

# THE CURTIS PAPERS

## CANADIAN AEROSPACE AND JOINT STUDIES

VOL. 1 • BOOK 2: 2009 | 2010  
MASTER OF DEFENCE STUDIES - SELECT PAPERS



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## Introduction

*The Curtis Papers* are named in honour of Air Marshal Wilfred Austin “Wilf” Curtis, Officer of the Order of Canada (OC), Companion of the Order of the Bath (CB), Commander of the Order of the British Empire (CBE), Distinguished Service Cross (DSC) and Bar, Efficiency Decoration (ED) and Canadian Forces Decoration (CD). Curtis was the Chief of the Air Staff of the Royal Canadian Air Force (RCAF) from 1947 until 1953 and was a strong supporter of the Canadian Forces College (CFC) in its early years as the RCAF Staff College. He firmly believed in the need for a well-trained and educated officer corps as a prerequisite for an efficient, effective and innovative military force.

The publication of *The Curtis Papers* supports the ongoing mandate of the Canadian Forces Aerospace Warfare Centre (CFAWC) to encourage the study of aerospace subjects of interest to both the RCAF and the joint defence community. One of the primary methods to achieve this goal is to publish, or to cause to have published, aerospace and joint material of a high professional and academic quality. The CFC, through its Master of Defence Studies (MDS) programme, produces on an annual basis a number of papers that meet these criteria. The papers contained herein were selected from amongst a multitude of fine papers produced by the students of the Joint Command and Staff Programme.

*The Curtis Papers* will be distributed to various Canadian and allied locations to serve as a resource for ongoing professional development and academic education. In this manner, they will increase aerospace awareness amongst broader civilian and military communities, while at the same time emphasizing the need for a joint perspective within aerospace forces.

## Abbreviations

CFC	Canadian Forces College
RCAF	Royal Canadian Air Force

These papers were written by students attending the Canadian Forces College in fulfilment of one of the requirements of their course of studies. The papers are scholastic documents, and thus contain facts and opinions, which the authors alone considered appropriate and correct for the subjects. They do not necessarily reflect the policy or the opinion of any agency, including the Government of Canada and the Canadian Department of National Defence.

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## Chapter 6 – Systemic Operational Design: A Viable Alternative to the Canadian Forces Operational Planning Process

Major Gregory W. Ivey

### Abstract

This paper demonstrates that the theoretical and doctrinal frameworks of the Canadian Forces (CF) operational planning process (OPP) render it unsuitable as a design and planning tool to address the complexities inherent in today's operating environment and that systemic operational design (SOD) is a viable alternative that merits further research. The CF OPP, an analytical decision model designed to solve linear problems of limited complexity, was conceived to address the linear conventional threat of the cold war operating environment. The CF OPP in its current form, however, is not ideally suited for operational-level problems that possess the properties of complexity and adaptivity. Systemic operational design, on the other hand, was purposely conceived to address complex problems inherent to the operating environment of the 21<sup>st</sup> century. Globalization and technology, international intervention into failed states, and the impending threat of non-state actors are three realities that define the 21<sup>st</sup> century operating environment complex. Systemic operational design is founded upon the naturalistic decision-making approach, capitalizing on the decision-maker's experience, breadth and depth of knowledge and intuition in the face of complex problems or external pressures. As such, SOD is theoretically well suited to address the complexities inherent in today's operating environment and deserves further attention with a view to improving CF operational design and planning doctrine.

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## 1. Introduction

*The Canadian Forces Operational Planning Process* describes conflict as “a human activity that is conducted under conditions of imperfect knowledge by multiple participants who act concurrently and react specifically against perceptions of probable actions and results of actions.”<sup>1</sup> In other words, conflict is complex and unpredictable. Despite these complexities, militaries must be prepared to execute their nation’s strategic and political goals. However, strategic goals can sometimes be ambiguous and broad and, therefore, must somehow be translated into a military campaign design whereby the actions of every soldier are linked to the accomplishment of the nation’s goals.<sup>2</sup> The CF OPP is the doctrinal planning and operational design process currently employed by the CF to translate strategic political intent into campaign plans in this complex environment.

The CF OPP is similar to the operational planning processes of most Western countries. The doctrinal roots of the CF OPP stem from industrial age analytical decision-making models as well as the practical lessons of great military minds, such as Napoleon and Clausewitz, dating back to the 1700s.<sup>3</sup> The current CF OPP was developed during the cold war era to cope with an operating environment characterized by an adversary’s conventional military.<sup>4</sup> Today’s complex environment raises the question regarding the suitability of the cold-war-based planning process. Recently, a variety of militaries, including those of the United States (US) and Israel, have acknowledged that this current planning process does not meet the exigencies of the current operating environment. In particular, the impact of 21<sup>st</sup> century globalization and technology, the emergence of non-state threats such as al Qaeda, and the security risks imposed on the West by failed nations such as Afghanistan have created an environment posing challenges to military commanders which are unparalleled in history.

The nature of 21<sup>st</sup> century conflict has been a topic of debate across militaries and academic institutions. Is there a requirement to evolve doctrine, specifically the process by which operations are planned, to address the 21<sup>st</sup> century operating environment? Equally important, is there a requirement for a paradigm shift regarding the way in which military practitioners think and solve problems? On one hand, Dr. Milan Vego, a professor at the United States Naval War College, argues that the nature of war has not actually changed and that the Western method of campaign planning is still relevant.<sup>5</sup> Likewise, former Canadian Forces College student Lieutenant-Colonel Lessard also supports the notion that the CF OPP is an effective tool as long as those using it actually understand the terminology and adhere to the steps as they were intended.<sup>6</sup>

On the other hand, the findings of the *Evaluation of the Maintenance and Currency of CF Doctrine* determined that:

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1. Canada, Department of National Defence (DND), B-GJ-005-500/FP-000, Canadian Forces Joint Publication (CFJP) 5.0, *The Canadian Forces Operational Planning Process (OPP)* (Ottawa: Department of National Defence, 2008), 1-3.

2. John Shy, “Jomini” in *Makers of Modern Strategy: From Machiavelli to the Nuclear Age*, ed. Peter Paret, (Princeton: Princeton University Press, 1986), 146.

3. Howard G. Coombs, “Perspectives on Operational Thought,” in *The Operational Art: Canadian Perspectives Context and Concepts*, ed. Allan English, (Kingston: Canadian Defence Academy Press, 2005), 77.

4. Stephan Lefebvre and Michel Frontman, “The Revolution in Military Affairs’: Its Implications for Doctrine and Force Development within the U.S. Army,” in *The Operational Art: Developments in the Theories of War*, eds. B. J. C. McKercher and Michael A. Hennessy, (Westport: Praeger, 1996), 180.

5. Dr. Milan Vego, “Systems versus Classical Approach to Warfare,” *Joint Force Quarterly*, no. 52 (1<sup>st</sup> quarter 2009): 46.

6. Lieutenant-Colonel Pierre Lessard, “Reuniting Operational Art with Strategy and Policy: A New Model of Campaign Design for the 21<sup>st</sup> Century,” in *The Operational Art* (see note 3), 335-37.

[d]octrine development above the tactical level has not kept pace with recent changes to CF command and control architecture and new capabilities introduced through CF Transformation. Coherently communicated and readily accessible military-strategic and joint operational doctrine is a necessary key enabler for interoperability and to achieve integrated operational effects. Remedial action is urgently required to ensure that current deficiencies do not negatively influence the achievement of military objectives.<sup>7</sup>

Likewise, referring to the challenges faced by commanders during both Operation ENDURING FREEDOM in Afghanistan and Operation IRAQI FREEDOM prior to 2006, Colonel James Greer, former director of the United States Army School of Military Studies, argues that “the current operational design construct is often incapable of providing planners and commanders the means of designing campaigns and major operations full-spectrum operations require.”<sup>8</sup> Greer also argues that current doctrine needs to be refined such that the current linear concepts of centres of gravity, lines of operations and decisive points reflect a systems approach.<sup>9</sup> If the CF OPP exhibits deficiencies that restrain commanders from achieving their strategic goals, what is the alternative?

In 2000, the Israeli Defence Force (IDF) formally adopted a new operational design tool: systemic operational design. After a review of its campaigns dating back to the 1973 Arab–Israeli War, the IDF acknowledged “an inability to link tactical level achievements with strategic goals” and began to question the utility of their OPP.<sup>10</sup> Systemic operational design addressed these deficiencies and also addressed the emerging complex environment faced by Israeli commanders in Lebanon and the Israeli occupied territories. Unlike the CF OPP, which is considered a linear and reductionist model, SOD, in its military application, applies general systems theory and complexity theory to operational design.

The emergence of SOD does not sideline the CF OPP. Likewise, many of the characteristics of 21<sup>st</sup> century warfare as Clausewitz viewed it are also not new: “Violence and political impact were two of the permanent characteristics of war. Another was the free play of human intelligence, will and emotions. These were the forces that dominated the chaos of warfare.”<sup>11</sup> What is new, however, is the emerging body of complexity theory and its formal application to military operations.<sup>12</sup> Also new is the requirement for a paradigm shift regarding the way in which military practitioners think and solve problems. Systemic operational design provides the commander and planners an alternative method of perceiving a complex military problem.

This paper will demonstrate that the theoretical and doctrinal frameworks of the CF OPP render it unsuitable as a planning tool to address the complexities inherent to today’s operating environment and that SOD is a viable alternative for operational-level commanders. In order to foster a credible debate, the theoretical framework and the practical elements of the CF OPP and SOD will be introduced. The two models will then be analysed individually, followed by a comparative analysis that will make recommendations for further avenues of study.

7. Canada, Department of National Defence, 1258–153, *Evaluation of the Maintenance and Currency of CF Doctrine* (Ottawa: Chief Review Services, 2007), iii, <http://www.crs-csex.forces.gc.ca/reports-rapports/int-eng.aspx?name=Evaluation%20of%20the%20Maintenance%20and%20Currency%20of%20CF%20Doctrine&size=628kB&link=/reports-rapports/pdf/2007/P0738-eng.pdf> (accessed September 27, 2012).

8. Colonel James Greer, “Operational Art for the Objective Force,” *Military Review* 82, no. 5 (Sep/Oct 2002): 23.

9. *Ibid.*, 26.

10. Lieutenant Colonel William T. Sorrells and others, “Systemic Operational Design: An Introduction” (Fort Leavenworth: School of Advanced Military Studies. United States Army Command and General Staff College, 2005), 9, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA479311> (accessed September 27, 2012).

11. Carl von Clausewitz, *On War*, eds. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1989), 11.

12. Edward Allen Smith, *Complexity, Networking & Effects-Based Approaches to Operations* (Washington, DC: CCRP Publications, 2006), 2.

First, Section 2 will introduce the notion of complexity and the evolution of general systems theory to understand how humans frame and characterize challenging problems. Next, the two theoretical decision-making models that form the basis of the CF OPP (normative) and SOD (naturalistic) will demonstrate how these challenging problems can be addressed. This section will demonstrate that military practitioners are not required to master this theory or the mathematics that support it.

Having an understanding of general systems theory and the two decision-making models, Section 3 will demonstrate that the 21<sup>st</sup> century operating environment facing the CF possesses the properties and characteristics of a complex adaptive system. First, to fully appreciate the unique responsibilities and challenges faced by commanders at the operational level, it is necessary to summarize the roles of all three hierarchical doctrinal levels of conflict: strategic, operational and tactical. Next, this section will examine how globalization and technology, the emergence of non-state threats, and the security risks inherent to failed nations have created a complex operating environment for military commanders. This synopsis will conclude that operational-level commanders are faced with an operating environment that is indeed a complex adaptive system. This notion will frame the analysis of the CF OPP and SOD in the subsequent sections.

Section 4 will examine the OPP currently employed by the CF to address the operational-level complexities introduced in the previous section. The first part will examine the genesis of operational design and the role of the CF OPP. The iterative steps will then be introduced in sequence. Last, this section will draw from the theoretical model and practical examples to demonstrate three deficiencies of the CF OPP at the operational level: the notion of the centre of gravity, linearity and inefficiency.

Once the CF OPP has been analysed within the context of the current operating environment, Section 5 will introduce SOD. Using the same methodology as the previous section, the genesis of SOD will be introduced first. The iterative steps will then be examined to highlight SOD's flexibility and its ability to capitalize on commander's intuition. Last, this section will draw from the theoretical models and, in this case, limited practical examples to demonstrate how SOD actually addresses the deficiencies of the CF OPP in today's operating environment.

Finally, Section 6 will provide a comparative analysis of the CF OPP and SOD. Understanding that SOD is relatively new outside of Israel, Western nations have very little first-hand experiences from which to draw.<sup>13</sup> Therefore, this section will make specific recommendations on the employment of SOD in conjunction with the CF OPP. Last, this section will conclude by providing recommendations on further areas of study beyond the scope of this paper with the aim of improving CF operational planning.

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13. Matthew Lauder, "Systemic Operational Design: Freeing Operational Planning from the Shackles of Linearity," *Canadian Military Journal* 9, no. 4, (2009): 41.

## 2. Theoretical framework

### Introduction

Doctrine is defined as the “fundamental principles by which military forces guide their actions in support of objectives. It is authoritative but requires judgment in application.”<sup>14</sup> The CF OPP is a product of CF doctrine. Although deeply rooted in the theoretical framework of operational art tracing back to Clausewitz and Jomini, the CF, like most NATO countries, developed its current war-fighting doctrine and organizations during the cold war.<sup>15</sup> These developments were legitimate efforts to address the complex problems of a unique type of conflict: conventional militaries of enemy nations.<sup>16</sup> Ironically, war between nations has been the rarest form of conflict in which NATO engaged since its conception.<sup>17</sup> As such, the rapid pace of change of the conduct of military operations to address failed states, insurgencies and non-state threats has challenged existing planning doctrine.<sup>18</sup> However, before discussing the impact of the current operating environment on the CF OPP, the theoretical framework of military decision making will be explored. What then are the theoretical foundations on which the CF OPP was based?

In order to foster a credible debate on the benefits and limitations of the CF OPP and the SOD in the following sections, the theoretical framework of both must be established. Military practitioners are not required to master this theory or the mathematics that support it. Rather, they “need to explore the fundamental nature of complexity, understand its potential impact and how military forces operate, and figure out how best to bound it so as to exploit it.”<sup>19</sup>

This section will provide that theoretical framework. First, general systems theory will be introduced. An understanding of general systems theory will permit further detailed exploration into the theory of complex adaptive systems. The theory of complex adaptive systems is the conceptual model to which this paper will refer in order to rationalize the complexities of the 21<sup>st</sup> century operating environment in the following sections. Next, the two different theoretical decision-making approaches that are deeply rooted in the CF OPP and SOD will be examined: specifically the normative and naturalist approaches.

### General systems theory

*If we are to figure out how to plan, execute, and assess ... operations and how to exploit their non-linearity, we must start by understanding what complexity and non-linearity are and what role they must play in military operations.*<sup>20</sup>

Modern science evolved out of the developments of 19<sup>th</sup> century classical physics. This era was characterized by Newtonian mechanistic efficiency and the scientific view that everything in the world, animate or inanimate, could be understood by viewing the individual components in isolation.<sup>21</sup>

14. Canada, Department of National Defence, A-AE-025-000/FP-001, *Canadian Forces Doctrine Development* (Ottawa: Department of National Defence, 2003), 1-3.

15. William MacAndrew, “Operational Art and the Canadian Army’s Way of War,” in *The Operational Art* (see note 4), 97–98.

16. Lieutenant-Colonel C. L. Dalton, “Systemic Operational Design: Epistemological Bumpf or the Way Ahead for Operational Design?” (Fort Leavenworth: United States Army Command and General Staff College, 2006), 7.

17. United States (US), Department of Defense (DoD), United States Army Training and Doctrine Command (TRADOC) Pamphlet 525-5-500, Version 1.0, *Commander’s Appreciation and Campaign Design* (Washington: Department of the Army, 2008), 6.

18. Canada, DND, *Evaluation of the Maintenance*.

19. Edward Allen Smith, 4.

20. Ibid., 1.

21. John F. Schmitt, “Command and (Out of) Control: The Military Implications of Complexity Theory,” in *Complexity, Global Politics and National Security*, eds. David S. Alberts and Thomas J. Czerwinski, (Washington, DC: National Defense University, 1997), 223.

In other words, a structure's properties were merely the sum of the individual components. Concurrent across all fields of science, yet in isolation of each other, there was skepticism surrounding the ability of this prevailing analytical scientific approach to address the complexities of modern society and technology.<sup>22</sup> For example, classical physics did not address notions like those of "wholeness, growth, differentiation, hierarchical order, dominance, control and competition."<sup>23</sup> Furthermore, the Newtonian analytical approach did not address the relationships between the individual components of a structure.

These notions are all characteristics of organization, be they of a living organism or a society.<sup>24</sup> Given the reality of the complexities inherent to such structures, the Newtonian approach was not effective in identifying and addressing them. A new approach was required, and the theory of systems began to influence contemporary thinking. General systems theory was developed by Hungarian scientist Ludwig von Bertalanffy in the 1940s after recognizing the need to analyse "wholeness," or the behaviour of organizations.

