to low intensity warfare (LIC).⁶⁶ A key tenant of officer training remained fostering flexibility and improvisation on the battlefield. In this culture, technology was used as a

⁶¹ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel...*, 68.

⁶² *Ibid.*, 77.

⁶³ *Ibid.*, 116.

⁶⁴ Avi Kober, “The Rise and Fall of Israeli Operational Art, 1948-2008,” in *The Evolution of Operational Art: From Napoleon to the Present*, ed. by John Andreas Olsen and Martin van Creveld (Oxford: Oxford University Press, 2011), 176.

⁶⁵ *Ibid.*, 177.

⁶⁶ *Ibid.*, 178.

force multiplier, layered on existing structures and concepts without fundamentally changing the method of warfare.⁶⁷ In the mid-1990s, Israel established the Operation Theory Research Institute (OTRI) with the intent of building the capacity to conduct operational level thinking.⁶⁸ However, the further development of precision guidance munitions (PGMs) only reinforced the Israeli reliance on technology as a force multiplier and the OTRI closed in 2005 without achieving its strategic objectives.⁶⁹ Israeli military culture was still unable to support the “abstract and paradoxical” intellectual thinking required for operational innovation.

The contrast of military organizations in Russia, the US and Israel demonstrates the important influence that culture has on innovation. In retrospect, it is observed that the culture within each of these military organizations both enabled and inhibited innovation. Despite having access to various levels of enabling technology, each military followed a different path that was guided primarily by cultural factors. The Soviets chose to intellectualize the future battlespace and developed conceptual ideas at the operational level that outpaced their political and economic support. The US sought innovative technological solutions, but lacked the conceptual focus of the Soviets and would take decades to reach the same level of operational vision. Israel valued bold and innovative leadership on the battlefield that relied on flexibility and improvisation, however, the Israelis also failed to innovate at the operational level and therefore were not able to develop new means of conducting warfare. Given the strengths and weakness resulting

⁶⁷ Avi Kober, “The Rise and Fall of Israeli Operational Art, 1948-2008,” in *The Evolution of Operational Art: From Napoleon to the Present...*, 188-189.

⁶⁸ *Ibid.*, 166.

⁶⁹ *Ibid.*, 166.

from these cultural factors, perhaps an ideal approach to developing a culture of military innovation might incorporate lessons from the three nations; Soviet conceptualization, US technological creativity and Israeli improvisation and assertiveness.⁷⁰

Chapter 4 – Distributing Innovation

When all think alike, no one is thinking.

– Walter Lippman

There are two components of innovation: the ability to generate new ideas and the means to implement them.⁷¹ As such, organizational innovation requires innovators and entrepreneurs. Innovators are those who create new concepts and ideas. As discussed, they exist at all levels within the organization. Entrepreneurs are those that are able to recognize the potential of innovations, and are able to provide the vision and resources to exploit these opportunities. They must understand the operational and strategic environments and be able to distinguish between the good ideas and the bad ones. Entrepreneurs understand risk, but are able to manage uncertainty and change through innovation. Entrepreneurs also exist on various levels of the organization, but due to the nature of their role, they need to have sufficient power and authority to build momentum within the organization and secure the resources required to implement innovative ideas.

Top-down models of innovation are predicated on the capacity of leaders to bring creative, abstract and visionary ideas forward. However, it would seem overly optimistic to expect that senior leaders in the military will suddenly be capable of innovation when they eventually assume positions of authority at the strategic level if they have not

⁷⁰ Dima Adamsky, *The Culture of Military Innovation: The Impact of Cultural Factors on the Revolution in Military Affairs in Russia, the US, and Israel...*, 141.

⁷¹ Rosabeth Moss Kanter, "How Great Companies Think Differently," *Harvard Business Review* 89, no. 11 (Nov 2011), 499.

experienced innovation throughout their career. Although it may not be possible to teach someone to be truly innovative, individuals can develop the skills to think critically and embrace a willingness to think outside of existing paradigms. In this regard, leadership development can foster a willingness to deliberately challenge current doctrinal concepts. This is the fundamental contradiction; if you want to have an effective process of top-down innovation, then you must distribute responsibility for innovation throughout the organization in order to grow future innovative leaders. Top-down models also do not recognize the fundamental role of middle managers as facilitators in this process. Hence, effective military organizations must support a culture that enables a network of top-down, lateral and bottom-up innovation.

According to David Fastabend and Robert Simpson, a culture of innovation "...is typified by an environment within which every single person in the organization is invested in the organization's success and feels a responsibility to implement new and better ways to achieve organizational objectives."⁷² Top-down models fail to acknowledge the potential for innovation that is generated from lower levels of the organization. A culture of innovation needs to break down this barrier, connecting those that are able to think disruptively and are willing to challenge the current concepts, methods and processes. This culture connects innovators and entrepreneurs, and encourages the distribution of responsibility and flow of information throughout the organization. In essence, a culture of innovation is founded on enabling a network of innovation. According to Schmidtchen, "[networks] require (and encourage) widespread

⁷² David A. Fastabend and Robert H. Simpson, "Adapt or Die: The Imperative for a Culture of Innovation in the United States Army," *Army Magazine* 54, no. 2 (Feb 2004), 3.

micro-entrepreneurship, and entrepreneurship thrives when people can think and act independently. These qualities are bred in open, participative and tolerant organisational cultures with an approach to professional development that encourages creative, critical thinking.”⁷³

Kanter provides a similar observation in her study of private businesses that have achieved remarkable success. In *How Great Companies Think Differently*, Kanter observes that “[rigidity] stifles innovation. Informal, self-organizing, shape-changing, and temporary networks are more flexible and can make connections between people or connect bundles of resources more quickly.”⁷⁴ Innovation is unpredictable and cannot succeed without the freedom to exchange ideas and concepts. In other words, the degree of innovation is dependent to the ability to connect people within an informal organizational structure that encourages information sharing, collaboration and intellectual interaction. This type of organization also displays a degree of informality that is uncommon in military organizations.

This Israel Defence Force (IDF) has been described as a military organization that has maintained a strong culture of innovation.⁷⁵ The IDF appears to support the theory that military innovation is dependent on civilian intervention and the alignment of military and political goals. However, the IDF also relies on bottom-up innovation that is facilitated by a flattened hierarchy and the delegation of decision making authority and

⁷³ David Schmidchen, *The Rise of the Strategic Private: Technology, Control and Change in a Network Enabled Military...*, 98.

⁷⁴ Rosabeth Moss Kanter, "How Great Companies Think Differently," *Harvard Business Review...*, 74.