It is necessary to study not only parts and processes in isolation, but also to solve the decisive problems found in the organization and order unifying them, resulting from dynamic interaction of parts, and making the behaviour of parts different when studied in isolation or within the whole.<sup>25</sup>

By identifying the laws and rationale that govern a system, Bertalanffy's theory provides a universal framework for understanding systems and the perceptual tools for their definition.<sup>26</sup> Before any further analysis of general systems theory can occur, it is important to understand the key characteristics that define a system.

#### *Defining a system*

A system is defined as "a functionally related group of elements forming a complex whole."<sup>27</sup> The level of complexity is measured in two different ways in order to frame the system: its structural complexity and its interactive complexity. A system's structural complexity is based on the number of components within the system.<sup>28</sup> The more individual components within the system, the greater the structural complexity. However, a more structurally complex system is not necessarily more challenging or unpredictable. A system's interactive complexity measures this level of predictability by referring to the amount of interaction of the individual components.<sup>29</sup> The more freedom of interaction between these individual components, the greater the interactive complexity. For example, a watch is a complex system of numerous intricate moving parts. However, a watch is not an interactively complex system because the behaviour of the individual parts, and the watch as a whole system, is predictable. In this case, the watch demonstrates properties of linearity.

What are the attributes that make a system linear? A system is considered linear if it meets three criteria. First, similar inputs produce similar proportionate outputs. Second, the cause and effect

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22. Shimon Naveh, *In Pursuit of Military Excellence, The Evolution of Operational Theory* (London: Frank Cass, 1997), 4.

23. Ludwig von Bertalanffy, *General Systems Theory: Foundations, Developments, Applications* (New York: George Braziller, 1980), 37.

24. *Ibid.*, 47.

25. *Ibid.*, 31.

26. Naveh, 3.

27. Bertalanffy, 47.

28. Schmitt, 234.

29. *Ibid.*



linkages are replicable under different conditions and with different actors.<sup>30</sup> For example, pushing the watch's lamp button will always turn on the watch lamp. Furthermore, no matter how often the lamp button is pushed, and regardless of who is pushing the button, there is no chance that another function, like the watch alarm for example, will be engaged. The last attribute that characterizes a system as linear is that the effects of the individual parts combine such that the whole simply equals the sum of the parts.<sup>31</sup> Based on these three attributes, the behaviour of a linear system can be understood by simply taking it apart and by isolating and studying the individual components.

A structure that is both structurally and interactively complex does not behave linearly, and therefore, the outcomes are more unpredictable. If the same watch behaved as a complex interactive structure, the following characteristics would be observed. First, similar inputs would not produce similar outputs. Pushing the lamp button may result in bright illumination in one instance but poor illumination in another. Second, pressing a particular button may not have the same result each time. In this case, the lamp button may cause the alarm to signal. Press the lamp button again and the stopwatch may start. Unlike the linear system, an interactively complex structure must be looked at from a systemic approach because analysis of its components in isolation does not take into account the dynamics between the components.<sup>32</sup> Having acknowledged the fundamental differences between linear and complex systems, the next subsection will now build on the principle of complexity and introduce the theory of complex adaptive systems.

### *Complex adaptive systems*

Suitably named, a complex adaptive systems (CAS) is one whose component parts interact with sufficient intricacy that they cannot be predicted by standard linear equations: "so many variables are at work in the system that its overall behaviour can only be understood as an emergent consequence of the holistic sum of all the myriad behaviours embedded within."<sup>33</sup> A CAS not only possesses all of the properties of a complex interactive system, it also learns and adapts to its surrounding environment in unpredictable ways. This Darwinian characteristic is prominent in social and biological systems; for any system to survive, it must be able to deal with the changing physical environment in which it finds itself.<sup>34</sup> Living systems epitomize CAS, and scientists, not to mention military practitioners, are coming to recognize that the world is not orderly or linear.<sup>35</sup>

Marion refers to Chris Langston's concept of complexity. According to Langston, the interactions of small individual components will produce one large structure. The individual components do not necessarily have an understanding of the large structure that they have created; they are merely driven by local rules and are reactive to local influences around them. Control is dispersed throughout the individual components but is not necessarily distributed equally. Some components are more important than others, but none are fully in control of the outcome. As such, Langston notes that their behaviour is based on "projections (however imperfect or primitive) of future outcome, thus they are adaptive in a teleological sense. They interact in some fashion, be it through language, hormones or simple reaction to the presence of another."<sup>36</sup> Based on Bertalanffy's principles, a CAS emerges.

30. US, DoD, *Commander's Appreciation*, 8.

31. Ibid.

32. Schmitt, 235.

33. Russ Marion, *The Edge of Organization* (Thousand Oaks, California: Sage Publications, 1999), 26.

34. Edward Allen Smith, 41–42.

35. Schmitt, 228.

36. Ibid.



This system does not necessarily emerge out of necessity. The system may simply emerge as a result of the dynamics of the individual components and the relationships with their surroundings. These components do not know that they are supposed to behave in a manner that facilitates the creation of the system.<sup>37</sup> As Marion summarizes, “it may, and very often does, just happen.”<sup>38</sup> What is clear, though, is that the whole system is larger than the sum of the parts. The large structure has an understanding of the big picture that is lacking within the individual components. Furthermore, the system has a feedback loop mechanism which permits learning and adaptation; this notion further complicates one’s ability to understand the system let alone predict future behaviours or outcomes. Bertalanffy believes that this emergent system “violates the second law of thermodynamics by growing and becoming stronger rather than dissipating ... it can maintain its integrity in the face of perturbation.”<sup>39</sup> Furthermore, the system exerts influence on the individual components in order to ensure its survival.

*Living systems model and the system of complex adaptive systems*

Langston’s model depicts a single complex adaptive system in isolation. James Grier Miller builds on this basic notion by explaining how complex adaptive systems interact, by considering a CAS as a system of systems. Miller developed this model, and it consists of the eight levels of living systems, divided into two groups:

a. biological:

- (1) cell;
- (2) organ; and
- (3) organism; and

b. sociological:

- (1) group;
- (2) organization;
- (3) community;
- (4) society; and
- (5) supranational.

The model is not meant to depict hierarchical control from one level to another. Each of the levels possesses interdependent variables and deals with varying degrees of interaction. As such, each of the subsystems at various levels adapts and changes through continual interaction within its environment. An increasingly complex system emerges out of the systems from the lower level. One level does not exert any form of control over the lower level. Miller points out that “it is a hierarchy of complexity with each successive level representing an aggregation of the complexity of all of the lower levels plus the additional complexity at that level.”<sup>40</sup> Human beings, the interaction between human beings and the organizations which are created by human beings possess the properties of a complex adaptive system. In no way do they display the properties of a linear model.

This paper has already determined that systems emerge out of the dynamic interactions of its subcomponents and the surrounding environment. It is important to understand how and why

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37. Schmitt, 223.

38. Marion, 26.

39. Bertalanffy, 35.

40. Edward Allen Smith, 9.

humans form groups (the lowest sociological level). This may seem far from the issue of operational design or the CF OPP, but this phenomenon is the lynchpin to understanding the significance of complexity and how it would apply to the military planning process.

First, people are socialized to behave a certain way.<sup>41</sup> For example, students are taught communication skills at a very young age; they are to sit at their desks and be quiet when the teacher enters the classroom. A student must first raise their hand in order to communicate with the class in an orderly fashion. Any behaviour contradictory to this would result in corrective action by the teacher. Socialization occurs in all cultures, and what may be considered acceptable behaviour in one culture may not be acceptable in another.

As such, human social behaviour is catalysed by ideas, beliefs and symbols. Humans assign meaning to things that have no physical substance. Russ provides a variety of examples: humans establish families out of love, tribes may form out of similar cultures, a shared belief may foster group action or drive a group into mass hysteria, militaries are created due to perceived threats to the nation's security, and humans join academic groups to share ideas. These mental constructs catalyse humans to create complex webs, alliances or social structures.<sup>42</sup>

Regardless of the motivations that catalyse humans to create these webs or groups, it is important to understand that these interactions are localized, or independent of each other. Referring to Miller's model, these localized interactions then create groups of complex adaptive systems. Organizations emerge from the interactions between groups, each more complex than the levels below them. Smith summarizes the importance of such a model:

It suggests that the closer we operate to the individual human in the continuum of living systems, the more we will have to deal with the hardwired primordial factors in human behaviour ... rather than hope to change it. ... From a functioning perspective, therefore, the apparent hierarchical ordering is not that of an Industrial Age wiring diagram but is more in the manner of an influence diagram in which one level influences a lower one.<sup>43</sup>

Based on the characteristics and the inherent unpredictability of such a complex adaptive system, it would appear impossible to solve a system's problems at first glance. However, a system's problems, according to Bertalanffy, are problems of interrelation of a great number of variables, which occur in the fields of politics, economics, industry, commerce and the military art.<sup>44</sup> In fact, through a combination of intuition and learned behaviour, humans already know how to deal with complexities simply by being inhabitants of a social environment.<sup>45</sup> For example, humans know how to deal with the complexities of small groups, such as one's sports team or family. Humans know how to function as part of an organization and as citizens of their country. Therefore, there is no linear mechanistic procedure to turn to for such a problem, nor is there a need. General systems theory implies that understanding human characteristics and human organizations is the key to defining and solving problems within society. Having introduced the two differing theoretical models used to frame problems, the next subsection will introduce the decision-making models designed to address them.

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41. Discussion with Dr. Eric Ouellet, Canadian Forces College, 23 March 2010.

42. Marion, 33.

43. Edward Allen Smith, 49.

44. Naveh, 4.

45. Edward Allen Smith, 49.

### Decision-making approaches

According to Matthew Lauder of Defence Research and Development Canada, there are two main approaches to decision making: the normative approach and the naturalistic approach.<sup>46</sup> Both approaches are currently employed in all facets of CF operations, and a fault line between the more suitable approach to military operations already exists.<sup>47</sup> This notion will be addressed in subsequent sections once the two decision-making approaches have been introduced.

#### *Normative decision-making process*

First, the normative is a formalized linear process, known otherwise as a rational or an analytical approach. This approach is a direct reflection of the Western world's Newtonian desire to reduce a linear system down into its primary components in order to understand it. Janis and Mann developed a popular model for rational decision making using the normative approach:

- a. Canvass a wide range of options.
- b. Survey a full range of objectives.
- c. Carefully weigh the costs, risks and benefits of each option.
- d. Assimilate new information.
- e. Re-examine the positive and negative consequences of each option.
- f. Carefully plan to include contingencies if various risks occur.<sup>48</sup>

The CF OPP was modeled after this method. Although the concept and detailed steps of the CF OPP will be introduced and analysed in Section 3, it is important to note its theoretical roots. The CF OPP possesses the same normative approach found in the steps developed by Janis and Mann. Such a method can be very effective when dealing with structural complexity and when sufficient time is available to conduct such a process. It is thorough and will likely result in a reliable decision. It is interesting to note that Klein insists that “this process is more helpful for beginners than for experienced decision-makers.”<sup>49</sup>

However, rational thinking has its limits in the social sciences and the human domain. By imposing rational thinking methodology onto an overtly complex problem, there is a risk of devising a solution to a problem that was never properly defined in the first place. Second, there is also a risk that the decision maker will subconsciously distort the problem to make it fit into the rational decision-making template.

#### *Naturalistic decision-making process*

The other approach to decision making is the naturalistic approach. The recognition-primed decision (RPD) model is an example of the naturalistic approach. It focuses on the way the decision maker assesses the situation and judges it familiar, not on comparing options.<sup>50</sup> The RPD model capitalizes on the decision maker's experience, breadth and depth of knowledge, and intuition in the face of complex problems or external pressures such as time constraints. With experienced decision

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46. Lauder, 42.

47. Discussion with Dr. Eric Ouellet, Canadian Forces College, 23 March 2010.

48. Gary A. Klein, *Sources of Power: How People Make Decisions* (Cambridge: The MIT Press, 1998), 28.

49. Ibid.

50. Ibid.

makers, courses of action need only be thought out informally until the first workable course of action is found. There is no need to continue developing additional courses of action. “By imaging the option being carried out, they can spot weaknesses and find ways to avoid these, thereby making the option stronger.”<sup>51</sup> As such, the experienced decision maker avoids paralysis by analysis.

However, the RPD model has limits. First, it is not suitable for inexperienced decision makers. Again, the model capitalizes on the inherent experience and knowledge of the decision maker. Someone with little knowledge or experience forced to make a critical decision is not able to draw from a repertoire of anecdotes or memories. Therefore, one’s ability to spot weaknesses or make the option stronger as it is being played out in one’s mind is limited. Sometimes one does not know what one does not know. Second, the tenets of the naturalistic approach make it vulnerable to the same problems inherent to the normative approach.<sup>52</sup> For example, intuitive decision making is susceptible to individual biases. Also, groupthinking fosters a deeper understanding of the problem but, by its very design, could create non-intuitive solutions.<sup>53</sup>

## Summary

This section provided a theoretical framework from which to begin a credible analysis of the CF OPP and SOD models. The theoretical tenets of general systems theory were introduced progressively in order to highlight the differences between linear systems and complex adaptive systems. The problem-solving methodologies required to solve these systems are very different.

A linear system is best understood by reducing it to its individual components because the system is equal to the sum of its parts. As such, a normative decision-making approach is well suited for linear problems of minimal complexity. A naturalistic decision-making approach, on the other hand, is well suited for complex problems because it capitalizes on the decision maker’s experience, breadth and depth of knowledge, and intuition. Although Miller’s model addresses generic CAS, profound similarities can already be drawn between the model and that of 21<sup>st</sup> century society as a complex adaptive system.

However, it is important to note that this theoretical framework is just that: a theory. They are models to which one may rationalize, evaluate or predict events in real life. Bertalanffy warns that general systems theory is not intended to create meaningless analogies where “nations are to be considered organisms on an inordinate level ... within which the human individual appears like an insignificant cell in an organism.”<sup>54</sup> Likewise, it is important to acknowledge that both decision-making approaches have inherent flaws, which reinforces the notion of complexity as an invariant.

General systems theory has its opponents. There are those, such as Vego, who dismiss the notion of applying systems theory to social sciences and, in particular, the military operational art. Systems theory, one could argue, is better suited for examining microcultures in a Petri dish in a laboratory rather than in a military operational-level headquarters. The next section will disprove this notion. In fact, the next section will demonstrate how 21<sup>st</sup> century society and military operating environments possess the same attributes inherent to complex adaptive systems.

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51. Ibid.

52. Dr. Jack D. Kem, *Design: Tools of the Trade* (Fort Leavenworth: US Army Command and General Staff College, 2009), 32.

53. Ibid.

54. Bertalanffy, 35.

### 3. Complex operating environment

*The mission of the CF has remained relatively unchanged since the 1990s: to defend Canada and Canadian interests at home and abroad while contributing to international peace and security. The Canadian government is committed to providing combat-capable maritime, land, and air forces to respond, at short notice, to fulfill a wide range of missions and tasks. What has changed is the evolving nature of operations to which the CF has been committed since the first Gulf War in 1991.<sup>55</sup>*

#### Introduction

The nature of 21<sup>st</sup> century conflict has been a topic of debate across militaries and academic institutions. What are the characteristics of the 21<sup>st</sup> century that make it different or more complex than that of the 20<sup>th</sup> century? More importantly, is there a requirement to evolve doctrine and current ways of thinking at the operational level in order to address these complexities? On one hand, Vego argues that the nature of war as Clausewitz defined it has not actually changed and that the Western method of campaign planning is still relevant.<sup>56</sup> On the other hand, Dr. Shimon Naveh believes that the nature of warfare has changed and that commanders at all levels today are faced with complexities that either did not exist or were not considered relevant in the 20<sup>th</sup> century. As such, Naveh argues that these complexities cannot be solved by the linear rational processes common in Western doctrine.<sup>57</sup> Rather, militaries must engage in a systems approach to solving complex problems.

This section will demonstrate that the 21<sup>st</sup> century operating environment facing the CF possesses the key characteristics of a complex adaptive system. This section will examine the roots of the CF OPP and demonstrate that it is a product of the doctrine development cycle; a cycle that should be ever evolving to meet the challenges of the ever-evolving operating environment. Second, the three doctrinal levels of conflict will be introduced such that the roles and challenges faced at the operational level are framed for future discussion. Last, the key characteristics of the current operating environment will be examined to highlight the inherent properties of CAS that were discussed in Section 2. Specifically over the past decade, the impact of globalization and technology, the emergence of non-state threats, and the security risks imposed on the West by failed nations have created an environment that offers challenges to military commanders that are unparalleled in history. Demonstrating that the operating environment possesses properties inherent to those of CAS will frame the analysis of the CF OPP and SOD in the subsequent sections.

#### CF operational design doctrine development

“The role of doctrine within the conceptual component of military power is to provide a framework within which operations are planned, executed, and evaluated.”<sup>58</sup> CF doctrine was neither conceived in isolation nor is it considered an immovable object. Doctrine is complementary to conceptual thinking and one of the major departure points of the force development process.<sup>59</sup> Although deeply rooted in the theoretical framework of Clausewitz and Jomini, the CF developed its current war-fighting doctrine and organizations during the cold war. It shares similarities with the United States joint doctrine and that of NATO. How then does doctrine evolve, and what are the major influences that spark the need for change?