⁷⁵ Dan Senor and Saul Singer, *Start-Up Nation: The Story of Israel's Economic Miracle* (Toronto: McClelland & Stewart Ltd, 2011), 44.

responsibility to lower levels of the organization. This “dilution of hierarchy and rank”⁷⁶ is essential to the culture of innovation that enables creative thought and shared ownership for the development of new concepts and capabilities.

In February 2013, the President and Chief Executive Officer (CEO) of Yahoo, Marissa Ann Mayer cancelled the company work-at-home policy.⁷⁷ Up to that point, employees had enjoyed the flexibility of working remotely, a practice that has become common among many companies in the US. Prior to taking over as CEO of Yahoo, Mayer had worked for another innovative leader within the technology sector, namely Google. Among the reasons for the change in work-at-home policy, Mayer cited the need to increase collaboration and innovation through face-to-face interaction. The move sparked off extensive debate; inciting criticism from those who favour virtual working as a means of improving productivity and quality of life, and garnering praise from others who believe that sharing a workspace as a critical factor in innovation. Other companies such as Google and Facebook have a more flexible arrangement that allows for a balance between remote and office working arrangements; however both companies strongly believe that in-person interaction is critical for effective innovation. Physical interaction facilitates spontaneous collaboration, critical debate and iterative development. However, as a result of globalization, it is not always possible to have people co-located on a continual basis. Therefore, there is a need to understand how to balance physical and virtual working arrangements, while still maintaining a high level of innovation.

⁷⁶ Dan Senor and Saul Singer, *Start-Up Nation: The Story of Israel's Economic Miracle...*, 44-45.

⁷⁷ Claire Cain Miller and Catherine Rampell, “Yahoo Orders Home Workers Back to the Office,” *The New York Times*, 25 February 2013, <http://www.nytimes.com/2013/02/26/technology/yahoo-orders-home-workers-back-to-the-office.html?pagewanted=all&r=0>

Investment in virtual tools and developing policies that support face-to-face interaction at critical times can enhance organizational innovation.⁷⁸

This debate regarding virtual working policies has important implications for military organizations that want to cultivate cultures of innovation. For example the Canadian Armed Forces is dispersed across the country, and military members often do not have a chance to interact with many of their peers from other regions and services. Reductions in the defence budget often results in a decrease of the frequency of geographic movement of personnel, thus limiting cross-pollination between different elements of the armed forces. Innovation is therefore inhibited by a lack of direct communication and collaboration between dispersed users. This type of a system favours a centralized, top-down innovation process based on the fact that interaction between specialist users and leaders only occurs once they are promoted to higher ranks and are posted to National Defence Headquarters. If cultivating a culture of innovation is a priority for the Canadian Armed Forces, then there must be a commitment to acquiring the right tools, technologies and implementing human resource policies that facilitate the connecting of innovation leaders at all levels. Virtual tools should include social networking, chat, virtual whiteboarding and video conferencing, along with the necessary training and programs to facilitate the effective use of these tools. Human resource policies should support connecting people through forums, conferences and working relationships that encourage innovation. In doing so, the Canadian Armed Forces will

⁷⁸ Cari Sommer, "Does Innovation Only Happen in the Office?" *Forbes.com* (27 February 2013), <http://www.forbes.com/sites/carisommer/2013/02/27/is-work-from-the-office-the-new-work-from-home/>.

build a network that can exploit innovative opportunities to develop new capabilities, concepts and structures.

Within every organization there are individuals who are naturally more proficient at producing innovative ideas and concepts. Eric von Hippel, a Professor of Management of Innovation at the MIT Sloan School of Business, has written extensively on distributed and open innovation. As part of his research, he has looked specifically at the emergence of user-centred innovation, a trend which is in contrast to the traditional process of manufacturer-driven innovation. In his 2005 publication, *Democratizing Innovation*, von Hippel identifies two key characteristics of *lead users*; they are typically "...ahead of the majority of users in their populations with respect to an important market trend and they expect to gain relatively high benefits from a solution to the needs they have encountered there."⁷⁹ Von Hippel advocates for the need to overhaul the current paradigm of innovation within business organizations by identifying *lead users* and harnessing their innovative potential.

Von Hippel provides a number of observations regarding the behaviour of lead users within organizations. The rapid advancement of information technologies has facilitated the ability of lead users to innovate. Von Hippel has found that lead users are very active in developing and modifying products based on their own specific needs and preferences. However, despite the fact that these products are based on unique requirements, there is a high probability they will also appeal to the majority of other users within the organization.⁸⁰ He cites empirical examples where lead users have

⁷⁹ Eric von Hippel, *Democratizing Innovation* (Cambridge, MA: The MIT Press, 2005), 4.

⁸⁰ *Ibid.*, 22.

innovated with respect to software, libraries, sports communities and hospital surgical centres.⁸¹ In addition to developing the products to meet their needs, von Hippel also shows how lead users also derive enjoyment and learning from participating in the *process* of innovating.⁸² Finally, von Hippel shows that lead users freely share their ideas and products with the larger innovation community. He observes that, “[users] who freely reveal what they have done often find that others then improve or suggest improvements to the innovation, to mutual benefit.”⁸³

User-driven innovation can only exist within a culture that recognizes the need for innovation and distributes responsibility to lower levels of the organization. It is important to note that lead users tend to originate from various elements within the organization. The exchange of innovative ideas and interaction between lead users tends to occur through informal means in an ad hoc construct. However, von Hippel describes how communication and collaboration can also be effectively enabled through formal, organized mechanisms. “Innovation communities” can be defined as “...nodes consisting of individuals or firms interconnected by information transfer links which may involve face –to-face, electronic, or other communication.”⁸⁴ The development of innovation communities is an effective means of enabling lead user innovation.

The military has traditionally focussed on encouraging user-lead battlefield adaptation, but has been less focussed on taking deliberate actions to enable user-driven innovation. Although the empirical research conducted by von Hippel has looked

⁸¹ Eric von Hippel, *Democratizing Innovation...*, 23-30.

⁸² *Ibid.*, 60.

⁸³ *Ibid.*, 10.

⁸⁴ *Ibid.*, 96.

specifically at the development of software and hardware products, there is certainly applicability in a military innovation. Identifying opportunities to connect lead users directly with research and development (R&D) organizations and defence industry partners is one opportunity to enable technological innovation. However, internally enabling lead users to enhance organizational innovation can be equally effective. Encouraging innovation communities and providing collaborative tools to facilitate interactions between lead users is a valuable means of rapidly developing new capabilities, concepts and structures.