55. Canada, DND, *Evaluation of the Maintenance*.

56. Vego, “Systems versus Classical Approach,” 46.

57. Naveh, 3.

58. Canada, Department of National Defence, Canadian Forces Joint Publication 01, *Canadian Military Doctrine* (Ottawa: Canadian Forces Experimentation Centre, 2009), 2-6.

59. Major General Irving Brinton Holley Jr, *The Role of Doctrine: Essays on a Challenging Relationship* (Maxwell AFB: Air University Press, 2004), 2.

Looking back to the First World War as an example, the genesis of three-dimensional warfare brought on by technological breakthroughs in artillery and airplanes demonstrates the impact that technology, strategy and campaign concepts can have on doctrine development.<sup>60</sup> Likewise, relevant and credible CF counter-insurgency (COIN) doctrine has been published recently, as a result of lessons learned as well as emerging concepts and the ever-evolving tactics, techniques and procedures from CF operations and those of its allies in contemporary theatres such as Afghanistan and Iraq.

Subsequently, doctrine is the focal point for developing new concepts and procedures. Since the cold war, operational commanders have been provided new tools to deal with these complexities. For example, the Canadian joint task force commander in Afghanistan commands organizations that include the Royal Canadian Mounted Police and the Department of Foreign Affairs and now has weapons and sensors at their disposal that were once doctrinally held at the strategic level.

Planning is also a product of doctrine. If doctrine provides the framework in which operations are planned and executed, certainly the planning doctrine required to execute such complex operations should also have kept pace with current 21<sup>st</sup> century trends. However, it has not. Colonel Bernd Horn provides an explanation for this deficiency: “Often we do not know what we do not know, and we assume our perception of the state of affairs is accurate and mutual, when in fact ground truth may be an entirely different reality.”<sup>61</sup> In other words, the CF may not even be aware that it is using planning doctrine designed for an operating environment that has been overtaken by time.

What then are the characteristics of the current operating environment that have rendered CF operational planning doctrine unsuitable? More importantly, is there a requirement to evolve doctrine, specifically the process by which operations are planned, to address these complexities? These questions will be answered through the following overview of the levels of conflict and the characteristics of today’s complex operating environment.

### Levels of conflict

The military operates across a spectrum of conflict. As such, the military must possess the flexibility and mental agility to plan, execute and sustain missions across this spectrum while fully inculcating the environmental complexities outlined in Figure 1. The left side of the spectrum relates to military operations that do not require the use of force to achieve the mission. Support to domestic operations, such as the Red River floods in 1997, is an example of a non-combat operation. International peacekeeping missions (such as United Nations Protection Force [UNPROFOR] in the former Republic of Yugoslavia in 1992–1995) and peace enforcement missions (such the NATO Stabilization Force in Bosnia in 1996–2004) are two types of missions central to the spectrum. Due to the very nature of maintaining or imposing peace among hostile forces, militaries must acknowledge that these types of missions are potentially volatile and can escalate along the spectrum of conflict very quickly.<sup>62</sup> The right side of the spectrum relates to military operations that require the use of force to accomplish the mission, such as the Russian incursion into Georgia in 2008. Operation ATHENA, Canada’s contribution to International Security Assistance Force (ISAF), and Operation IRAQI FREEDOM are two examples of operations that may at any time involve tactical activities that span the spectrum.

60. Jonathan Bailey, “The First World War and the Birth of Modern Warfare” in *The Dynamics of Military Revolution 1300–2050*, eds. MacGregor Knox and Williamson Murray, 132–53 (New York: Cambridge University Press, 2001), 132.

61. Colonel Bernd Horn, *In Harm’s Way: “The Buck Stops Here”: Commanders on Operations* (Kingston: Canadian Defence Academy Press, 2007), 203.

62. Canada, Department of National Defence, B-GJ-005-307/FP-030, *Peace Support Operations* (Ottawa: Department of National Defence, 2002).





Figure 1. *Spectrum of conflict*<sup>63</sup>

Regardless of the nature of conflict, CF operations must be consistent with the national political aims. In order to align military actions at all levels (from the Chief of Defence Staff to a section commander tactically deployed in a theatre of operations) towards the same national aim, CF doctrine delineates military activities into three levels of conflict “to allow commanders to visualize a logical flow of operations, allocate resources, and assign tasks.”<sup>64</sup> They are the strategic, operational and tactical levels. These levels are distinguished neither by the number of formations nor the ranges of the weapons systems. These levels are distinguished by the intended outcome and will now be introduced in hierarchical order.

#### *Strategic level*

The strategic level of conflict is that level at which the nation determines its security objectives and employs the nation’s resources to achieve those objectives. Here, the government assesses the national interest and develops a range of options to address a crisis across the spectrum of national power.<sup>65</sup> Options could include, but are not limited to, diplomatic, economic, information and military action. Roles for the military will be defined at this level, along with employment limitations and any inherent risks associated with employing the military. Although the overriding criteria for the conduct of military operations are the strategic objectives, this strategic direction may not always be clear, tangible or completely achievable through the military alone. It is the role of the next level of conflict to synthesize this strategic direction and translate it into concrete objectives for the tactical commanders.

#### *Operational level*

The operational level of conflict is “the level at which campaigns and major operations are planned, conducted and sustained to accomplish the strategic objectives within theatres or areas of operations.”<sup>66</sup> This is the level that links strategy to tactical actions on the ground. Accomplishment of a strategic or operational objective requires sequenced and synchronized employment of military and non-military sources of power. To achieve these objectives, the commander’s intuition and experience required to wade through the ambiguities and challenges faced at this level of conflict are aptly named operational art.<sup>67</sup> *The Canadian Forces Operational Planning Process* formally defines operational art as “the skill of employing military forces to attain strategic objectives in a theatre of

63. Canada, DND, *Canadian Forces Operations*, 1-4.

64. Ibid.

65. Canada, DND, *Canadian Forces Operational Planning Process*, 1-8.

66. Canada, DND, *Canadian Forces Operations*, 2-6.

67. Dr. Milan Vego, *Joint Operational Warfare* (Newport, RI: Naval War College, 2000), I-3.



war or theatre of operations through the design, organization and conduct of campaigns and major operations.”<sup>68</sup> It also ensures that the focus of effort is on the objectives to be accomplished, not on tasks to be achieved or targets to be destroyed or neutralized.<sup>69</sup>

### *Tactical level*

The tactical level of command is the level that directs the use of military forces in battles or engagements. Each of these engagements, be they combat or non-combat activities, should be designed to contribute to the operational-level objectives.<sup>70</sup> This section will demonstrate that the lines between the different levels of conflict are not as clear as the definition portrays. A division or brigade headquarters has traditionally been considered to be at the tactical level. However, both could actually be working at the operational level depending on the joint resources at their disposal and the objectives they must achieve. Although it fits the definition of a tactical-level headquarters, one could argue that Canada’s Joint Task Force Afghanistan Headquarters is an operational-level headquarters due to the inherent joint resources at its disposal and the strategic objectives it has been mandated to achieve.<sup>71</sup>

### **The 21st century operating environment**

This section has introduced two notions thus far. First, CF operational planning doctrine roots stem from the mechanistic influences of industrial-age warfare, and it has not evolved since the cold war. Second, CF doctrine identifies the operational level as the link between strategic goals and tactical actions. This part will now introduce three complexities of the 21<sup>st</sup> century that affect the operational level with a view to debating the suitability of the CF OPP and SOD in subsequent sections.

The 21<sup>st</sup> century offers challenges for military commanders. No doubt these challenges are difficult. The question to ask, however, is if these difficult challenges possess the same properties of complex adaptive systems. Clearly, the Army has recognized this based on the words and terms used to frame the current operating environment in *Land Operations 2021: Adaptive and Dispersed Operations*:

Conflict within this environment reflects the relationships between the underlying actions, structures, and beliefs resident within the conflict. Each dimension must be understood both individually and as part of the larger whole, i.e. in terms of how they affect and are affected by the others. Land operations undertaken to resolve the root causes of conflict in the future security environment must therefore address the multi-threat, multidimensional, multinational, joint and interagency aspects of the operating environment.<sup>72</sup>

This part will examine three realms of the complex operating environment from which complex adaptive systems emerge: globalization and technology, failed states and non-state actors. These notions are not new to the world per se because technology and the phenomenon of failed states, for example, can be found throughout history. However, all three are interdependent and their

68. Canada, DND, *Canadian Forces Operational Planning Process*, 1-3.

69. Vego, *Joint Operational Warfare*, II 6-7.

70. Canada, DND, *Canadian Military Doctrine*, 5-3.

71. Canada, Department of National Defence, “CEFCOM. Our Mission in Afghanistan: Why Are We There?” <http://www.comfec-cefcom.forces.gc.ca/pa-ap/ops/fs-fr/afg-eng.asp> (accessed September 27, 2012).

72. Canada, Department of National Defence, *Land Operations 2021 Adaptive and Dispersed Operations: The Force Employment Concept for Canada's Army of Tomorrow* (Kingston: Directorate of Land Concepts and Design, 2007), 16.

synergistic effect on the environment in which the military operates is indeed reflective of that of a complex adaptive system. Ignoring these interdependencies may permit a nation to win tactical battles, but it will deny campaign success.

### *Globalization and technology*

In *The Utility of Force: The Art of War in the Modern World*, Rupert Smith argues that future conflict will not pin nation versus nation. Rather, future conflict will be characterized as “wars amongst the people.”<sup>73</sup> Demographic trends indicate that population growth will be in the cities of Third World countries; the same area in which continuing state weakness is prevalent.<sup>74</sup>

For Canada, with a history of conducting expeditionary operations in troubled nations, the implications of this operating environment are significant. Adversaries will be fighting for specific social and political conditions rather than the absolute objectives over which political leaders traditionally went to war and, subsequently, resolved through treaties.<sup>75</sup> Fighting will take place among the people in cities and built up areas. Conflicts involving tribal cultures may not necessarily be constrained by national borders and could spill into other neighbouring countries.

Certain technological advances in the past decade have also rendered national borders and social structures transparent. Internet and cell phone cameras “shape the perception of a global audience in near real time. Every action conveys a message, and the interpretation of that message often varies from one audience to another in unintended and unpredictable ways.”<sup>76</sup> Free-flowing information in the form of blogs and websites and offering opinions and stories is now considered a source of information in the same way one would consider a national news programme such as CNN or CTV. As absurd or as credible as this notion may appear, the fact remains that presently there is no way to control its acceptance or refusal.

Globalization and technology have created a complex system that is difficult to predict. State and non-state actors can adapt and exploit technology to leverage both their regional and international influence. One small action, such as the abuse case at the United States prison in Abu Garib, can have synergistic global impact almost instantaneously. The United States Joint Force Command (JFCOM) recognized in 2007 that “an environment influenced by global communications well beyond those controlled by state institutions will only lead to ‘complex’ outcomes.”<sup>77</sup> JFCOM ceased all joint developments in planning doctrine that did not apply the tenets of general systems theory.

### *Failed states*

The origins of a state crisis often lie in failures to govern one or more key constituents in a manner which benefits the population. Figure 2 illustrates both the interdependencies and the complex adaptive system that emerges.

73. Rupert Smith, *The Utility of Force: The Art of War in the Modern World* (London: Penguin Books Ltd, 2005), 267.

74. Canada, DND, *Land Operations 2021*, 4–5.

75. Rupert Smith, 270–71.

76. US, DoD, *Commander's Appreciation*, 6.

77. Canadian Forces College, “Into the Future: Emerging Operational Concepts” (Joint Command and Staff Programme 36 activity package C/DS-543/WAS/LD-06, 2010), n.d.

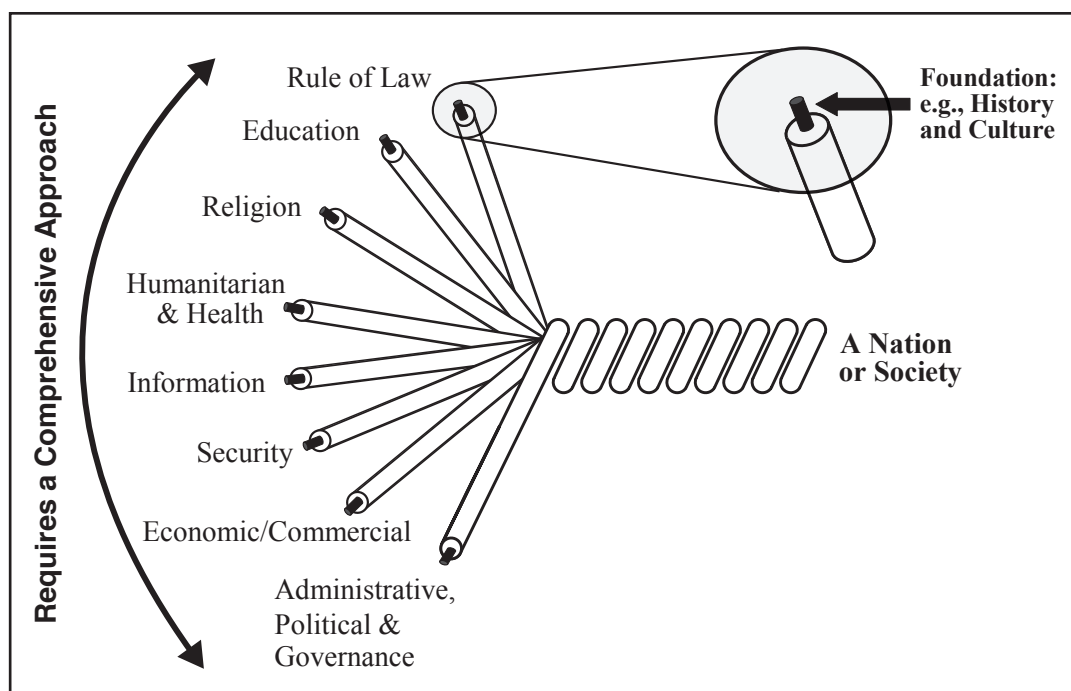


Figure 2. *Environmental complexity*<sup>78</sup>

The constituent parts of a society include but are not limited to rule of law; education; religion; humanitarian and health; information; security; economic/commercial; and administrative, political and governance. These constituent parts are interdependent, and foundations, such as culture and history, are present in each constituent. In each constituent part, there may be issues of perception, inequality, ethnicity, class, gender or religion. It may only take one of these issues, depending on its significance, to act as the catalyst that throws the state into failure. However, solving this conflict is not simply a matter of providing the missing constituent. Every state is subtly different, and they will have developed differing strengths, priorities and interdependencies based on core values provided by their culture and history. These conflicts will involve carefully coordinated and synchronized political and military action.

These tenets, coupled with the influences of globalization, are all currently having an impact in Afghanistan and Iraq. Prior to 9/11 and Operation IRAQI FREEDOM, Robert Leonhard warned that US Army doctrine only focused on the first 30 days of the European theatre and that, despite the requirement to conduct intensive battles, the US Army could not afford to overlook other contingencies and realities of an ensuing campaign.<sup>79</sup>

Only three years after Leonhard's warning, Operation IRAQI FREEDOM demonstrated that although 21<sup>st</sup> century military operations could start out as state versus state conflicts, they can quickly turn into a war among the people when the goals involve the establishment of the missing constituent parts identified in Figure 2.

78. Canada, Department of National Defence, B-GL-300-001/FP-001, *Land Operations* (Ottawa: Department of National Defence, 2008), 5-42.

79. Robert Leonhard, *The Art of Maneuver, Maneuver-Warfare Theory and Air Land Battle* (Novato: Presidio, 1991), 238.

Although Operation IRAQI FREEDOM met the objective of ousting Saddam Hussein's regime in less than one month, the US continues its struggle to rebuild the failed nation of Iraq seven years later. This scenario depicts a key property of general systems design—adaptivity. Removing Saddam Hussein created a power vacuum in the system. Iraq struggles today, as the various elements within and external to the system attempt to fill that void.

Solving such conflicts requires capabilities and resources beyond the realm of a traditional military operation. After a significant number of US air strikes into Afghanistan in November 2001, intended to cripple al Qaeda and Taliban command centres, Milton Beardon, a retired senior US intelligence officer, warned:

As a rule ... [g]etting into Afghan cities, particularly for foreign armies, has always been pretty easy; it took the Soviets less than two weeks to take most of the cities. ... The hard part always has been what comes next. ... So to call the Taliban down for the count because a string of urban centres has fallen, while possibly true, would be needlessly pushing our luck.<sup>80</sup>

Lieutenant-Colonel Lavoie, Commanding Officer 1 Royal Canadian Regiment Battle Group in Kandahar in 2006, argued that the “contemporary operating environment itself, specifically working in an insurgency, poses another whole range of challenges ... such as the difficulty of gaining the necessary intelligence, as well as working in an environment where it is so difficult to differentiate friend from foe.”<sup>81</sup> In failed states, the foe may consist of locals or non-state actors.