Robert T. Foley, a senior lecturer in modern military history at the University of Liverpool (UK), proposes the concept of horizontal innovation as a rapid form of transformation. In contrast to the top-down and bottom-up models that emphasize the role of key leaders, Foley argues that an organization can innovate through a highly flexible, horizontal process that does not strictly rely on individual ownership.⁸⁵ He provides a historical example of horizontal innovation that occurred within the German Army from 1916-1918. The Germans were technically challenged and struggled against the combined arms strength of the British and French forces. They required constant innovation to hold their positions and seek opportunities to gain superiority. However, due to the intensity and pace of the battle, the Germans could not rely on a top-down driven innovation process.

On 26 Jun 1916 the British and French began a massive artillery bombardment that would prepare the battlefield for the subsequent infantry assault on 1 July. The battle

⁸⁵ Robert T. Foley, "A Case Study in Horizontal Military Innovation: The German Army, 1916-1918," *Journal of Strategic Studies*..., 803.

of the Somme involved incredible amounts of material and manpower. By the end of the battle, approximately 147 German, 96 British and 70 French divisions would rotate through. At the peak, German divisions only were able to sustain two weeks at the front.⁸⁶ To survive the battle, the Germans had to implement new means of fighting that would directly contradict formal doctrine. For example, the existing doctrine stated that any ground that was lost would be immediately recaptured at all costs. In the course of the battle, the Germans developed doctrine that resulted in a flexible defensive position with an undefined front line.⁸⁷ They also developed new methods of conducting the counter attack, both hasty and deliberate, depending on the situation. In some cases, the new doctrine allowed commanders to decide if and when to conduct the counter-attack.⁸⁸ These methods also demanded new means of deploying units into battle which allowed great autonomy, and gave divisional commanders the ability to reinforce within their own lines.⁸⁹ All of these changes were driven from the bottom-up with a horizontal innovation process that enabled the transfer of information and lessons learned *between* units as they cycled through the battle. There were no individuals identified that had ownership for these changes, nor was there any formal direction from the German high command to innovate.⁹⁰

The Germans were able to conduct bottom-up and horizontal innovation as a result of four factors. First, as opposed to the formal, centralized doctrine that currently

⁸⁶ Robert T. Foley, "A Case Study in Horizontal Military Innovation: The German Army, 1916-1918," *Journal of Strategic Studies*..., 806.

⁸⁷ *Ibid.*, 807.

⁸⁸ *Ibid.*, 810.

⁸⁹ *Ibid.*, 811.

⁹⁰ *Ibid.*, 823-824.

exists in most western militaries, the German's weak doctrine afforded commanders with the flexibility and latitude to act on their own critical analysis of a situation.⁹¹ The lack of emphasis on rigid, formal doctrine encouraged a culture that distributed responsibility for innovation to the lowest level possible. Secondly, the Germans had a robust lesson-learned system and learning culture that facilitated the sharing of information horizontally between units and formations, and encouraged honest and analytical reporting of lessons learned.⁹² Within the German Army, learning was a constant process. During training and exercises there were no correct or incorrect answers. Reasoning was the key element that was assessed which reinforced independent thinking.⁹³ Third, the structure and functioning of the General Staff System and a lack of ownership of ideas meant that staff officers were not vested to any particular solution and were adaptive to new information that might contradict previous plans and doctrine.⁹⁴ Finally, the Germans had a devolved training system that gave commanders flexibility and enhanced the learning culture.⁹⁵ It should be noted that the horizontal innovation had its limitations. Innovations were often made without access to all necessary resources and commanders could not influence force structures in a timely manner.⁹⁶ Without these conditions, the German Army was not able to exploit all opportunities and fully institutionalize many innovations of World War II.

⁹¹ Robert T. Foley, "A Case Study in Horizontal Military Innovation: The German Army, 1916-1918," *Journal of Strategic Studies*..., 812-813.

⁹² *Ibid.*, 814.

⁹³ *Ibid.*, 815-816.

⁹⁴ *Ibid.*, 817.

⁹⁵ *Ibid.*, 819-820

⁹⁶ *Ibid.*, 820.

Modern military organizations can learn three key lessons from the horizontal innovation that occurred within the German Army in World War I. First, the importance of facilitating distributed innovation at the lowest possible level is a mechanism for rapid change and flexibility to respond to new threats in the battlespace. Second, the reliance on robust, centralized doctrine can inhibit innovations. Finally, a formalized lessons-learned process that inhibits the free dissemination of honest and relevant feedback in a timely manner will reduce innovation within a military organization. Potentially the use of informal social networking and development of innovation communities would provide an effective means of sharing and collaborating on new ideas.

In his report *Innovate or Die: Innovation and Technology for Special Operations*, Dr. Robert Spulak, manager of the SOF Program Office at Sandia National Laboratories, describes how Special Operations Forces (SOF) must rapidly innovate in order to maintain technological and operational dominance of the battlespace. According to Spulak, SOF is distinct from conventional forces by nature of their “elite warriorship”, “flexibility” and “creativity”.⁹⁷ In addition, SOF operators share many of the traits of innovators. These traits include, “...thinking tangentially, approaching tasks from unsuspected angles; undisciplined, unpredictable...ingenious; unsound, impractical...”⁹⁸ The concentration of individuals sharing these characteristics contributes to a culture that values innovation. Within this culture, Spulak defines flexibility as the ability to transform existing capabilities, usually at the tactical level, whereas creativity leads to operational innovations that profoundly advance the tools and methods of war. According

⁹⁷ Robert G. Spulak, Jr., *Innovate or Die: Innovation and Technology for Special Operations*, (MacDill Air Force Base, FL: The JSOU Press, 2010), 5.

⁹⁸ *Ibid.*, 27.

to Spulak, "...creativity for SOF is rapid operational innovation."⁹⁹ To ensure that SOF is able to sustain this competitive advantage, Spulak proposes an "innovation braid" that connects science and understanding, tools and technology and missions and users.

Spulak highlights a number of areas that differentiate SOF and conventional forces with respect to innovation. SOF is able to innovate in areas where the conventional forces cannot afford due to the potential risks incurred with respect to force development, force generation and force employment processes. In order to achieve overmatch, SOF is willing to accept programmatic risks such as changes to the cost, schedule and performance of new capabilities.¹⁰⁰ SOF maintains a high degree of self-sufficiency and autonomy, and therefore does not face the same concerns regarding interoperability between different units, formations and services. SOF can also overcome many of the sustainment issues that accompany the integration of new capabilities and concepts, whereas the conventional forces face significant challenges due to the scope and scale of C2 networks and supply chains.

SOF maintains a high degree of organizational agility and self-sufficiency, and is therefore able to effectively exploit opportunities for capability development. Spulak attributes this to the fact that SOF can innovate without following a conventional process of institutionalization that requires review by multiple levels of authority and the formalization of doctrine, training and procedures prior to fielding.¹⁰¹ In contrast to the top-down process which dominates innovation within conventional forces, SOF relies on bottom-up innovation. Spulak describes top-down innovation as a linear process,

⁹⁹ Robert G. Spulak, Jr., *Innovate or Die: Innovation and Technology for Special Operations...*, 1.

¹⁰⁰ *Ibid.*, 47.

¹⁰¹ *Ibid.*, 17.

requiring a high level of coordination across larger organizations, resulting in significant delays to the implementation of changes. The linear process involves multiple layers of review and oversight, potentially diluting new ideas that may have been generated from within the organization. In addition, "...the linear model for innovation inhibits creativity because creativity is the combination of disparate ideas."¹⁰² To maintain overmatch, SOF must be able to leverage creative ideas from all corners of the organization, and rapidly implement these as operational innovations. Achieving this relies heavily on a culture that enables communication, collaboration and distributes the responsibility for innovation to the lowest possible level.

Conventional forces can certainly benefit from SOF innovations considering that new tools, technology and methods are often eventually migrated to the other services. However, conventional forces can also learn from SOF in order to identify opportunities to cultivate their own culture of innovation. One of the 'SOF Truths' is that "Special Operations Forces cannot be mass produced."¹⁰³ When considering the need for a culture of innovation, it is important to keep this 'truth' in mind and avoid trying to transform conventional forces into SOF. As indicated above, the conventional forces have a different tolerance for risk and face unique organizational challenges when compared with SOF. Conventional forces are much larger organizations that rely heavily on standardization, interoperability and process controls. Personnel are subjected to an additional selection process for SOF to assess specific traits and abilities for employment. Since conventional forces are drawn from a wider population, they do not have the same

¹⁰² Robert G. Spulak, Jr., *Innovate or Die: Innovation and Technology for Special Operations...*, 26.

¹⁰³ United States Special Operations Forces Command, "SOF Truths", accessed 10 April 2013, <http://www.socom.mil/default.aspx>.

degree of homogeneity within the workforce. As such, the challenge for conventional forces is to identify and connect users that have innovative ideas, while concurrently, supporting a culture that can generate, develop and implement these new concepts. Conventional forces may not be able to achieve the same degree of bottom-up innovation SOF, but there is definitely an opportunity to enhance communications and collaboration in order to leverage the creative potential that exists at all levels of the organization.

As part of their research for the US Command and Control Research Project (CCRP), David Alberts and Richard Hayes have described the necessary conditions for a highly innovative, “edge” organization. In their book *Power to the Edge*, Alberts and Hayes defines “edge” organizations as those “where everyone is empowered by information and has the freedom to do what makes sense.”¹⁰⁴ Alberts and Hayes describe the need to consider new approaches to command and control due to changes in the operational environment and the means of conducting of operations, as well as the rapid advancement of new technologies, in particular, information technologies.¹⁰⁵ To address these challenges they developed a conceptual model describing the “command and control (C2) approach space.” The axis of this approach space reflects three inter-related dimensions; *the allocation of decision rights, the patterns of interaction among the actors, and the distribution of information.*¹⁰⁶ Applying this to the challenge of building a culture of innovation, an effective C2 approach would be represented by peer-to-peer decision making, unconstrained patterns of interaction and a broad dissemination of

¹⁰⁴ David S. Alberts and Richard E. Hayes, *Power to the Edge: Command and Control in the Information Age* (Washington, DC: CCRP Publication Series, 2003), 177.

¹⁰⁵ David S. Alberts and Richard E. Hayes, *Understanding Command and Control* (Washington, DC: CCRP Publication Series, 2006), 1-2.

¹⁰⁶ Alberts and Hayes, *Understanding Command and Control ...*, 75.

information. This C2 approach defines an edge organization which is capable of self-synchronizing without formal direction from a higher authority. An organization that is able to implement this style of C2 would be well equipped to build and maintain a culture of innovation.

The reality is that most large military organizations rely extensively on a hierarchical C2 structure that formally assigns responsibilities and authorities according to formal doctrine. Information networks are configured to ensure timely, accurate passage of information, but this often results in interactions that are controlled and restricts open access to information. This C2 structure is meant to reduce the risk associated with the uncertain and volatile conditions of war. However, if the objective is to foster a culture of innovation, then the military needs to look at balancing the organizational requirements to support force development, force generation and force employment. The military culture must be capable of supporting a culture that ensures excellence in operations, while supporting innovation in training and development. Effective distribution of innovation requires a culture that empowers and enables innovators and entrepreneurs.

Chapter 5 – Thinking Disruptively

The only thing harder than getting a new idea into the military mind is to get an old one out.

– B.H. Liddell Hart, *Thoughts on War*, 1944

The use of Unmanned Aerial Vehicles (UAVs) in modern war is revolutionizing the way in which airborne intelligence, surveillance, and reconnaissance (ISR) missions are conducted in support of operations. The employment of UAVs to deliver precision munitions to remote targets is extremely controversial, yet a highly effective deep strike

capability that is profoundly changing the conduct of war in the 21st century. The ability to project both ISR and strike assets to any location in the world, without directly exposing soldiers to harm is a powerful and innovative new capability. Canada has been experimenting with UAVs over the past few decades, but has yet to institutionalize this capability at any level. One explanation for this is a failure to apply disruptive thinking. In the first edition of the UAV Campaign Plan, produced in March 2007, Canada imposed a number of high-level requirements to guide capability development. Included in the campaign plan was a mandatory requirement that “UAV operations will be governed by existing CF operational and tactical doctrine and will keep pace with this doctrine as it evolves due to increased CF experience with UAV operations and the fielding of additional UAV capabilities.”¹⁰⁷ The rapid advancements in UAV technologies represent an opportunity to completely rethink ISR and strike capabilities. However, rather than disrupting the paradigm, the Canadian Armed Forces made a deliberate decision to simply layer this new technology on top of existing doctrine. There were certainly practical reasons for pursuing this approach to UAV development including minimizing the impact on training, technical standards and interoperability. Regardless, the imposition of this constraint illustrated a culture within the Canadian Armed Forces that fundamentally resisted the need to think disruptively.