#### *Non-state actors*

*While it is useful to hate the enemy you must kill, it is counterproductive to sail into a war armed with hatred but no understanding of your foe's worthiness, skill, or appeal. In bin Laden's case, hate and our unwillingness to talk frankly about Islam have blinded many Americans to the fact that bin Laden has been, in the words of Thomas L. Friedman, “a brilliant and dedicated foe.”<sup>82</sup>*

How does a nation's government address a threat that does not have a place of residence? Globalization has facilitated the emergence of non-state actors who may be funded through international enterprises while harbouring within the borders of failed or failing states. These entities have the ability through technology to command subordinate cells and garner influence across the globe. Such a threat does not possess the properties of a linear system. It is unpredictable, extremely adaptable and relies on synergistic effects to achieve notoriety. The destruction of two US embassies in Africa, the crippling of the US destroyer *Cole* in Yemen, and the attacks on the World Trade Centre and the Pentagon are indicators of a non-state actor's range of military, political, economic and propaganda successes between 1996–2005.<sup>83</sup> Unnamed US officials offered this summary of military operations up to January 2002:

They [bin Laden and al Qaeda] can no longer conceive a new operation in Afghanistan ... we have basically eviscerated their capacity to project power outside Afghanistan. They are now in a survival only mode ... unable to communicate with their global cells ... About all they can do is hide out and not get caught. They are not in a position to conduct operations.<sup>84</sup>

80. Michael Scheuer, *Through Our Enemies' Eyes: Osama bin Laden, Radical Islam, and the Future of America* (Washington: Potomac Books, Inc., 2006), 277.

81. Horn, 231.

82. Scheuer, 281.

83. Ibid., 230.

84. Ibid., 273.

Normative thinking is preventing military practitioners, and arguably political leaders, from viewing the problem with an open mind and first defining the actual problem before taking action to solve it. “Tragically, many American experts have displayed simple laziness in their research and have fallen back on ... analysis by assertion. They have not for example read what bin Laden has written.”<sup>85</sup> As such, the West takes action to solve an ill-defined problem.

### Impact on operational commanders

There is a common theme throughout the three tenets of the 21<sup>st</sup> century operating environment: complexity. The military practitioner’s quest for full understanding of the operating environment at the start of an operational planning process is becoming increasingly illusive. The operating environment indeed displays the adaptive nature inherent to Bertalanffy’s theory. As such, militaries have struggled with operations such as counter-insurgencies, non-state actors and the war of public opinion because of the inability to accurately frame the problem. When a military problem is not properly framed, tactical actions do not align with the strategic intent. A design and planning tool is required to bridge that fault line. Equally important is a paradigm shift in the way military practitioners think about the operational problem.

### Summary

This section has demonstrated that the current operating environment possesses the characteristics inherent to that of Bertalanffy’s complex adaptive system model. CF doctrine also acknowledges that the operational environment is indeed a complex problem. Although the CF has provided new capabilities and technology to address the challenges, one critical doctrinal tool remains absent: a cognitive planning tool. The quest for full understanding of the operating environment at the start of an operational planning process is becoming increasingly illusive. Therefore, such a cognitive planning tool must acknowledge this fact in order to permit the commander to conduct relevant operations within the operating environment.

The next section will examine the CF OPP, the current planning tool employed at the operational level to address the complexities inherent to 21<sup>st</sup> century conflict. The basic steps will be addressed to understand the interaction between the staff and commander and the products that will emerge. Finally, the benefits and deficiencies of the CF OPP will be analysed within the frame of this complex operating environment.

## 4. CF operational planning process

### Introduction

*The essence of operational design is to apply joint effects in a manner in which friendly strengths are brought to bear on enemy weaknesses, friendly weaknesses are shielded and the enemy is outmanoeuvred in time, space, and legitimacy, forcing him into a position from which the only option is capitulation.*<sup>86</sup>

The essence of operational design, as articulated above, is a legitimate comment, but it is not necessarily complete for today’s operating environment. For example, it refers to only two contenders in the battlespace: the friendly force and the enemy opponent in isolation. This section will draw upon the foundations of Bertalanffy’s general systems theory and the normative decision-making

<sup>85</sup> Ibid., 280.

<sup>86</sup> Canada, DND, *Canadian Forces Operational Planning Process*, 2-8.

model to examine the CF OPP currently employed to address the operational-level complexities introduced in the previous sections. The first part will examine the genesis of operational design and the role of the CF OPP. The five steps of the CF OPP will then be introduced in sequence. Last, this section will expose three specific limitations of the CF OPP at the operational level: the ambiguous notion of the centre of gravity, linearity and the stifling of commander and staff creativity.

It should be noted that terminology varies throughout the different references used in this section. “Operational design” and “campaign design” are used synonymously throughout *Canadian Forces Operational Planning Process* for example. The nouns “plan” and “design” also appear to be interchangeable. This section will maintain standard CF definitions and terms where possible, with the understanding that terminology and the definitions of specific terms may vary between nations and publications. The confusion caused by these ambiguities will be addressed as a topic of the analysis section.

### The genesis of Canadian Forces operational planning process

This paper has already identified that the CF OPP is employed by operational-level headquarters to translate strategic political intent into conventional campaign plans. How does the CF OPP actually facilitate this process? *Canadian Forces Operational Planning Process* attests that it is deliberately “designed to optimize logical, analytical steps of decision making in conditions of uncertainty and ambiguity.”<sup>87</sup> Lieutenant-Colonel Dalton contends that it “emerged out of efforts to solve a particular military problem; namely, how to overcome the challenges initially manifested during the ‘epoch of imperialism’—large-scale, state on state, mechanized warfare.”<sup>88</sup> The CF OPP has since evolved into its latest form during the cold war. Its current form is a linear analytical process that incorporates both design and planning. Before the actual steps of this process are discussed, it is important to conceptualize the expected result of the CF OPP—the campaign plan.

Operational design, or campaign design, is a product that is created within the steps of the CF OPP. Figure 3 is the graphical representation of an operational design taught by the Canadian Forces College. The design depicts a number of triangular decisive points (DP) representing critical events synchronized in time along horizontal lines of operation that will pave the way to the commander’s end state. Lines of operation help visualize the different types of operations that are taking place simultaneously, as shown in Figure 3.<sup>89</sup> The different lines of operation allow the commander to coordinate efforts and resources in time and space in order to achieve the objectives mandated by the strategic level, depicted in Figure 3 as circles. The centre of gravity (COG) is a notion established by Clausewitz referring to “dynamic and powerful physical or moral agents of action or influence that possess certain characteristics and capabilities, and benefit from a given location or terrain.”<sup>90</sup> By defeating the enemy COG, the model insists that the enemy will capitulate and the end state will be achieved.<sup>91</sup> The terminology and the linear framework of the operational design are indeed reflective of the CF OPP’s Napoleonic roots. Before further analysis takes place, the steps of the CF OPP will be discussed.

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87. Ibid. 3-1.

88. Dalton, 11.

89. Dr. Jack Kem, *Campaign Planning: Tools of the Trade*, 2nd ed. (Fort Leavenworth: U.S. Army Command and General Staff College, 2006), 31.

90. Dr. Joe Strange and Colonel Richard Iron, “What Clausewitz (Really) Meant by Center of Gravity: Understanding Centers of Gravity and Critical Vulnerabilities,” *Joint Force Quarterly* no. 35 (October 2004): 15, <http://www.ndu.edu/press/lib/pdf/jfq-35/JFQ-35.pdf> (accessed September 27, 2012).

91. Canada, DND, *Canadian Forces Operational Planning Process*, 2-1.



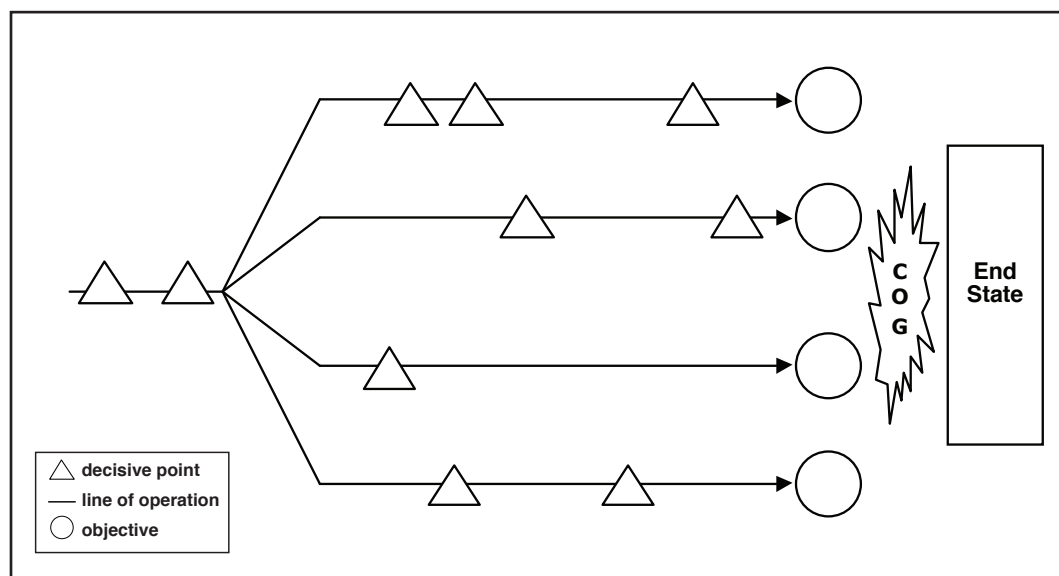


Figure 3. Graphical representation of a campaign design<sup>92</sup>

### The steps of the CF OPP

This subsection will now discuss the steps of the CF OPP: initiation, orientation, course of action (COA) development, plan development and plan review. Each of these five steps contains several subfunctions. The process is commander-led, in that the commander provides their overall intent to the staff and the staff then conduct the analysis and produce the different options, or COA, for the commander's choosing.<sup>93</sup>

#### Initiation

During this step, the commander will receive strategic guidance and, in turn, will issue initial planning guidance to their staff in order to focus the staff's preliminary study of the situation and to develop strategic-level intent.

#### Orientation

Orientation is the next and most critical step of the CF OPP in terms of operational design. As such, more emphasis will be placed on this step than the others. Orientation has two objectives: it determines the nature of the problem, and it also confirms the results to be achieved.<sup>94</sup> Two deliverables or products emerge out of the orientation step: the mission analysis briefing and the commander's planning guidance to their subordinate command elements. This paper will not examine the latter because the details within that planning guidance are simply the results of the mission analysis process.

92. Caanda, Department of National Defence, *Canadian Forces College Guide to CF Operational Planning Process* (Toronto: Department of Exercises and Simulation, 2010), G-4/17.

93. Lauder, 42.

94. Canada, DND, *Canadian Forces Operational Planning Process*, 4-4.



The mission analysis briefing is prepared and then articulated to the higher-level headquarters. The briefing itself, although important, is not the focus. The mission analysis is the focus. It represents the culmination of staff work to ensure that the commander's operational design, a product of this step, meets the strategic-level intent and end state. The descriptions of the mission analysis provided in *Canadian Forces Operational Planning Process* and *Canadian Forces College Guide to CF Operational Planning Process* can be summarized as follows:

- a. The commander and staff review the situation in order to frame the problem. This involves “a first look at environmental, political, and geographic factors ... [and] a review of enemy and friendly forces, administrative, logistic and command and control factors ... .”<sup>95</sup>
- b. Next, the commander and staff review the strategic-level intent and envisioned end state, focusing on: critical facts and assumptions, any limitations imposed by the higher headquarters that may limit the commander's freedom of action, an analysis of the strengths and weaknesses of friendly and enemy forces, the commander's tasks assigned by the higher headquarters and those implied tasks that are required to achieve the assigned tasks, the stated objectives and end state that describe the accomplishment of strategic-level goals, and the level of risk the commander is willing to accept in order to achieve them.<sup>96</sup> It is critical that these factors be understood by the commander and their staff for they will become the foundation on which the operational design is constructed.

#### *Course of action development*

Having determined the nature of the problem in step two, step three focuses on course of action development to solve the problem. A comparison of these COAs takes place such that the commander can select the best COA to further develop into a plan. This selection process is carried out by comparing the viability of the COAs against specific selection criteria devised by the commander in their planning guidance from the orientation step.

#### *Plan development*

Step four, plan development, is dedicated to the development of the selected COA. The staff prepares the plan and the products, such as orders, annexes and any other supporting information that is required.

#### *Plan review*

Last, step five is the plan review. Here, the staff conducts a review of the campaign design and the detailed plan. This may include an exercise or a war game. If required, the commander and staff may reinitiate the CF OPP or make amendments or changes to the plan to guide the plan towards the intended end state.

### **Analysis of OPP**

The five steps of the operational planning process are similar to those across the majority of Western militaries. The CF OPP is a product of practical experience and theory, and it does have strengths. First, the CF OPP was deliberately designed to be a simple process, a hangover from the massed militaries of the post-industrial age where the headquarters was seen as a number of interchangeable parts. This notion makes sense because replacements, new staff or new commanders can take over with minimal loss of corporate knowledge. This particular strength of the CF OPP

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<sup>95</sup> Ibid., 4-5.

<sup>96</sup> Canada, DND, *CFC Guide*, II-9/17.

will be examined further when the CF OPP is compared to the SOD in Section 7. As well, the CF OPP forces the military planners to analyse a problem in detail. One could also argue that having the staff develop a number of COAs, three being the accepted norm, serves to validate the commander's original intuition for their campaign design. However, by importing the planning process from the US, the CF has also imported the problems and the deficiencies associated with it.<sup>97</sup> This subsection will simply discuss three specific shortfalls of the CF OPP with a view to recommending solutions in subsequent sections.

### *Centre of gravity*

There are two challenges that emerge from the notion of the centre of gravity. First, after 300 years of translation and interpretation, the quest to understand what Clausewitz actually meant by the notion of the centre of gravity has turned into analysis by assertion. *Canadian Forces Operational Planning Process* defines the centre of gravity as follows:

The centre of gravity is defined as “characteristics, capabilities or localities from which a nation, an alliance, a military force or other grouping derives its freedom of action, physical strength or will to fight.” ...

... Centres of gravity can be considered at the strategic, operational and tactical levels of conflict.<sup>98</sup>

In contrast, Dr. Joe Strange, the originator of the Strange Analysis used by the Canadian Forces Joint Command and Staff Programme to analyse enemy and friendly force strengths and weaknesses in the orientation step, argues that “Clausewitzian centers of gravity are not characteristics, capabilities or locations. They are dynamic and powerful physical and moral agents of action or influence with certain qualities and capabilities that derive their benefit from a given location or terrain.”<sup>99</sup>

Despite the fundamental differences of opinion on the 300 year-old notion, the CF OPP dogmatically relies on the selection of the correct enemy centre of gravity in order to build an operational design that is focused on destroying it. This reliance is further complicated by the fact that the enemy did not provide their centre of gravity to the friendly force commander. Rather, the friendly force staff, through a filtered lens of Western values, customs and experiences, must decide upon the enemy's centre of gravity using the linear analytical process in step two of the CF OPP. This raises the question of the validity of the centre of gravity and the magnitude of effort that is focused towards its destruction.

To further complicate the notion of the centre of gravity, counter-insurgency and peace support operations require further identification of a centre of gravity for each of the key parties in the conflict. The doctrinal ambiguity surrounding the centre of gravity becomes more apparent.

There may be more than two centres of gravity in a [peace support operation] PSO as there will be one for each political entity in the mission area. Centre of gravity analysis in complex PSO should not merely focus on the application of military force. While used to seek lines of operations that will provide leverage in ensuring continuing compliance with the mandate, those selected must have a direct relation to the political entities [sic] structural characteristics.<sup>100</sup>

97. English, 31.

98. Canada, DND, *Canadian Forces Operational Planning Process*, 2-1.

99. Strange and Iron, 27.

100. Canada, DND, *Peace Support Operations*, 6-9.

How does the linear operational design in Figure 3 address multiple parties with multiple centres of gravity? In Figure 3, all friendly force activities and objectives are designed to destroy one enemy's centre of gravity. Therefore, once the centre of gravity has been destroyed, the operational design implies that the end state will be achieved. This is a dangerous notion when applied to operations other than a conventional conflict. Lieutenant Colonel Echevarria addresses this notion in his *Naval War College Review* article:

The industrial-age paradigm of warfare, in which the distinction between the strategic, operational, and tactical levels is inviolate, needs to be replaced with one that regards all activities of war as interdependent. Clausewitz did not distinguish between tactical, operational, or strategic centers of gravity; he defined the center of gravity holistically—that is, by the entire system (or structure) of the enemy—not in terms of level of war.<sup>101</sup>

Echevarria recognizes the danger in viewing the centre of gravity as a Newtonian element in a linear system that can be isolated and subsequently removed. This Newtonian view also assumes that the enemy centre of gravity remains constant throughout the entire campaign and that it is not affected by external influences. In other words, it is not considered part of a complex adaptive system. However, similar to the friendly force, the enemy force is likely doing everything possible to protect its centre of gravity. Referring back to the theory of complex adaptive systems, if the enemy force centre of gravity is truly the source of its freedom of action and will to fight, then the centre of gravity will adapt and change over the course of the campaign in order for the enemy force to survive. This creates a challenge for the commander conducting a campaign whose actions are not focused on the emergent enemy centre of gravity, but on the original perceived centre of gravity. As such, Echevarria's statement also includes the recommendation to adopt a holistic systemic approach when considering enemy strengths and weaknesses vice the reductionist approach inherent in the CF OPP.