Professor Clayton M. Christensen from the Harvard Business School has written extensively on the subject of disruptive innovation. He introduced the concept of disruptive technologies to explain why some of the best managed companies often failed to maintain a competitive advantage despite their most determined efforts to stay ahead.

¹⁰⁷ Department of National Defence, *UAV Campaign Plan, Edition 1* (Ottawa: UAV JPO, 2007), 4.

He defines *sustaining technologies* as those that improve the performance of existing product, as opposed to *disruptive technologies* which are those that "...bring to market a very different value proposition than had been available previously."¹⁰⁸ According to Christensen, these leading firms were unable to maintain their position at the top of their respective markets because they continued to invest in sustaining current capabilities, and were unable to forecast emerging technologies and anticipate future customer demands. Based on this, Christensen observes that good management practices often inhibit innovation.¹⁰⁹ Christensen's first book on disruptive innovation, *The Innovators Dilemma*, begins with an analysis of the disk drive industry, illustrating how leading firms invested in improving the speed and capacity of the disk drive to meet customer demands, but failed to realize the disruptive technology inherent in making the disk drives smaller.¹¹⁰ Christensen expands on this case study and uses other examples to show the relevance of disruptive innovations in other technology, manufacturing and service industries.

From a military perspective, the concept of a disruptive technology is equally relevant. In the military, a sustaining technology represents the existing capabilities and concepts that are used to conduct war, while disruptive technologies present opportunities to introduce new methods of warfare that will radically change the way conflicts are resolved. Disruptive innovation theory has often been discounted as being focused on technology; however it can be applied equally to the development of organizational concepts, process and structure. Christensen was able to apply his theory of disruptive

¹⁰⁸ Clayton M. Christensen, *The Innovator's Dilemma* (New York: Harper Business, 2002), xviii.

¹⁰⁹ *Ibid.*, xv.

¹¹⁰ *Ibid.*, 3-4.

innovation to the business but did not consider it in the context of military organizations. Again, this theory does not account for how poorly run organizations fail; it focusses on good companies that fail, despite their best efforts to succeed.

Recognizing disruptive technologies requires disruptive thinking. In his article entitled “The Military Needs More Disruptive Thinkers” published in the *Small Wars Journal* (SWJ), US F/A-18 pilot LT Benjamin Kohlmann argues the need for professional military education (PME) and a career progression system that recognizes the value of disruptive thinking.¹¹¹ He criticizes a PME system that delivers training too late, and focuses on teaching doctrine rather than critical and conceptual thinking. The article was a catalyst for debate on the subject with many readers challenged various elements of argument, specifically identifying the lack of a clear thesis and realistic application in the military. To address some of these missing elements, Marine Officer Peter Munson subsequently published an article in SWJ which focused on the issue of applying disruptive thinking to address the anticipated challenges facing the military including cultural reforms, strategic reviews and reductions in defence budget. Munson states “America’s defense complex faces a period of strategic reset and retrenchment, during which disruptive thinking is required in order to challenge the status quo and effect a reorganization and reprioritization of the Department of Defense and its industrial and conceptual supporters.”¹¹² The boldness and creativity that accompanies disruptive thinking is seen to be the driver for institutional change. He takes a broader approach to

¹¹¹ Benjamin Kohlmann, “The Military Needs More Disruptive Thinkers,” *Small Wars Journal* (5 Apr 2012), 1-2.

¹¹² Peter J. Munson, “Disruptive Thinkers: Defining the Problem,” *Small Wars Journal* (9 Apr 2012), 2.

PME that does not see a ‘one size fits all’ design, but recognizes the need for greater interaction with organizations outside the military. Munson argues that the talented officers that are trained as Commanders to ‘think outside the box’ and take decisive action on the battlefield, must apply this same approach to challenge existing paradigms at the operational and strategic levels. Finally, Munson relates the need for disruptive thinking as a core requirement for both bottom-up and top-down innovation.

Soren Kaplan, author of *Leapfrogging*, states that there are a number of fundamental challenges that accompany disruptive innovation.¹¹³ The first is that disruptive innovation creates an incredible amount of uncertainty. This causes business and military leaders great angst considering the amount of uncertainty that already exists within their respective organizations. After all, many leaders follow the popular adage, ‘if it isn’t broke, don’t fix it’. However, those that champion disruptive innovation would counter this by saying that, ‘it is broken, and you just haven’t realized it yet.’ Supporters of disruptive innovation argue we are victims of our own success when we fail to recognize the impetus for change and institutional reform.

Secondly, Soren Kaplan identifies that disruptive innovations can be distinguished in hindsight but they are unpredictable and it is impossible to create any type of formalized, repeatable process to predict what will be successful in the future. He believes that “[in] today’s turbulent environment, leading disruptive innovation is likely more about best principles than best practices, and requires a disruptive approach to management itself.”¹¹⁴ To address disruptive innovation, Kaplan provides a framework

¹¹³ Soren Kaplan, “Leading Disruptive Innovation,” *Ivey Business Journal*..., 1.

¹¹⁴ *Ibid.*, 1.

which includes five strategies that leaders can use to encourage, identify and exploit disruptive innovation. He proposes the acronym LEAPS; Listen, Explore, Act, Persist and Seize.¹¹⁵

The first step, *Listen*, refers to looking internally for innovative ideas and recognizing those that break from the norm. A talented leader must be able to avoid pursuing the obvious solutions and seek out those that demonstrate the potential to radically change the organization.¹¹⁶ Military leaders need to look for innovative ideas within the organization and resist strictly following the priorities of the defence industry or other military institutions. Leaders must also be able to *Explore* uncertainty and embrace both the risks and opportunities that are presented by change.¹¹⁷ For military leaders this particularly applies to the ambiguity of warfare, and the need to look outside the bounds of doctrine to find innovative opportunities to grow capabilities. This also means that military leaders must be willing to ask the hard questions, knowing that the answer will not be always desirable, and scrutiny may follow.

Kaplan prescribes the need to *Act* in such a way that small steps can gain the greatest advantage from potential disruptive innovations; “Leading disruptive innovation requires a mindset of continuous adaptation.”¹¹⁸ This approach allows leaders to manage risk while still making decisive strides forward to realize disruptive innovations. In a military context, this approach is far more marketable than the ‘all or nothing’ mindset. Following Kaplan’s model, military leaders must be prepared to recognize disruptive

¹¹⁵ Soren Kaplan, “Leading Disruptive Innovation,” *Ivey Business Journal*..., 2.