### *Linearity*

*The idea of “organized chaos” reflects the constant contradiction between the random nature of such operations and the traditional trend to institutionalize their study in scientific patterns.*<sup>102</sup>

The CF OPP follows the same essential steps inherent in the Janis and Mann model introduced in Section 2, a reductionist decision-making model established to solve problems of limited complexity and, when sufficient time is available, to conduct such a process. For instance, the problem is identified, a range of options are created, these options are weighed against each other and a suitable option is selected. It is thorough and will likely result in a reliable decision given sufficient time to conduct the thorough analysis it is designed to achieve.<sup>103</sup> As such, the argument that the CF OPP is not linear, because the staff can always return to a previous step, is irrelevant. The term “linearity” should not be confused with terms “sequential” and “iterative.”

Klein also insists that “this process is more helpful for beginners than for experienced decision-makers” because this process forces the inexperienced decision maker to conduct a detailed analysis of all of the facts prior to making a decision.<sup>104</sup> If this tool is more beneficial for the inexperienced decision maker as Klein argues, would not an experienced commander and their staff at the operational level be burdened by such a rigid planning tool in a complex operating environment?

101. Lieutenant Colonel Antulio Echevarria, “Clausewitz’s Center of Gravity: It’s Not What We Thought,” *Naval War College Review* (Winter 2003), <http://www.usnwc.edu/Publications/Naval-War-College-Review/2003---Winter.aspx> (accessed September 27, 2012).

102. Naveh, 8.

103. Klein, 26.

104. *Ibid.*, 6.

Lauder confirms this notion. The number of formal rigid substeps within the five main steps of the CF OPP “encourages planners to view each step of the process as independent and sequential, which implies that each step should be treated as discrete and not used to inform subsequent steps.”<sup>105</sup> Lieutenant Colonel Hoskin, an Australian Army officer, also supports this notion:

the process is biased towards analysis and determinate judgments, which is unrealistic in terms of the likelihood of complete and accurate information being available, and also in terms of the intuitive decision-making processes actually used in practice.<sup>106</sup>

The burden caused by the inherent rigidity and formality explains why commanders and staffs “tend to deviate from the formal OPP (as it is written doctrine) in an operational setting, often modifying the process or, in some cases, completely abandoning the OPP in favour of naturalistic approaches.”<sup>107</sup>

From an operational design perspective, the representation in Figure 3 reflects the same rigidity inherent to the planning process. The notion that key events can be forecasted and synchronized sequentially along distinct lines of operation, with a view to destroying the enemy’s centre of gravity, contradicts the very characteristics that define conflict in the first place: complex and unpredictable. Therefore, it can be concluded that, although the CF acknowledges the inherent systemic complexities of conflict, it only offers the commander and their staff a normative and linear planning tool rather than a cognitive tool to deal with these complexities.

#### *The CF OPP: Enabler or anchor?*

The complex nature of the current operating environment creates problems of command that are not necessarily present or relevant in a conflict that pins one nation’s military against that of another. Despite two decades separating the end of the cold war and today, *Canadian Forces Operational Planning Process* still attests that the principles that design a campaign should remain the same across the entire spectrum of conflict, highlighted earlier in Figure 1, and therefore, the CF OPP in its current form also applies.<sup>108</sup> Despite changes in the operating environment, doctrine continues to force the proverbial square peg into a round hole. That is to say, current doctrine attempts to use a linear planning process to solve complex problems.

This dilemma becomes apparent during step three of the CF OPP. If the headquarters fails to properly frame the problem, the headquarters will continually be forced to return to the mission analysis in step two throughout the entire process. One may argue that this is a positive characteristic of the CF OPP’s iterative process. However, it is not efficient. Specifically, the key factors are analysed in isolation during step two, but they are not actually synchronized and studied holistically until step three during the COA development. This dilemma can be mitigated by very thorough liaison and coordination between the different staff. Ironically, the process preaches constant coordination between branches, but the planning process is designed to have the different branches working on concurrent pieces of the puzzle in isolation.

Furthermore, the CF OPP framework puts the commander and key staff in a precarious position. On one hand, the commander is required to provide guidance and a vision of the campaign plan well before the detailed framing of the problem has even occurred. Does the commander’s vision

105. Lauder, 43.

106. Lieutenant Colonel Rupert Hoskin, “The Ghost in the Machine: Better Application of Human Factors to Enhance the Military Appreciation Process” (Canberra; Land Warfare Studies Centre, 2009), 12.

107. Lauder, 43.

108. Canada, DND, *Canadian Forces Operational Planning Process*, Chapter 2.

of the design, around which the staff will construct the operational design, come first? Or does the operational design emerge as a result of the detailed analysis after step two? Dalton identifies this particular deficiency: “one could argue that no distinct design process exists. From a theoretical perspective this is interesting because it suggests that design emerges as a result of planning, a teleological process that is linear, deterministic and reductionist.”<sup>109</sup>

On the other hand, the CF OPP is also designed to allow the commander to be absent. Having provided initial guidance in step one, the commander relies upon the breadth and depth of experience of their key staff. Staff updates to the commander will obviously occur throughout the planning process, but again, the process is neither efficient nor does it facilitate the exercise of operational art. “While theoretically an efficient process, in practice the commander’s ability to personally influence the process is less than ideal ... [and] planning time is wasted. It also fails to prepare the commander for subsequent intuitive decision-making.”<sup>110</sup>

Finally, what aspect of the CF OPP permits the commander and their staff to deal with an environment where the lines between the strategic, operational and tactical levels are blurred? For instance, the CF Joint Task Force Headquarters currently serving under the ISAF mission in Afghanistan is responsible for providing traditional military security, facilitating governance through a 300-person provincial reconstruction team consisting of Department of Foreign Affairs and Canadian International Aid representatives, and providing training and mentoring to both the Afghan National Army and Afghan National Police services.<sup>111</sup> *Peace Support Operations* clearly identifies this challenge:

The conduct of PSO is likely to be politically highly charged, and strategic and operational level [sic] considerations may have a considerable and disproportionate effect, even at the lowest tactical level. There could be a tendency for the operational and tactical levels of command to overlap as individual incidents assume a high profile in political terms. Each national contingent is likely to have separate national command arrangements which could affect many aspects of the operation, particularly if sudden and unexpected escalations of violence occur which place new demands upon the military force.<sup>112</sup>

Unfortunately, the only advice provided to commanders by CF doctrine is to conduct more frequent plan reviews and a wider range of branches and sequels during the campaign plan.<sup>113</sup> This advice is inefficient and could potentially overwhelm the operational planning process as it was intended.

Despite the concept of logical, in place of physical, lines of operation in the 2001 version of FM 3-0, planners of the ongoing counterterrorism campaign face the same challenges as planners of peace-support operations in the Balkans. Today’s doctrinal concepts ... hamstring planners’ and commanders’ abilities to design and conduct effective, coherent campaigns for operations across the spectrum of conflict in today’s security environment.<sup>114</sup>

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109. Dalton, 22.

110. Hoskin, 12.

111. Canada, DND, “CEFCOM. Our Mission in Afghanistan.”

112. Canada, DND, *Peace Support Operations*, 6-10.

113. Ibid., 6-9.

114. Greer, 23-24.

## Summary

Although the CF OPP has its strengths as a thorough analytical tool, today's operating environment highlights its critical deficiencies. Specifically, the ambiguity surrounding the centre of gravity poses a risk to the planning process. Despite the varying definitions of the centre of gravity, doctrine still dogmatically forces the commander to identify that of the enemy and orient a campaign plan around its destruction. Second, this section demonstrated that the CF OPP is very much a linear analytical tool that is ideally suited for complicated, not complex, problems that require detailed reductionist analysis. It is not suited, however, for commanders and staff, all of whom have inherent decision-making experience based on the ranks they have achieved, in situations that are not defined as linear. The last deficiency of the CF OPP relates to the process itself. Today's operating environment requires a tool that goes beyond simply identifying and analysing factors in isolation.

A tool that enables the commander to understand the operating environment holistically, including the acknowledgement of relationships between the groups in the operating environment, will not only better frame the problem but will also facilitate an achievable solution. The next section will introduce and analyse SOD, an alternative planning tool designed to address the complexities of the operating environment.

## 5. Systemic operational design

### Introduction

Systemic operational design emerged out of necessity. The IDF fell victim to operational-level planning doctrine that did not keep pace with the operating environment in which Israel had been operating. As such, the IDF experienced difficulties over the past three decades linking its tactical operations to strategic political aims.<sup>115</sup> A complete overhaul of its operational-level planning doctrine was undertaken to inculcate cognitive planning tools designed specifically to address the complexities inherent in the 21<sup>st</sup> century environment.<sup>116</sup>

Drawing upon the foundations of Bertalanffy's general systems theory and the naturalistic decision-making model from Section 2, this section will introduce the elements of SOD and demonstrate how it addresses those complexities faced by operational-level commanders. The first part will examine the genesis of SOD in Israel and the momentum it has recently gained at the US Army Command and General Staff College. Systemic operational design's characteristics and its different levels of discourse will then be introduced in sequence. Finally, this section will demonstrate how SOD addresses the same three operational-level deficiencies inherent to the CF OPP: the ambiguous notion of the centre of gravity, linearity as well as the stifling of commander and staff creativity.

### Genesis of systemic operational design

Section 2 highlighted the emergence of general systems theory as a means of addressing complex problems not readily explainable by previous scientific analytical models. Although Bertalanffy is credited with establishing the body of general systems theory, retired IDF Brigadier General Shimon Naveh is credited with establishing its military application in the form of SOD. Naveh's interest in systems theory began out of frustration with how operational-level analysis and campaign design were understood and taught to Israeli officers. "His examination of the role cognition plays

115. Dr. Milan Vego, "A Case against Systemic Operational Design," *Joint Force Quarterly* 53 (2<sup>nd</sup> quarter 2009): 70.

116. Sorrells, 5.



with the conceptualizing of operational art led both him and the ... IDF to realize in 1992 that they had let their knowledge of the concept of operational art drift.”<sup>117</sup>

Operational failures in Lebanon, the West Bank and the Gaza Strip supported his argument. In fact, Naveh's argument was so convincing the IDF established the Operational Theory Research Institute, as well as the School of Operational Command, in order to educate the IDF in the lost notion of operational art.<sup>118</sup> SOD was officially adopted by the IDF in 2000 and is still considered in its infancy. Due to the classification level and lack of English documents, very little Israeli doctrine is available for detailed analysis. As such, the concept and tenets of SOD will serve as the launch point to debate its usefulness as an alternate or reinforcing tool to the CF OPP. Prior to examining the seven discourses that form the process of SOD, it is important to understand the underlying principles by which SOD is guided.

### Elements of SOD

First and foremost, Section 2 indicated that a system continually seeks to adapt to its environment in order to survive. Therefore, any system can be destroyed if it cannot adapt to its environment. Destruction can occur in one of two ways. First, a system can be forced into equilibrium, or a steady state, such that it will no longer react to change and will become irrelevant. Second, the system can be thrown into chaos when it can no longer adapt quickly enough to the changes occurring in and around it. SOD seeks to achieve disruption of the enemy by injecting energy into the system, by learning from the reactions of the system, and by then adapting to the reactions. Energy refers to the conduct of military actions in the operating environment, be they kinetic or non-kinetic. Operational shock is the term Naveh uses to describe the enemy's paralysis as a result of this cycle.<sup>119</sup> In this case, “operational manoeuvre” may be viewed as a means of learning about the enemy's system by making them react, rather than for a deterministic operational effect in the classical sense of the term.

Second, in order to achieve the operational shock and the inherent operational objectives laid out by the strategic guidance, SOD focuses on problem framing rather than problem solving. Although subsequent parts will examine the differences between operational design and operational planning in detail, at this stage it must be understood that problem solving is a subsequent and subordinate step to problem framing and design. As such, the complex operating environment must be viewed as an abstraction rather than a Newtonian mechanism that can be reduced down to its individual components and analysed in isolation. By breaking down the operating environment, there is an inherent risk of losing sight of the dynamic relationships that exist between elements such as the enemy's forces, the friendly forces, the population, international agencies as well as the economy and stability.<sup>120</sup>

Third, SOD is reflective of Bertalanffy's theory in that it acknowledges that it is impossible to fully understand the operating environment and players within. Systemic operational design also acknowledges that characterizing an operating environment and its parts is in itself subjective; it is affected by the military practitioner's political, social, cultural and economic views. The military practitioner must also acknowledge that they are actually immersed in the operating environment and that they influence it by their very actions. Therefore, SOD relies upon a flexible and broad operational design, deliberately avoiding predictions or deterministic sequenced events.

117. Ibid., 42.

118. Major Jelte R. Groen, “Systemic Operational Design: Improving Operational Planning for the Netherlands Armed Forces” (Fort Leavenworth: United States Army Command and General Staff College, 2006), 21.

119. Naveh, 17–18.

120. Sorrells, 15.



Designing permits flexibility for the commander to learn about the operating environment and to make the necessary changes to the design as the system emerges and as their level of understanding increases.<sup>121</sup> Dalton supports this notion: “design is a process that enables the development of a hypothesis—an operational design—that bridges the strategic and tactical levels of thought and provides planners with a temporary determinate space within which to plan, execute and learn.”<sup>122</sup>

Finally, SOD is command centric. The commander is involved intimately with their staff throughout the design process to ensure that their knowledge, experience and intuition are imparted on the staff and the design. The commander is also intimately involved because they play an important role in the learning process. Through discourse, learning occurs. The discourse sessions must facilitate open and critical discussion among the key staff and commander. Rank and seniority are not constructive tools in the discourse, and the staff must be permitted the candour that critical discourse deserves. The commander will also be in constant discussion with the strategic-level headquarters to ensure that problem definition continues. Throughout the process, the discourses are recorded for future reference.

### Discourses of SOD

There are seven discourses or steps of SOD. The first four discourses serve to gain an understanding of the system. The remaining three focus on the actual designing of and planning for the operation. Each discourse is guided by several sets of questions. These questions are not intended to be followed and answered one by one but are meant to facilitate a discourse. Each discourse has a particular role and expected output that serves to influence the operational design. Each discourse is analogous to formal brainstorming as opposed to a linear or sequential step in a larger process. Because SOD is guided by continual learning and adaptation, it is expected that the commander and staff will revisit particular discourses based on the emergence of new information and better understanding. The seven discourses are:

- a. for understanding the system:
  - (1) system framing;
  - (2) rival as rationale;
  - (3) command as rationale; and
  - (4) logistics as rationale; and
- b. for designing and planning the operation:
  - (1) operation framing;
  - (2) operational effects; and
  - (3) forms of functions.<sup>123</sup>

#### *System framing*

Problem definition and subsequent planning cannot occur until the problem has been framed to a scope that is manageable for the operational commander. The United States Army Training and Doctrine Command (TRADOC) views the art of system framing as “the art of seeing the essential and relevant among the trivial and irrelevant, penetrating the logic of the broad received mission and

121. Groen, 40.

122. Dalton, 35.

123. For an image of the model, see Lauder at <http://www.journal.forces.gc.ca/vo9/no4/08-lauder-eng.asp> (accessed September 27, 2012).

its messy contextual situation, and reshaping it into a well-enough structured working hypothesis.”<sup>124</sup> The purpose of system framing, therefore, is to put the strategic guidance and the nature of the operating environment into context. By framing the conceptual system, the commander and their staff then have a common starting point for mutual understanding.<sup>125</sup>

The design team, which includes the commander, should strive to answer the following question: What in the system has changed to merit the issuing of strategic guidance? To do this, the design team needs to frame the problem by putting a hypothetical boundary around all of the elements that have an impact or influence on the problem. Elements should include, but are not limited to, the strategic guidance and objectives as well as the cognitive connections and relationships of the friendly force, enemy force, any other actors and the environment. The hypothetical boundary is likely going to be a smaller, more manageable system including only those elements which have a bearing on the strategic intent.<sup>126</sup>

There are two outcomes of this discourse. First, discourse among the design team and also with the strategic headquarters will facilitate better understanding of the problem and provide a common frame of reference for further development. Second, the discourse is recorded to capture the thought process and logic of the discourse. It can be captured as a combination of narrative and diagrams. It will be used to inform the next discourse.

#### *Rival as rationale*

The role of rival as rationale is to examine the conceptual framework of the rival's system.<sup>127</sup> The rival is not merely the enemy force in the classic sense. Systemic operational design deliberately views the rival to be any condition or element that must be disrupted or influenced in order to achieve the operational objectives.<sup>128</sup> Therefore, the design team must understand the rival's operational intent and reason for its behaviour within the system. The team must also examine the significance of different capabilities, values, goals and practices between the rival and the friendly force in order to build the cognitive relationships and tensions within the system.<sup>129</sup> In stability operations, for example, discourse must include all of the organizations and conditions that could pose threats to friendly force activities. The discourse must investigate the tensions internal to the organizations and between the organizations such that a holistic systemic picture may be drawn. The product of this discourse is a running narrative, again a combination of narrative and rival organization graphics.

#### *Command as rationale*

The role of command as rationale is to determine the tensions between the existing command structure and the system in order to determine a suitable command structure for the operation.<sup>130</sup> Here, the design team must critically analyse the assumptions and objectives provided by the strategic headquarters in order to ensure that the conceptual command structure meets the demands of the strategic guidance. Likewise, rigorous assessment of the rival's capabilities should be compared against the conceptual command combinations in order to highlight any deficiencies or omissions.<sup>131</sup>

124. US, DoD, *Commander's Appreciation*, 21.

125. Sorrells, 20.

126. United States, Department of Defense, *Systemic Operational Design: Designing Campaigns and Operations to Disrupt a Rival System* (Virginia: US Army Doctrine and Training Command, n.d.).

127. Ibid., 16.

128. Lauder, 46.

129. Major Patrick E. McGlade, “Effects-Based Operations versus Systemic Operational Design: Is There a Difference?” (Ohio: Air Force Institute of Technology, 2006), 23.

130. US, DoD, *Systemic Operational Design*, 17.

131. Groen, 33.

The products of this discourse should include the running narrative and graphical command and control organization graphics.

### *Logistics as rationale*

The role of logistics as rationale is to examine the tension between the existing logistical structures and that required to meet the challenges of the design.<sup>132</sup> The aim of this step is to identify the means to sustain the structure of the design within the limits or restraints of the logistics capabilities.<sup>133</sup> Lauder identifies three specific areas to which the design team must focus: strategic mobilization, strategic-operational deployability and operational sustainment.<sup>134</sup> The design team must determine that the logistics system can provide the adequate resources, troop levels and delivery mechanisms in order to support the developing COA. The end result of this discourse is to identify and adapt existing procedures and sustainment methods which will provide the means to execute sustainment of the friendly force in the structure of the design.

### *Operation framing*

In the first discourse, system framing, the scope of the problem was narrowed down into the operational framework. Operation framing narrows the problem further in order to focus on the design of the operation itself and to provide the key ideas of how to conduct the operation. Friendly components are arranged in time and space to give structure for the movement of forces in relationship to the rival. Because the operation is not deterministic in the classic sense, the operation is viewed as the first of many operations that will eventually force the system in a state desired by the strategic-level headquarters. Therefore, this step has a short-term focus. Systemic operational design is not concerned with a clearly defined end state because a system will continually adapt to change. Therefore, after each operation, a re-evaluation of the situation must take place to reassess if the system is changing and moving in the direction desired by the commander.<sup>135</sup>

### *Operational effects*

The purpose of operational effects is to enable the achievement of the strategic goal. This discourse converges even more on the actual operation. The interrelated elements of the rival and the friendly force will be the point of initiation for learning through military action. The design team must understand the components of the rival so they can judge the form and the procedures to break apart the rival into an easily understood structure.

### *Forms of function*

This last discourse permits the commander to provide the design team the specifics of the COA. This last discourse also permits the design team to commence the actual planning process with the planning team in order to develop the COA into a plan. The design products, the collection of staff data and the COA are presented to the planners through discourse. As Groen highlights: “the discourse with the planners is in fact a test of the design. If the planners have a clear understanding of what is required of them, they start translating the design into an executable plan.”<sup>136</sup>

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132. Ibid.

133. McGlade, 23.

134. Lauder, 47.

135. Groen, 34.

136. Ibid., 37.

## Analysis

As with any emerging concept, SOD can be easily met with scepticism simply because of its fundamental differences with classical operational design. First and foremost, the vocabulary of SOD is foreign to Western military practitioners and could be cause for immediate mistrust or scepticism. This is certainly the view of Vego, a proponent of the classic operational planning methods. He affirms that the vocabulary used by SOD advocates is essentially “unintelligible” and that doctrine with unintelligible vocabulary is dangerous.<sup>137</sup> Vego’s concern is indeed credible. For 300 years, Western militaries have had the luxury of maintaining the same vocabulary developed by Jomini and Napoleon.

The second challenge facing Western militaries is their limited exposure to, if not complete absence of, any education in general systems theory (GST). Although the concept of systems theory is relatively easy to grasp, the military application of GST demands that designers and planners have a deeper understanding of the scientific and philosophical roots. Naveh and Vego both attribute Israel’s 2006 failures in Lebanon to this issue. Israeli senior officers applied SOD without the adequate level of understanding of GST, resulting in operational-level plans and orders that were ambiguous and tactically unsound.<sup>138</sup> Bearing these two shortfalls in mind, this subsection will now demonstrate how SOD addresses the three specific shortfalls of the CF OPP: ambiguity of the notion of the centre of gravity, linearity and its effectiveness as a process.

### *Centre of gravity*

SOD does not paint the commander into a corner; they are not forced them to choose the enemy centre of gravity before they have developed an understanding of the enemy force and the operating environment. Rather, SOD views the centre of gravity as a moment in time and space during the operation where the enemy is unknowingly exposed. The commander can achieve operational shock and then subsequently neutralize the enemy by striking at that location at the right moment in time and space.<sup>139</sup>

This is not actually a new concept but is one that evolved from the Soviet deep battle concept during the interwar years of the 1930s.<sup>140</sup> The roots of GST are in this concept because it acknowledges two important notions up front. First, the friendly force does not have complete understanding of the enemy force. Second, not only is there a lack of understanding, the enemy force continually adapts to protect itself and to exploit the weaknesses of the friendly force. The notion of “complexity arises somewhat paradoxically from the same conditions because it is exactly this non-linearity that presents the possibility of obtaining a disproportionate leverage from a given action.”<sup>141</sup>

Therefore, the centre of gravity cannot be viewed as a predetermined inanimate object. Rather, it is a moment in time and space identified through commander’s intuition where the conditions favour the friendly force to exert the devastating blow to the unknowing enemy. In this case, the application of commander’s intuition, deception and manoeuvre encapsulates the spirit of operational art, even in the classical sense.<sup>142</sup>

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137. Vego, “A Case against Systemic Operational Design,” 75.

138. Ibid., 73.

139. Naveh, 19.

140. Jacob Kipp, “Two Views of Warsaw: The Russian Civil War and Soviet Operational Art, 1920–1932,” in *The Operational Art* (see note 4), 63–64.

141. Edward Allen Smith, 8.

142. Naveh, 19.

*Linearity*

Systemic operational design addresses the dogma of linearity simply by the nature of its design. It assumes uncertainty, and therefore, the operating environment and strategic guidance require constant reframing. Therefore, the centre of gravity is not used in the Jominian sense because a complex system involving human interaction renders such an entity impossible to identify. Systemic operational design also views the end state in the same way. A system does not have an end state, it will transform to a new, altered system due to influxes of energy.<sup>143</sup>

To highlight the notion that a system has no end state but continues to transform, military practitioners need only look to the 2002 Operation ENDURING FREEDOM (OEF) mission in Afghanistan. OEF successfully neutralized the Taliban and al Qaeda forces operating in Afghanistan, a conventional joint operation. However, in doing so, they failed to understand the relationships and tensions that existed within the system. As such, the system eventually adapted and transformed into a new one due to the power vacuum created.

The situation on the ground in Afghanistan also bodes well for a resurgence of the Taliban and their al Qaeda associates. Since the fall of Kandahar [in 2002], multiple warlords—many of whom served as anti-Taliban proxies for the US-led coalition—have established control over personal fiefdoms across the country, creating a land so perilous it can boggle the mind of anyone who has lived in peace.<sup>144</sup>

To avoid such deterministic ways of thinking, the commander and staff focus on achieving the operational objectives and the strategic vision. “Although the [IDF] use the [Hebrew] term end state ..., a better term in this context would be ‘waypoint,’ to explain the nature of the operations on the path to an acceptable state of the Rival system.”<sup>145</sup>

Although the seven discourses are structured, from system framing down to forms of function, this structure highlights operational art and cognitive reasoning rather than deterministic procedures or steps. The running narrative and the graphical products are not created in isolation nor are they meant to be products in their own right. It is expected that the designers will continually revisit any discourse as new information presents itself and as learning occurs. For example, the final rival-as-rationale graphic depicting all of the elements posing threats to the friendly force mission will invariably differ significantly from the initial graphic and be much more thorough as the learning process evolves through each discourse.

*SOD—Enabler or anchor?*

One defining characteristic of SOD as an enabler is its emphasis on understanding the operational problem rather than analysing the mission. This characteristic is the root of the larger debate between the CF OPP and SOD and will be addressed further in Section 6. Before any design can take place in a complex environment, the commander must first understand the operational problem. Also, the collaborative and egalitarian nature of the discourses forces the commander and staff to cast aside biases and promotes the intuition and creativity intended from the groupthink concept.<sup>146</sup>

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143. Groen, 45.

144. Scheuer, 278.

145. Groen, 44.

146. Dee Ann Kline, *How Professionals Make Decisions*, eds. Henry Montgomery, Raanan Lipshitz, and Berndt Brehmer (Mahwah: Lawrence Erlbaum Associates, 2005), 4–5.

The other defining factor of SOD as an enabler is the distinct separation of design from planning. Although the two activities are related, Naveh distinguishes between the two:

Design deals with learning, while planning is about action. Design is a referential framework for redesign, while planning is a framework for action. Design addresses problem setting, while planning deals with problem solving. Design creates new patterns, while planning uses existing templates. Design is holistic but incomplete and not detailed, while planning is complete but partial. Design is an open construct, while planning is a closed one.<sup>147</sup>

Design acknowledges that, although problems may be similar, no problem is exactly the same as another. Therefore, understanding each unique problem requires a unique approach and acknowledgment that it may not have a solution in the conventional sense. The design team translates the strategic concepts and frames the problem—a creative process that includes the commander throughout. The design is then handed to the planning team, that then applies the military structured processes of building the plan, assigning specific tasks to subordinate formations and coordinating the standard activities—a more mechanistic process. Throughout, discourse continues between the planners and designers in order to adapt and adjust the plan as learning continues. This separation of design and planning process is very much common practice in many civilian professions.

Consider a simplistic civilian anecdote to highlight the differences between design and planning: a customer requires a new kitchen in their house. The customer must engage in discourse with the designer who will then define the customer's specific requirements. Vague requirements could be ample storage space and natural light. Specific customer requirements may call for certain appliances to be located next to each other. At this stage, it is too early to start planning to build such a kitchen. It is important for the designer and the customer to acknowledge that each unique problem requires a unique approach. At this stage, the designer's work is more creative or artistic. The designer cannot gain an appreciation for the problem by implementing a check list. As discourse continues, both the customer and the designer learn more about the situation. For example, it may be impossible to place the appliances in the original manner stated by the customer because of electrical codes or because of functionality. As such, the design will change and develop as knowledge is gained. Once the designer has a design concept that meets the customers' requirements, they will pass the design to the planners who will use specific trade skills and a more mechanistic process to put the plan together to actually construct the kitchen. Although this example is a simple scenario, it highlights the difference between design and planning. More importantly, it highlights the fact that planning cannot occur without a design.

Finally, SOD enables the commander to be involved from receipt of the strategic direction to the transfer of the operational design to the planning staff. SOD is command centric. The commander is involved intimately with their staff throughout the design process to ensure that their knowledge, experience and intuition are imparted on the staff and the design. The commander is also intimately involved because they play an important role in the learning process. Discourse facilitates better understanding of the problem. Discourse is intended to inform the operational-level headquarters as much as it is meant to inform the strategic level. As in any scenario, the more critical discussion that takes place, the more each level will learn about the problem and further develop a thorough course of action. Sorrells confirms this notion based on experimentation at Fort Leavenworth: "it is apparent to the design team that this method produces a very rich level of understanding of the situation amongst the designers, whilst it avoids producing lockstep, numerous courses of action."<sup>148</sup>

147. Groen, 26–27.

148. Sorrells, 27.



## Summary

Although SOD is still in its infancy in the West, SOD's deep roots in GST and the normative decision-making model make it well suited as a design tool to address the complexities of 21<sup>st</sup> century operations. Systemic operational design acknowledges that the military practitioner will never gain complete understanding of the operating environment and, therefore, requires the commander to first frame the actual problem into a manageable operating environment. It is also based on the tenets of open and unhindered discussion and learning throughout the seven discourses. Last, SOD clearly separates the design process from the planning process. As such, it is a tool that enables the commander to understand the operating environment holistically, including the acknowledgement of relationships between the groups in the operating environment. SOD will not only better frame the problem but also facilitate an achievable solution.

The next section will further analyse SOD with respect to the CF OPP to foster debate on the usefulness of both tools. It is clear that SOD and the CF OPP are very different beasts. In the case of SOD, there is little doctrinal or historical data from which to draw. However, this paper will select three key requirements of any military practitioner in an operational-level headquarters to provide a framework for the comparative analysis:

- a. effectiveness as a design tool;
- b. effectiveness as a planning tool; and
- c. efficiency of the tool at operational-level headquarters.

## 6. Comparative analysis

### Introduction

This section will provide a comparative analysis of the CF OPP and SOD with a view to fostering debate on the usefulness of each. It is clear now that SOD and the CF OPP are fundamentally different tools stemming from different theoretical models and established in different eras to address different operating environments. However, they do have one common characteristic: they are both intended to act as the medium through which strategic objectives are translated into tactical actions through a campaign plan. Therefore, the framework for the comparative analysis must centre on the ability of the operational headquarters to employ the tools.

This section will pose three questions that the author considers to be critical requirements of an operational-level headquarters. First, how effectively does the tool address operational design? Second, how effectively does the tool address operational planning? Third, is the tool efficient for an operational-level headquarters? Finally, this section will conclude by providing recommendations on further areas of study beyond the scope of this paper with the aim of improving CF operational planning.

### Effectiveness as a design tool

The question of the operational commander beginning by analysing the mission or by first gaining an understanding of the operational problem is the root of the debate between the CF OPP and SOD. From the perspective of SOD, it requires the commander to first gain an understanding of the operational problem. Systemic operational design assumes that the strategic headquarters does not have complete knowledge and understanding of the operating environment, the elements and the relationships therein. The CF OPP, on the other hand, puts the commander's mission analysis

at the forefront of the process because the CF OPP assumes that the strategic headquarters has sufficiently framed the problem. Referring back to the kitchen design analogy in Section 5, this notion would be akin to the customer, the strategic headquarters, completely defining the problem for the kitchen designer, or the operational-level designers, in such detail that the mechanistic planning could commence immediately.

Therefore, the answer to the question depends on the type of mission the operational-level commander has been given. If the problem is one of little complexity and the strategic headquarters has properly framed it in the strategic guidance, then the commander should be able to commence with mission analysis. Systemic operational design emphasizes problem definition because it assumes that complexity compels the commander to first understand the operational problem and then, based upon that understanding, design a broad approach to problem solving.<sup>149</sup> “When we talk about analytic versus intuitive decision making, neither is good or bad. What is bad is if you use either of them in an inappropriate circumstance.”<sup>150</sup> How, then, does one compare or measure the usefulness of either tool if they were meant for different situations?

The current operating environment must serve as the litmus test to provide this measure of effectiveness. In 2005, Chairman of the Joint Chiefs, General Myers, stated that militaries now “operate on nonmilitary and cross-border fronts, involving law enforcement, diplomacy, and finance.”<sup>151</sup> This phenomenon is rooted in the mission of the Canadian Joint Task Force Afghanistan Headquarters. Not only does the headquarters direct subordinate forces into combat to achieve its strategic objectives, it must also contend with diplomacy and civil-military cooperation.

Twenty-five PRTs [provincial reconstruction teams] throughout Afghanistan help the democratically-elected government of Afghanistan extend its authority and ability to govern, rebuild the nation, and provide services to its citizens. The PRT combines the expertise of diplomats, corrections experts, development specialists, the Canadian police, including the RCMP [Royal Canadian Mounted Police], and the military. It supports key initiatives in the province and carries out a broad range of enabling roles such as police training and strengthening local governance capacity, in line with Canada’s priorities in Afghanistan.<sup>152</sup>

This level of complexity is not simply inherent to that of counter-insurgency operations. Referring back to Section 3, globalization and technology will not permit a return to operations of limited complexity. Therefore, the relevance of the CF OPP as an appropriate design tool is questionable for the current and future environments. As one analyst in the United States Joint Forces Command quipped:

The next war is not just going to be military on military. The deciding factor is not going to be how many tanks you destroy ... . The deciding factor is how you take apart your adversary’s system. Instead of going after war-fighting capability, we have to go after war-making capability. The military is connected to the economic system, which is connected to their cultural system, to their personal relationships. We have to understand the links between all those systems.<sup>153</sup>

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149. US, DoD, *Commander’s Appreciation*, 14.

150. Malcolm Gladwell, *Blink: The Power of Thinking Without Thinking* (New York: Back Bay Books / Little, Brown and Company, 2005), 143–44.