¹¹⁶ *Ibid.*, 2.

¹¹⁷ *Ibid.*, 2.

¹¹⁸ *Ibid.*, 3.

innovation in order to put a ‘flexible stake in the ground’ and then move decisively forward.

Persist means that leaders must be willing to accept failure, and use it to launch the organization into a radically new direction. Kaplan refers to this as ‘optimistic persistence’ as a means of taking bold action and realizing the opportunity afforded by risks.¹¹⁹ Military leaders must be willing to challenge doctrine, experiment and have the confidence to fail in the pursuit of disruptive innovations. They must leave the safety of the standard, proven models and methods in order to discover new ways of conducting war. Historically, some of the greatest military innovations have resulted from those nations that faced adversity either during or as a result of war. The challenge for military leaders is to willingly embrace failure before the face catastrophic defeat in combat. Finally, Kaplan discusses the need to *Seize* opportunities that present themselves when events do not play out as expected. Uncertainty often breeds surprise, and so leaders need to have the mental agility, the strength of character and the flexibility to rapidly seize unexpected disruptive innovations when they occur.¹²⁰

Harvard Business School professor Gautam Mukunda provides a versatile application of disruptive innovation theory that can be applied to a wider range of organizations including the military.¹²¹ Mukunda observes that the current theory presented by Christensen does not provide an accurate means of defining or forecasting disruptive innovations. To supplement the existing theory of disruptive innovation,

¹¹⁹ Soren Kaplan, “Leading Disruptive Innovation,” *Ivey Business Journal*..., 3.

¹²⁰ *Ibid.*, 3.

¹²¹ Gautam Mukunda, “We Cannot Go On: Disruptive Innovation and the First World War Royal Navy,” *Security Studies*, 127.

Mukunda proposes a model for analysis that focusses on secondary vice the primary tasks of an organization. He defines a primary task as one that is part of the core mission and therefore a high investment priority for the organization. Secondary tasks tend to reflect opportunities for the development of new concepts and capabilities. As such, primary tasks relate to sustaining innovations while secondary tasks could potentially provide disruptive innovations.¹²² Mukunda refers to this model as Generalized DI, founded on the principle that "...militaries will successfully counter-innovate against sustaining threats but struggle against disruptive one."¹²³ According to Mukunda, "Christensen's 'innovators dilemma' in this respect is choosing whether to continue to invest in the primary task or divert resources to exploit the disruptive innovation associated with secondary tasks."¹²⁴ Unfortunately, as shown by the disruptive innovation theory, countless leading firms have continued to dump massive resources into developing sustaining technologies to face today's threats at the expense of supporting disruptive innovations for the future competitiveness.

To identify and analyze disruptive innovations, Mukunda presents a framework that considers the goals, missions, output and metrics of an organization. In this case, goals reflect the overall purpose, missions are a prioritized list of tasks, outputs are what need to be done to achieve a mission and metrics measure effectiveness.¹²⁵ Based on metrics, organizations can assess what investment or innovation is required in order to optimize priority tasks and maintain an advantage over competitors. Mukunda's central

¹²² Gautam Mukunda, "We Cannot Go On: Disruptive Innovation and the First World War Royal Navy," *Security Studies*, 129-130.

¹²³ *Ibid.*, 133.

¹²⁴ *Ibid.*, 130.

¹²⁵ *Ibid.*, 133.

prediction in Generalized DI is that leading organizations will experience success with sustaining innovations but fail when faced with disruption.¹²⁶ He also indicates three other principles of Generalized DI; over-investment in sustaining threats, faulty metrics leading to an information deficiency regarding disruptive innovations, and the need for independent organizations to counter the disruption.¹²⁷

To illustrate the Generalized DI model, Mukunda describes the experiences of the Royal Navy (RN) during World War I and the development of anti-submarine warfare (ASW).¹²⁸ In this case study, Mukunda shows how the RN considered maritime dominance as a core goal and protecting the fleet as a primary mission. The RN was successful at continuously innovating to counter the threat posed by German submarines against the RN fleet. In this respect, the RN was highly effective at supporting the development of sustaining innovations.¹²⁹ However, the RN did not anticipate that the Germans would use their submarine capability against the British merchant fleet. Consequently, the RN was completely unprepared to counter this threat. The Germans were able to inflict massive damages on the merchant fleet and disrupt the RN strategy in the war. The submarine capability itself did not represent a disruptive innovation, but employment of this capability against commerce assets was highly disruptive.¹³⁰

As predicted by the Generalized DI model, the RN was highly successful at maintaining dominance of sustaining technologies, but failed against the disruptive

¹²⁶ Gautam Mukunda, "We Cannot Go On: Disruptive Innovation and the First World War Royal Navy," *Security Studies*..., 143.

¹²⁷ *Ibid.*, 143-144.

¹²⁸ *Ibid.*, 139-156.

¹²⁹ *Ibid.*, 147.

¹³⁰ *Ibid.*, 143.

innovation of German submarine warfare.¹³¹ The case study also supports Mukunda's additional principles of Generalized DI. The RN continued to invest heavily in the primary task and supported the innovation of sustaining technologies. However, in doing so, the RN failed to allocate resources to support disruptive innovation related to secondary tasks. The RN did not have the metrics in place to predict and understand the threat to the merchant fleet. Finally, once the RN recognized the threat from the German submarines, they were forced to make major organizational changes to develop a solution. Following heavy losses to the merchant fleet, the RN implemented convoy procedures, going against previously held notions that convoys were unnecessary, inefficient and did not address the threat. The RN fit the profile of a well-led, innovative, dominant organization, and yet they failed against a disruptive innovation. By applying the Generalized DI, the RN may have been able to detect the error of continued investment in sustaining primary capabilities at the expense of fostering disruptive innovation.

Chapter 6 – Embracing Failure

"If you want to succeed, double your failure rate."

Thomas J. Watson Sr.

Failure is a powerful motivation to innovate. However, in a military operation, failure can lead to catastrophic loss of life and resources and have devastating political, economic and social consequences. As a result, military organizations have developed an instinctive aversion to risk and resist failure at all levels. Military culture reinforces the

¹³¹ Gautam Mukunda, "We Cannot Go On: Disruptive Innovation and the First World War Royal Navy," *Security Studies*..., 156-157.

‘no fail’ approach to operations, which is often the reality considering that the military option is often the last resort in dealing with national or international security threats. For this reason, recognizing and advocating failure as a critical enabler of innovation is a challenging endeavour. How can leaders create the conditions to avoid failure at an organizational level, yet encourage failure on an individual and group level in order to facilitate discovery, adaptation, improvisation and eventually, innovation? Can militaries capitalize on the motivational aspects of failure during training and exercises, and still ensure that failure is seen as unacceptable during operations?