151. Richard Downie, “Defining Integrated Operations,” *Joint Force Quarterly*, no. 38 (3<sup>rd</sup> Quarter, 2005): 10.

152. Government of Canada, “Canada’s Engagement in Afghanistan. Kandahar Provincial Reconstruction Team,” [http://www.afghanistan.gc.ca/canada-afghanistan/kandahar/kprt-eprk.aspx?menu\\_id=41&menu=L](http://www.afghanistan.gc.ca/canada-afghanistan/kandahar/kprt-eprk.aspx?menu_id=41&menu=L) (accessed February 21, 2010, content updated).

153. Gladwell, 104.

Operational-level experimentation conducted by the Future Warfare Studies Division of TRADOC serves to reinforce this notion. On one hand, experimentation determined that the classical approach to operational art worked well for conventional conflict.<sup>154</sup> The tenets of current campaign design (which include the end state, centre of gravity, lines of operation and decisive points) worked well because the problem was readily defined and framed by the strategic-level headquarters. As such, the operational-level headquarters was not responsible for defining the problem, it was able to readily accept the strategic-level guidance and focus on designing a campaign to achieve very specific and tangible objectives.

On the other hand, the same experimentation observed that the classic approach was not suitable for irregular or unconventional warfare, concluding that operational art in its current form constrains how military practitioners think.<sup>155</sup> The study identified three problems with the classical approach in today's environment. First, it does not address the influences of other government departments or multinational action. Second, conventional thinking hinders a comprehensive understanding of an adaptable and flexible enemy. The classic approach was designed to study massed conventional enemies. Finally, "the classical elements of operational design [are] based on history, theory, and practice from a different context."<sup>156</sup> Operational art in its current form addresses issues of mass, space, time and linearity, not the asymmetries such as enemy motivation, morality and the impact of globalization.

### Effectiveness as a planning tool

Section 5 highlighted the distinction between design and planning. Both activities are critical requirements in the process of translating strategic guidance into tactical actions in the operating environment. The fundamentals of the CF OPP make it a useful planning tool in theory. Its roots stem from the Newtonian analytical way of thinking and the normative decision-making model, forcing the military practitioner down the analytical path of detailed problem solving. The lockstep procedure permits detailed options, or COAs, that serve to validate the commander's initial planning guidance.

However, in reality this is not the case. No distinct design process actually exists in the CF OPP. Design emerges as a result of the planning steps inherent to the process. Therefore, without a distinct design process, the planning process will be inherently flawed. With little commander interaction throughout the process, except for the initial mission analysis and subsequent planning guidance, the creativity in the operational design and the subsequent COA development must come from the staff. Hoskin supports the notion that OPP lacks depth as a planning tool because of its own mechanistic structure. He argues that, because the focus of the staff is on mechanistic planning and COA development in steps two and three, "the creative aspect of the process tends to be left to chance, with no consideration of the best way to harness the full creative abilities of the people involved."<sup>157</sup> Lauder observes that Canadian military planners often deviate from the doctrinal CF OPP steps in order to avoid wasting staff effort on adherence to a process.<sup>158</sup> The conclusion that is drawn from Lauder's observation is that the CF OPP, in its current form, is not ideally suited for planning. CF military practitioners must veer from the actual steps of the CF OPP in order to harness the staff effort and creativity required to understand the operating environment and develop COAs that address implied tasks, deception, a workable command and control framework as well as a workable logistics framework.

154. US, DoD, *Systemic Operational Design*, 1.

155. *Ibid.*, 5.

156. *Ibid.*, 6.

157. Hoskin, 12.

158. Lauder, 43.

Systemic operational design is structured, on the other hand, to harness staff effort on operational design separate from the planning function. In theory, the systemic approach to framing the problem and creating an operational design using the naturalistic approach to decision making is better suited to a complex operating environment. The final two discourses are purposely intended to facilitate the transition of the operational design into one plan.

### Efficiency

Efficiency is a comparison of the output of the design tool with the effort that must go into the process.<sup>159</sup> The measure of efficiency goes beyond simply employing the tool at the operational level. The realities of an operational headquarters must also be considered when determining a tool's efficiency. Some of these realities include a headquarters that may not be fully manned due to casualties of war or higher priorities that require personnel elsewhere. Another reality of a headquarters is the limited inherent experience or cohesion of the staff due to casualty replacement, promotions or postings over the course of a campaign. Therefore, this part will attempt to apply the realities of a campaign to each tool with a view to validating their overall efficiency.

At first glance, the CF OPP does not appear to be efficient. There is a significant amount of staff effort dedicated to questionable activities. First, the production of multiple COAs could be considered an inefficient activity simply to validate the commander's original intuition. Each of the COAs must be developed and detailed to the point where the staff can actually war game each against the perceived enemy COAs. Only one of these many COAs will actually be selected and developed into a detailed plan. Lauder refers to Swedish scientist Peter Thunholm's observation that the production of multiple COAs does not yield a better solution than that of a process that is dedicated to the production of a single COA.<sup>160</sup> Second, the absence of the commander throughout the OPP creates the requirement to provide very deliberate and detailed staff presentations at predetermined steps in the process. Specifically, there is a deliberate information brief designed to update the commander with the progress of the staff during step two of the CF OPP. The Canadian Force College (CFC) package provides a standard information brief that includes a PowerPoint slide deck comprising close to 100 slides. Second, the commander will receive a very detailed decision briefing during step three of the CF OPP in order to select the COA that will be further developed into the plan. This briefing includes the results of the COA war game and the recommendation to the commander to select a particular COA based on predetermined comparison criteria. Again, the CFC standard briefing includes approximately 60 PowerPoint slides. If the commander were more involved in the process, would it be necessary to provide such staff-intensive briefings? Is the staff work required to produce multiple COAs and briefings, simply to have two discarded in the end, an efficient process? The answer to both of these questions is no.

On the other hand, SOD has been developed to address these inefficiencies. By now it is clear that SOD was deliberately developed by the IDF based on their strategic failures to re-establish its understanding of operational art. Therefore, from a theoretical perspective, it is difficult to argue the fundamentals and the intentions of the process itself. The staff is less apt to second-guess the commander's intent because the commander is actually present and key to the discourse. Involving the commander in the discourses diminishes the need to validate the commander's intuition by extensive COA development. Systemic operational design certainly addresses the complexities inherent in the current operating environment. After all, Israel is a nation founded on conflict and one that has struggled to maintain its sovereignty since its conception.

159. Merriam Webster On-line Dictionary and Thesaurus, <http://www.merriam-webster.com/> (accessed September 27, 2012).

160. Lauder, 43.

However, Israel's operating environment is a complex system whose components and tensions have ironically remained relatively constant for decades. Israel's neighbours have and always will be the same Arab countries. Those countries will not physically move. Hezbollah, Syria, Hamas and Iran are constant threats to Israel's sovereignty. Therefore, the complexity of the Israeli operating environment is actually reduced. The corporate knowledge of the system already exists amongst the IDF. Thus, system framing is not an arduous process, it is a matter of routine. The IDF can afford to invest in their officer corps to create expertise and specialized staffs to deal specifically with particular aspects of their system because the IDF is actually immersed in the system.<sup>161</sup> Therefore, SOD is an efficient tool for the IDF.

Systemic operational design may be more efficient for the IDF than the classic OPP, but a tool that requires specialization and very rich knowledge of a particular rival system is also more fragile. As such, SOD presents a significant challenge to Western militaries that normally conduct campaigns in other parts of the world rather than on their own soil and, arguably, for short periods of time.<sup>162</sup> The IDF has the luxury of apprenticeship in the operational art in the same system for the very reasons highlighted earlier. The West does not have this luxury.

For example, the CF has developed an understanding of the system that has existed in southern Afghanistan for only six years. When the ISAF mission terminates in the near future, that inherent expertise in Afghan culture, diplomacy, economics and the elusive centre of gravity will no longer be required. The relationships built between the CF and other governmental departments as a result of the mission in Afghanistan will cease to exist. The entire process must occur for the next campaign the CF finds itself supporting. The future expertise to acquire is not known yet.<sup>163</sup> Therefore, SOD is not necessarily an efficient tool for Western militaries who will not be immersed in a system long enough to understand it. Likewise, Western militaries will not establish staffs and specialized skills to address a particular operating environment knowing that the mission duration, and public appetite for extended campaigns, is short.

Finally, although the CF establishment changes that would be required to incorporate SOD are beyond the scope of this paper, it should be noted that systems theory is not found in any CF curriculum. The CF would require a significant overhaul to educate and train its officer corps. Such an overhaul raises the question of how SOD and "operational art" could be taught. For example, are SOD and operational art concepts that should be learned through apprenticeship vice the current classroom methodology of teaching the CF OPP? Although the CF OPP has its flaws, the military must face a tough question: is the need for new operational design and planning mindset greater than the effort it will take to inculcate it into the CF?

## Recommendations

The CF OPP has its strengths and its weakness, and until SOD is further developed (such that headquarters structures and procedures are in place to seamlessly accept SOD), the CF OPP will remain the doctrinal planning tool for the CF. In the meantime, there is a requirement to include think tanks, such as defence research and social scientists, in the professional debate regarding the application of systems theory to ensure it meets the comprehensive approach to operational design. Furthermore, elements of SOD can be inculcated into the CF OPP immediately to improve operational design and planning.

161. Discussion with Dr. Eric Ouellet, Canadian Forces College, 26 March 2010.

162. Groen, 40.

163. Discussion with Dr. Eric Ouellet, Canadian Forces College, 26 March 2010.



The first, and arguably the most important, element will require a fundamental shift in the way Western military practitioners think. The commander and staff must accept that they will never gain complete understanding of the situation and that the enemy, the operating environment and their own friendly forces are not immovable objects; they will adapt over time and space. Acknowledgement of this reality will facilitate the development of more realistic and tenable operational design.

Second, the commander and senior planning staff can focus on problem definition and design rather than jumping into mission analysis in step two the CF OPP. To achieve this, SOD can be employed immediately during steps one and two of the CF OPP to produce a more thorough and richer mission analysis and operational design at the end of step two. Although this particular recommendation does not address the critical shortfalls of the CF OPP, specifically linearity and the deterministic Jominian operational design construct, it does narrow the current fault line between design and planning.

Finally, the concept of open discourse can be embraced in each step in order to enhance the collective understanding of the problem both within the operational- and strategic-level headquarters. This notion also requires a shift in the current way of thinking. That Western commanders and politicians are too busy to be present for continuous discourses highlights a serious flaw in current Western political-military strategy, but it is also well beyond the scope of this paper. Suffice it to conclude that discourse between all military levels and the government is a fundamental requirement if SOD is to succeed.

### Summary

The CF OPP and SOD are fundamentally different tools stemming from different theoretical models and established in different eras to address different operating environments. However, they do have one common characteristic: they are both intended to act as the medium through which strategic objectives are translated into tactical actions through a campaign plan. This section provided a comparative analysis of the CF OPP and SOD, focusing on the ability of the operational headquarters to employ the tools.

Three critical requirements of an operational-level headquarters were used as the framework to compare the usefulness of both models. The CF OPP is not an effective design tool because the design process is actually subordinate to the planning process. On the other hand, SOD is deliberately structured to be an effective design tool. The CF OPP, although effective, is not necessarily an efficient planning tool due to the questionable and often redundant activities that take place within the inherent steps. Systemic operational design is an effective planning tool because effort is focused on the creation of one well developed COA. The CF OPP is an efficient tool over the course of a complete campaign because the terminology and doctrine are simple and familiar for Western militaries. In contrast, SOD is not efficient for rotating staffs because it relies on a combination of unstructured groupthink processes and commander's intuition. However, until SOD is further developed by Western militaries, elements of SOD can be incorporated into the CF OPP to improve its effectiveness.



## 7. Conclusion

This paper has demonstrated that the theoretical and doctrinal frameworks of the CF OPP render it unsuitable as a planning tool to address the complexities inherent in today's operating environment and that SOD is a viable alternative that merits further research for operational-level commanders. The consequences of error in the military profession are so catastrophic that relevant doctrine is not an option, it is an expectation. Therefore, professional militaries must continue the process of challenging their doctrine in order to maintain its relevancy. If doctrine is not open to professional debate or challenged by new concepts, it runs the risk of becoming dogma.<sup>164</sup> In the case of operational design, the aim of this paper was to foster debate over the effectiveness of the CF OPP by comparing it to the emerging SOD in order to improve the CF operational design capability.

The CF OPP was conceived during the cold war to address conventional warfare. As challenging and arduous as conventional warfare may be, the operational-level problems faced in conventional warfare are by definition linear and of limited complexity. The steps and processes of the CF OPP are similar to those of the Janis and Mann decision-making model, a normative model designed to solve linear problems of limited complexity. Therefore, the CF OPP is an appropriate problem-solving tool for conventional operational-level problems. The CF OPP in its current form, however, is not ideally suited for operational-level problems that possess the properties of complexity and adaptivity.

On the other hand, SOD was purposely conceived to address complex problems inherent in the operating environment of the 21<sup>st</sup> century. Globalization and technology, international intervention into failed states, and the impending threat of non-state actors are three realities that define the 21<sup>st</sup> century operating environment as complex. Systemic operational design is founded upon the naturalistic decision-making approach, capitalizing on the decision maker's experience, breadth and depth of knowledge and intuition in the face of complex problems or external pressures. As such, SOD is theoretically well suited to address the complexities inherent in today's operating environment.

Systemic operational design is still in its infancy. Although conceptually well suited as a design and planning tool, there is not yet enough practical experience and unclassified lessons learned to merit complete acceptance of SOD and a departure from the CF OPP. Furthermore, the CF OPP has its strengths and its weakness, and until SOD is further developed (such that headquarters structures and procedures are in place to seamlessly accept SOD as doctrine), the CF OPP will remain the doctrinal planning tool for the CF. In the meantime, elements of SOD can be incorporated into the CF OPP to immediately improve operational design and planning. The commander and senior planning staff can focus on problem definition and design rather than jumping into mission analysis in step two of the CF OPP. Discourse can be embraced in each step in order to enhance the collective understanding of the problem both within the operational- and strategic-level headquarters. Most important, the commander and staff must accept that they will never gain complete understanding of the situation and that the enemy, the operating environment and their own friendly forces are not immovable objects; they will adapt over time and space. Acknowledgement of this reality will facilitate the development of a richer campaign plan.

With a view to improving the CF's ability to design operational campaigns that better achieve the strategic goals of the nation, it is recommended that further research be conducted in three fields. First, Western nations have very few first-hand experiences from which to draw.<sup>165</sup> As such, how could the discourses of SOD be best conducted and recorded based on current CF headquarters structure?

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164. Sorrells, 7.

165. Lauder, 41.

Second, based on the significant theoretical and philosophical foundations of SOD, how and when should it be taught to CF officers within the professional development stream? Finally, does SOD require significant changes to headquarters structure in order for it to work and, if so, what are the most significant changes that would be required? The essentials of SOD, as McAndrew attests for any emerging model, “will only be revealed through sustained thought and open discussion.”<sup>166</sup>

## Abbreviations

<b>CAS</b>	complex adaptive systems
<b>CF</b>	Canadian Forces
<b>CFC</b>	Canadian Forces College
<b>COA</b>	course of action
<b>COG</b>	centre of gravity
<b>DoD</b>	Department of Defense (United States)
<b>DP</b>	decisive point [only keep if abbreviation is added to Fig 3]
<b>GST</b>	general systems theory
<b>IDF</b>	Israeli Defense Force
<b>ISAF</b>	International Security Assistance Force
<b>JFCOM</b>	United States Joint Force Command
<b>OPP</b>	operational planning process
<b>PSO</b>	peace support operation
<b>RPD</b>	recognition-primed decision
<b>SOD</b>	systemic operational design
<b>TRADOC</b>	United States Army Training and Doctrine Command
<b>US</b>	United States

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166. MacAndrew, 98.

## Chapter 7 – The Impact of New Media on Military Operations

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### Abstract

This paper examines the effects of new media in a military environment and argues that new media and informationalism have a profound impact on the practice of planning, preparing, conducting and sustaining major Canadian Forces (CF) operations. In evaluating new media and the operational art, a comprehensive overview of the theory of informationalism is outlined, including the identification of the human element of new media and the new media characteristics that are expected within today's society. In assessing the pervasive, instantaneous, social and interactive characteristics of new media, a practical perspective is given on how these characteristics shape the present network society. The digital divide between the leadership and the younger generation within the CF is identified. New media is challenging the operational art of the commander and staff officer and is impacting the political, informational and military elements of conflict. While commanders have benefitted from the improved common operating picture and situational appreciation for the battlespace, military forces have to deal with the abundant volume of information available, making the modern planner more reliant on technology to complete operational art. The commander has succinct challenges in the complete implementation of new media within a theatre of operations. Information protection activities and influence activities of information operations are challenged by the openness of new media; the ease with which information is promulgated through social networking; and the ability of the adversary to threaten the confidentiality, integrity and accuracy of information. Organizational efforts within the CF will have to be implemented in earnest to develop a better understanding of the strategic context and the real-world conditions that influence the employment of new media in order to positively affect the desired end states of military operations.