Management consultants Paul Schoemaker and Robert Gunther recognize the importance of failure. In order to succeed, “...most companies are designed for optimum performance rather than learning, and mistakes are seen as defects that need to be minimized.”¹³² While mistakes are widely regarded as valuable learning opportunities, there is an aversion to failure that prohibits many organizations from embracing these opportunities to innovate. Alina Tugend, author of *Better By Mistake: The Unexpected Benefits of Being Wrong*, describes how the cultural aversion to failure “...creates workplaces where taking chances and being creative while risking failure is subsumed by an ethos of mistake-prevention at the cost of daring and innovation.”¹³³

Schoemaker and Gunther emphasize the paradoxical term “deliberate mistakes” that are discovered through experimentation that is meant to confirm assumptions underpinning fundamental guiding principles. Exploiting these types of mistakes requires

¹³² Paul J.H. Schoemaker and Robert E. Gunther, “The Wisdom of Deliberate Mistakes,” *Harvard Business Review* 84, no. 11 (June 2006), 110.

¹³³ Alina Tugend, *Better By Mistake: The Unexpected Benefits of Being Wrong* (New York: Riverhead Books, 2011), 3.

leaders to engage in “thinking about thinking”.¹³⁴ It also requires a great deal of humility since most professionals take great pride in their achievements and do not want their reputation tarnished by the stain of failure, regardless of how positive they can affect the larger organization.

According to Schoemaker and Gunther, there are four main reasons that organizations avoid making mistakes which are reflected in the culture of an organization.¹³⁵ First, organizations may feel overconfident in their own abilities. This is the consequence of developing expertise to the point where leaders are not able to see alternative and potentially more effective, ways of executing their responsibilities. Secondly, leaders are risk adverse and fear being wrong. They often do not want to be tested for fear of being exposed as wrong or inferior. This culture is often reinforced by the reward structure and career progression models which can disadvantage those who make deliberate mistakes and challenge the system. Leaders also tend to look for data points that validate existing beliefs, processes, structures and business models. Analyzing lessons learned and experimental results objectively is critical, but too often leaders will look for evidence that supports current doctrine and policies. Finally, leaders assume that feedback is both complete and reliable. In order to enable innovation, it is important to look for less obvious findings and conduct activities that expose alternative viewpoints. This approach will yield potential areas of vulnerability that may not be otherwise visible.

Overcoming the barriers that prevent organizations from making valuable mistakes and encouraging leaders to accept the risk of being wrong is critical to fostering

¹³⁴ Paul J.H. Schoemaker and Robert E. Gunther, “The Wisdom of Deliberate Mistakes,” *Harvard Business Review*..., 114.

¹³⁵ *Ibid.*, 111.

a culture that embraces failure as a means of enabling innovation. In developing a culture of innovation, the military meets many of the conditions for an organization that can benefit from intentional mistakes.¹³⁶ Specifically, military organizations conduct repetitive drills, exercises and training that reinforce doctrine, processes and procedures. This repetition is required in order to develop a highly level of competency and specialization in operations. However, this practise also prevents military organizations from making deliberate mistakes. Military organizations also deal with constantly evolving threats and complex, ambiguous and volatile problem sets. Similarly, this environment creates a great deal of uncertainty and volatility that makes an organization resistant to challenging assumptions and proven solutions that would be required to make mistakes.

Building a culture that embraces the innovative potential of failure requires leaders who are able to differentiate between ‘good’ mistakes and ‘bad’ mistakes.¹³⁷ Bad mistakes are those that come from poor planning, lack of critical thinking, incompetence and negligence. Good mistakes are those that are a result of deliberate efforts to take risks and accept the possibility of failure. These types of mistakes support learning and enable innovation by challenging assumptions and concepts that comprise the status quo. The first step in making good mistakes is to identify assumptions and develop strategies to test them. Leaders must be willing to make these types of mistakes, but also foster a culture that accepts productive mistakes and the associated failures as a mechanism for motivating innovation on an individual and organizational level. Accountability for

¹³⁶ Paul J.H. Schoemaker and Robert E. Gunther, “The Wisdom of Deliberate Mistakes,” *Harvard Business Review*..., 112.

¹³⁷ *Ibid.*, 112.

failure must still exist but not at the expense of stemming the flow of innovative ideas or the avoidance of future risks.

As previously stated, the military cannot afford failure in operations due to the potential for catastrophic consequences. This is the paradox that the military is faced with; encouraging failure during training, exercises and capability development, but avoiding failure under operational conditions. Creating a culture where success and failure coexist faces obvious challenges. ‘Train as we fight’ does not mean that accepting failure in training means repeating the same failures in operations. The military is also a long way from recognizing failure as a necessary contribution towards career advancement. The Canadian Forces Personnel Appraisal System (CFPAS) only addresses mistakes as part of the *Accountability* criteria of Performance. However, the rating criteria only describes the need to recognize mistakes and take corrective action, but does not reward the ability to take risks and make meaningful mistakes.

To overcome the instinctive cultural resistance to failure, leaders must create the conditions to learn from mistakes. As Tugend states, “[while] success may be a bad teacher, failure isn’t a very good one either if we don’t recognize the lessons being taught.”¹³⁸ Most western military organizations have institutionalized a formal lessons-learned process. The Canadian Army maintains an Army Lessons-Learned Centre (ALLC) whose purpose is to gather feedback from operations and disseminating this information in official publications such as *Dispatches*. This process relies on the lessons being reported objectively, accurately and openly. In addition, it supports a culture of innovation only as long as the lessons reflect the occurrence and critical analysis of ‘good

¹³⁸ Alina Tugend, *Better By Mistake: The Unexpected Benefits of Being Wrong...*, 89.

mistakes'. Enabling good mistakes means that training and exercises ask questions rather than validating solutions. Leaders must seek to conduct realistic scenarios that provide the opportunity to challenge doctrine and learn through failure.

Fostering a culture that exploits failure as a means of enabling innovation is a critical challenge for military leaders. In some cases this culture will counter many of the traditional norms and beliefs. However, in order to innovate, military organizations must be willing to create a culture, including a personnel management system and career progression model that acknowledges the value of failure on both an individual and institutional level. Those individuals who are willing to risk failure in order to discover new concepts and capabilities must be encouraged and rewarded.

An element of Israeli culture that is reflected in the IDF is an acceptance of failure. The Israeli entrepreneurial culture strives for success evident in the implementation of revolutionary new ideas. However, the same culture recognizes that failure motivates competition, creativity and innovation. It is clear that where one idea succeeds, many others have failed in the process. Yet in a military organization, leaders are often unwilling to accept the risk of failure and the associated stigma. As such, progress is either stagnant or marginal. Israeli culture acknowledges that failure is a necessary component of progress and therefore, those entrepreneurs that have failed are not ridiculed or isolated from society.¹³⁹ Instead, they are given the opportunity to compete once again and contribute to the larger community of innovation. This same attitude toward failure permeates the military and is a foundation for its culture of innovation.

¹³⁹ Dan Senor and Saul Singer, *Start-Up Nation: The Story of Israel's Economic Miracle...*, 20.

The German Army during the interwar years illustrates the benefit of cultural acceptance of failure. As a result of defeat in World War I, the Germans left with no option but to innovate and develop new methods of conducting warfare. An example of this was the emergence of armoured warfare. The British and French were well advanced in terms of tank technology, yet lacked the ability to fully exploit this new capability. During the Battle for France in the spring of 1940, the Germans demonstrated that they had innovated far ahead of their adversaries. The Germans had developed the tactical and operational level concepts and structures to effectively conduct armoured warfare. Williamson Murray describes how the Germany army culture during World War II facilitated a process of learning from mistakes. In this environment, “[they] saw mistakes as a learning experience, not a cause for reproof... German army culture provided for trust and honesty among command levels. Commanders were not afraid to admit that their units had problems.”¹⁴⁰ The German Army had a culture that embraced failure as a critical component of innovation. The impact of this innovative culture was clearly demonstrated by the decisive victories achieved during the early stages of World War II.

Conclusion

Building a culture of innovation should be a strategic priority for the Canadian Armed Forces (CAF). Like many other western militaries, the CAF is facing major reductions in the defence budget and being challenged to justify expenditures without a clear threat to national security. Further, military leaders are in the process of reconstituting forces following the withdrawal from operations in Afghanistan and preparing to respond to a broad range of potential future operations as a result of failing

¹⁴⁰ Williamson Murray, “Innovation: Past and Future,” *Joint Force Quarterly*..., 55.

states, terrorist organizations and state-on-state aggression. The impending revision to the 2008 Canada First Defence Strategy could be a potential driver of innovation in the CAF. Additionally, the formation CJOC and CANSOFCOM, as well as a renewed emphasis on joint operations could also support innovation as a result of interservice competition. The CAF also now benefits from the specialized capabilities of Canadian SOF to drive innovation for the larger institution.

In this time of uncertainty and volatility, it would be wise to continue with evolutionary development rather than invest in revolutionary changes. Encouraging a policy of adaptation is a low risk strategy for making incremental improvements and managing gradual change in military organizations. Many believe that the CAF has made already major advances in capability as a result of recent operational experiences in Afghanistan and should build upon this success. In this regard, the priority should be on consolidating lessons learned and formalizing doctrine rather than pursuing radical departures from the status quo. To this point, the *Report on Transformation 2011* does not mention innovation nor does it acknowledge the requirement for a culture of innovation to support CAF transformation.¹⁴¹

This paper argues that the CAF must adopt a culture of innovation in order to remain relevant and be capable of effectively responding to future threats to national and international security. Innovations result in profound changes in the way a military conducts warfare and disrupts the existing operational paradigm. While technological advances often contribute to innovation, it is not sufficient to assimilate new capabilities

¹⁴¹ Department of National Defence, *Report on Transformation 2011*, (Ottawa: Chief of Transformation, 2011).

into existing doctrine without critical analysis and the development of new concepts and structures. Like many western military organizations, the CAF relies on formal doctrine, a hierarchical C2 structure and standardized processes and procedures. The CAF is a reflection of government bureaucracy and is generally risk adverse. All of these factors inhibit the ability of the CAF to support innovation. However, military leaders can overcome these barriers by building and maintaining a culture of innovation within the CAF.

Culture guides organizational and individual actions through established norms, values, behaviours and beliefs. A culture of innovation is characterized by the predominance of competition, collaboration, critical thinking and intellectual debate. Other traits such as trust, honesty, openness and transparency are critical for maintaining an innovative culture. To build a culture of innovation, the CAF should develop a strategy that incorporates three guiding principles; distributing innovation, thinking disruptively and embracing failure.

Distributing innovation empowers innovative users within the organization and develops a shared ownership for creating new capabilities, concepts and structures. The decentralization of innovation recognizes that creative potential exists at all levels within the organization. Leaders need to be exposed to innovation throughout their careers in order to prepare for senior positions where they can continue to influence innovative opportunities. To effectively distribute innovation, the CAF needs to align policies and invest in tools and technologies that facilitate information sharing, collaboration and creative interactions between innovative users. Information must freely flow horizontally and vertically without the traditional constraints and controls. The creation of innovation

communities and use of social media should also be a priority to achieve distributed innovation.

Disruptive thinking is critical to identify and exploit the creative ideas that can profoundly change warfare. Technology alone does not result in innovation without conceptual analysis and intellectualization necessary to develop supporting concepts, methods and structures. Uncertainty and volatility drive the requirement to disrupt the existing paradigm. Disruptive thinking provides the opportunity to explore radical ideas and challenge existing doctrine and processes. The CAF can address this component of a culture of innovation by institutionalizing disruptive thinking into professional military education. Those who are able to effectively think disruptively and provide alternative perspectives should be recognized rather than isolated. Leaders at all levels must exploit opportunities to disrupt rather than continuing to sustain current capabilities. The CAF must also be willing to reduce the rigidity of doctrine and develop a process to rapidly implement disruptive innovation.

Finally, the CAF must develop a culture that embraces failure in the pursuit of innovation in order to avoid failure at the institutional level. The CAF must acknowledge the need to make mistakes in force development and force generation activities that question fundamental assumptions and challenge rather than validating doctrine. To embrace failure, the CAF must also develop and implement a reward and career progression model that does not punish or penalize those that fail. The collection of lessons learned must be honest, open and accurate, seeking to ask questions as opposed to validating 'proven' solutions.

Transformation of the CAF cannot occur without innovation. To maintain operational excellence, overcome institutional challenges and pre-empt future threats to national security the CAF must build a culture of innovation. To achieve this, the CAF should pursue a strategy that distributes innovation to all levels of the organization, encourages disruptive thinking and embraces failure as a catalyst for innovation.

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