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## 1. Introduction

Tucked in the valley of the Hindu Kush mountain range, the political centre of the Islamic Republic of Afghanistan, the city of Kabul lies on the banks of the Kabul River. Thousands of soldiers, sailors and air personnel from 45 nations reside in a small compound literally minutes from the Presidential Palace of Hamid Karzai. Officers and non-commissioned members arrive from all corners of the globe, tasked by their nations to contribute to the North Atlantic Treaty Organization (NATO) headquarters for the International Security Assistance Force (ISAF) – Afghanistan. At first glance, all are different—their distinctive arid camouflage sets them apart from every other participating nation. With closer scrutiny, however, there are commonalities. The majority of personnel arriving in theatre are armed with personal cellphones; others bring their own laptops, personal gaming devices, MP3 players and e-books. From every culture and from every country, the present-day warrior wades into battle armed with digital technology.

Social network connectivity in theatres of war such as Afghanistan and Iraq is an expectation. Morale and welfare networks consisting of high speed Internet and file servers for games, music and movies were available in each soldier's barracks. The three European-style cafés on base had wireless Internet hotspots for staff and a multitude of transient visitors on theatre assistance visits. For those without personal computers, national support elements had Internet cafés and voice over Internet Protocol (VoIP) telephones to stay connected with families and friends back home. It was impressive to think that in the middle of a war zone, 10,443 kilometres<sup>1</sup> from home, that any soldier could sit in front of any personal computer and videoconference via webcam over Skype in real time.

The expectation of connectivity for the social welfare network was a priority and a constant consternation among the users.<sup>2</sup> This attitude carried throughout the entire area of responsibility. Every regional command had an established commercial communications network for their personnel, most based on local new upstart Internet service providers (ISP). Soldiers purchased local pay-as-you-go (Subscriber Identity Module) SIM cards for local personal texting and voice calls within the bases and also carried them on missions in local patrols or visits to ensure redundant communications with their units. Waging war in the 21<sup>st</sup> century has brought connectivity challenges to the forefront that were not present 10 years ago. A social communications evolution has occurred within today's definition of the modern soldier.

Simultaneously, the reliance on mobile communication technology by the population in the countries to which we deploy has witnessed exponential growth. Since the fall of the Taliban regime in 2001, the communication revolution in Afghanistan has gone viral. From unreliable land line telephones where a handful would serve an entire region, Afghanistan boasted over 1.4 million cellular customers by 2007 and a growth of 150,000 new customers per month.<sup>3</sup> Where the landline cost for long distance in 2001 was approximately US\$19 per minute, Afghans now pay 10 cents per minute on prepaid voice services.<sup>4</sup> Global System for Mobile Communications (GSM) cellular coverage is now in 133 major cities and villages in all 34 provinces, enabled through a 2500 kilometre microwave network that links the entire country. The Afghan population is now interconnected in ways that were literally inconceivable a decade ago.

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1. The straight-line distance between Ottawa, Ontario, and Kabul, Afghanistan.

2. As the custodian for the ISAF HQ Morale and Welfare network from September 2007 to April 2008, I became acutely aware of the importance of the network to individuals and quickly developed a thick skin against the complaints on outages and lack of bandwidth.

3. Chris Brummitt, "Cell-phone Use Booming in Afghanistan," *Wireless on NBCNEWS.com*, <http://www.msnbc.msn.com/id/20479899/> (accessed November 13, 2012).

4. The price of US\$19 for landline long-distance rates was related to the author in a conversation with the founder of the Afghan Wireless Communication Company (AWCC), Ehsan Bayat in November 2007.



The communication infrastructure in Afghanistan has created a quagmire for the Taliban insurgents who remain in Afghanistan to oust the infidels from their country. In 2001, its use was contrary to the Taliban's strict interpretation of Sharia Law that electronic communication—be it telephone, television or radio—should be banned.<sup>5</sup> The necessity to control the population by hindering communications is grounded far back into their reign after the Soviet invasion forces left in 1989.<sup>6</sup> However, the al-Qaeda-backed Taliban have proficiently used cellular telephones and Internet connections to coordinate their counter-insurgency efforts against ISAF. They have equally realized that ISAF also uses the new communications infrastructure to their advantage: either to coordinate among themselves or to communicate with human intelligence (HUMINT) spotters and key leaders inside villages to identify Taliban locations. Faced with this critical problem, the Taliban demanded that Afghan Wireless Communication Company (AWCC), Roshan, Areeba and Etisalat—the four leading cellular providers in Afghanistan—turn off their services between 5 p.m. and 7 a.m. on the belief that ISAF was using the civilian carriers to track down insurgents using cellphone technology.<sup>7</sup> They made good on their threats, and in the first five months of 2008, the Taliban successfully attacked the country's cellular communication infrastructure at 50 cellular towers in the southern and eastern regions of Afghanistan.<sup>8</sup> The Taliban was willing to forego their ability to communicate at night in order to regain tactical advantage over NATO forces when engaged in operations.

What they didn't expect was the pushback from the local population. Residents of villages, towns and communities threatened by the Taliban's promise to destroy cellular towers countered the insurgents by assisting ISAF in locating the Taliban threat, contacting the cellular companies to give them warning about impending attacks and even forming vigilante security forces to protect their local community tower from attack. The locals' reliance on cellular technology was now such an integral component of their society that they were determined to remain a part of the "network." The cellular companies and the locals were willing to stand up to the Taliban's threats in order to maintain connectivity.<sup>9</sup>

These examples from Afghanistan demonstrate the considerable weight that new media has on societies—both developing and stable. On one hand, it shows the reliance of a war-torn nation on a new communications infrastructure and, on the other hand, an expectation of social network connectivity on the part of ISAF's soldiers. It demonstrates that the Taliban insurgents, even though vehemently against technology during their governance, appreciate the power of the new media in order to further their resistance against ISAF. This brings to the surface the complicated elements of new media and its effects on the battlespace. It begs to ask the questions: What significant role is new media playing in operations? How should forces react to the enemy's use of the same technologies? How will new media affect the operational art and decision making?

Important questions on the employment and effects of new media in operations are now coming to the forefront. However, our present reality is that with the dual pressures of a lack of up to date doctrine on employing new media on operations and in garrison as well as an exponential growth of

5. Amy Waldman, "A Nation Challenged: The Law; No TV, No Chess, No Kites: Taliban's Code from A to Z," *New York Times Online*, <http://www.nytimes.com/2001/11/22/world/a-nation-challenged-the-law-no-tv-no-chess-no-kites-taliban-s-code-from-a-to-z.html> (accessed November 13, 2012).

6. "Timeline: Soviet War in Afghanistan," BBC News, [http://news.bbc.co.uk/2/hi/south\\_asia/7883532.stm](http://news.bbc.co.uk/2/hi/south_asia/7883532.stm) (accessed November 13, 2012).

7. Mark Rutherford, "Taliban: Nix Nighttime Cell Phone Service," CNET News, [http://news.cnet.com/8301-13639\\_3-9881951-42.html](http://news.cnet.com/8301-13639_3-9881951-42.html) (accessed November 13, 2012).

8. "Afghanistan Update: May 2008," Centre for Defense Information, <http://www.cdi.org/friendlyversion/-printversion.cfm?documentID=4320> (accessed February 9, 2010, site discontinued).

9. One theory, however, was that the cellular companies paid off the Taliban to cease their aggression. Both Roshan and AWCC were adamant throughout early 2008 that they did not negotiate with the Taliban to end the attacks.

both the capabilities and the frequency of personal communication devices in theatre, it behoves us to explore this aspect of communications in the battlespace and the effects it will have on operational art.

This paper argues that new media and informationalism have a profound impact on CF operations and that the effects of new media on the battlespace must be considered within operational planning in order to ensure strategic success. The focus in this research paper is on non-secure, unclassified communications within the Department of National Defence (DND) and the CF and will concentrate on the passage of open-source information. I anticipate that new media will directly impact CF operations. As the use of new media technology by soldiers, sailors and air personnel during operations increases and the expectation of real-time, ubiquitous connectivity becomes the norm, a younger, more “tied-in” generation will continue to challenge the older, more risk-averse generation when applying change to the use and application of networking technologies. I also anticipate that the challenges of operational and information security will be the main obstacles to adopting new media technologies within the battlespace. Security concerns will also be paralleled with the unbridled proliferation of new media technologies by insurgents, non-state actors and radicals.

Section 2 will start our discussion by investigating the technological paradigm of the information society and considering Bell’s technological determinist theory and Castells’ theory of informationalism. The value and importance of information and knowledge will be discussed as we look into the economics of information and its value within the new social structure of the network society. I will discuss the focus of connectivity, information and the will of the network society. I will show that informationalism and the network society instil a requirement for organizations to understand the value within the characteristics of new media and the people who will be affected by their employ.

Section 3 will explore the characteristics of new media and provide an appreciation of how these characteristics will affect the CF. I will start with a formal definition of new media and will identify the main characteristics of new media (pervasiveness, instantaneous, social and interactive) and how they shape the present network society. I will also define the characters at play within the network society: the digital natives and digital immigrants. I will establish in this section that there is a digital divide between the leadership and the younger generation within the CF.

My objective in Section 4 is to underscore the fact that innovations in global media technologies are challenging the operational art of the staff officer and impacting the political, military and societal elements of conflict. I will discuss the impact that new media has on the diplomatic, informational and military lines of operation. Section 4 will also investigate the proficiency with which the enemy uses new media in their quest for information engagement and will identify how their actions directly affect the operational art of military forces, the government and members of society within nations who support the global war on terrorism.

To conclude this research paper, Section 5 will identify the challenges that new media places within the information operation (IO) campaigns of war. I will look at the information protection activities and influence activities of IO and the challenges that new media pose on operational security and information security. I will also focus on the social element and explore the best way to achieve the attention of the target audience through the use of new media. By the end of the section, I will have identified the challenges that new media creates within the CF and the areas of concern for the organization in order to integrate new media into the organization.

## 2. New media and society: Exploring the foundations of social change

New media and the information age have given spark to an inferno of new and revised social studies and theories on what influences society and how these influences change the political, economic and social landscape. In order to comprehensively examine the effects of new media as it relates to CF operations, it is necessary to first have an understanding of the theories of information technology and its influence on society and institutions. To this end, informationalism, the economics of information and the network society will be considered in this section before examining the military operational influences of new media.

I will start by discussing the technological paradigm of the information society and investigate Bell's technological determinist theory and Castells' theory of informationalism. I will also demonstrate the importance of information and knowledge: how it is of considerable value within the new social structure of the network society. By the end of the section, I will have established that the acceptance of new media is not being driven by pure technological advances but by a societal desire to be ubiquitously connected within their organizations with a view to accessing and processing valuable information. A better understanding of the human factors of information and connectivity will give us better insight on how new media will affect CF operations.

### Informationalism: The technological paradigm

"Technology ... is a fundamental dimension of social structure and social change."<sup>10</sup> It is usually defined as the use of scientific knowledge to set procedures for performance in a reproducible manner. It evolves in interaction with the other dimensions of society, but it has its own dynamics, linked to the conditions of scientific discovery, technological innovation as well as application and diffusion in society at large.<sup>11</sup> This research pertains to information technology (IT) and information communications technology (ICT); therefore, clarity on their definition is warranted.<sup>12</sup> The Information Technology Association of America (ITAA) defines IT as:

the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. ... [I]nformation technology is the capability to electronically input, process, store, output, transmit, and receive data and information, including text, graphics, sound, and video, as well as the ability to control machines of all kinds electronically.<sup>13</sup>

There are several schools of thought on informationalism. In his 2001 work *Investigating the Information Society*, Hugh Mackay outlines the subject of the information society.<sup>14</sup> The dominant aspect that he posits is the consideration of the information society as the root of societal change.<sup>15</sup>

The differentiating positions on information as the source of change in society are twofold: (1) the idea of technological development—or technological determination—as the catalyst for social change versus (2) the focus of information social change driven by political, economic, social or

10. Claude Fischer, *America Calling: A Social History of the Telephone to 1940*, (Berkeley: University of California Press, 1992) quoted in Manuel Castells, "Informationalism, Networks, and the Network Society: A Theoretical Blueprint" in Manuel Castells, ed., *The Network Society: A Cross-Cultural Perspective* (Northampton, MA: Edward Elgar, 2004), 9.

11. Ibid., 9–10.

12. The initialisms IT and ICT are interchangeable. In the CF, ICT is becoming the dominant term referring to technology, as the CF community accepts IT to represent "individual training."

13. "Information Technology," Wikipedia, The Free Encyclopedia, [http://en.wikipedia.org/wiki/Information\\_technology#cite\\_note-0](http://en.wikipedia.org/wiki/Information_technology#cite_note-0) (accessed January 13, 2010, content updated).

14. Hugh Mackay, *Investigating the Information Society* (New York: Routledge, 2001), 21.

15. Ibid.

cultural factors to which many refer not to the information society “but to late modernity, post-industrialism, postmodernism or globalization to characterize the transformation of contemporary society.”<sup>16</sup>

While the aforementioned distinctions of the information society are painted as a contrast of views among authoritative voices, the two best-known advocates are the American sociologist Daniel Bell and the urban theorist Manuel Castells.<sup>17</sup> Through their combined works, we see over a span of 35 years the evolution of the theories of the development of postmodern society from early “post-industrial” technological determinism of Bell to the network society of Castells’ informationalism.

### Technological determinism

Bell’s hallmark writings in 1973 on a “post-industrial” society identified a coming revolution in which the computer played a central role in society.<sup>18</sup> Bell refers to pre-industrial society as raw muscle power against nature; the industrial age is characterized by machinery, and the post-industrial society is based on services, when “what counts is not raw muscle power, or energy, but information.”<sup>19</sup> For Bell, the post-industrial society is viewed by the centrality of scientific knowledge and by scientific knowledge directing social change.<sup>20</sup> He saw technology as the basis of enhanced productivity, resulting in a transformed economy.<sup>21</sup> Bell’s prediction on technology is the basis for the theory of technological determinism.

Various theorists,<sup>22</sup> including Bell, have adopted the stance of technological determinism. Technological determinism espouses the belief that technology shapes society and that technology, as an independent factor, is seen as the fundamental condition underlying the pattern of social organization.<sup>23</sup> As with Bell’s post-industrial society (in which the evolution of technology was responsible for the transformation of the economy), technological determinism asserts that technology is the main determinant of social change and the prime mover of history.<sup>24</sup>

This position argues that knowledge and information are the key factors in economic and social development. The central argument here is that productive and distributive processes within the economy are increasingly driven by knowledge-based inputs. In this way, the development of new media technology needs to be linked into the transformation of the economy and be related to changes within politics and culture.<sup>25</sup>

Technological determinists see technology, in general, and ICTs, in particular, as the basis of society in the past, present and even the future. They say that technologies such as print, television and the computer “changed society.”<sup>26</sup> In its extreme, the entire form of society is seen as being determined by technology: new technologies transform society at every level, including institutions,

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16. Ibid.

17. Ibid.

18. Ibid.

19. Daniel Bell, *The Coming of Post-Industrial Society: A Venture in Social Forecasting* (London: Heinemann, 1973) quoted in Mackay, 22.

20. Mackay, 24

21. Ibid., 29.

22. Daniel Chandler, “Technological or Media Determinism,” <http://www.aber.ac.uk/media/Documents/tecdet/tcet02.html> (accessed November 13, 2012). Chandler cites Sigfried Giedion, Leslie White, Lynn White Jr, Harold Innis, and Marshall McLuhan as adopters of technical determinism.

23. Ibid.

24. Mackay, 29.

25. Nick Stevenson, *Understanding Media Cultures: Social Theory and Mass Communication*, 2<sup>nd</sup> ed. (London: Sage Publications, 2002), 184.

26. Chandler.

social interaction and individuals. At the least, a wide range of social and cultural phenomena are seen as being shaped by technology. “Human factors” and social arrangements are seen as secondary.<sup>27</sup> The direct contrast to technological determinism is Castells’ theory of informationalism.

### Defining informationalism

The information revolution that has occurred over the past two decades concerns connectivity: the amount of information reach and the quality of interactions between users resulting from advances in technology.<sup>28</sup>

Informationalism is a technological paradigm.<sup>29</sup> It refers to technology, not to social organization and not to institutions. Informationalism provides the basis for a certain type of social structure that Castells terms the “network society.”<sup>30</sup> Informationalism is a catalyst for social evolution—a means to which a new social structure is formed. It does not, however, directly produce social evolution. Informationalism has allowed organizations to achieve increased flexibility through more knowledge-dependent and less hierarchical structures. New technology has enabled large structures to coordinate their activities world wide, while building in reflexive inputs to both quickly respond to the current state of the market and benefit from economies of scale.<sup>31</sup> In order to appreciate how communications technology has been a catalyst, it is necessary to first look at the technological paradigms of the past 70 years and see how informationalism has aided society to evolve to our present state of network dependency.

A paradigm is defined as a conceptual pattern or example that formulates a framework, either theoretical or philosophical.<sup>32</sup> A technological paradigm is, therefore, the pattern of technological discoveries that can be grouped around a common occurrence or period of time and forms a system of relationships that enhance the performance of each specific technology.<sup>33</sup> By this definition, the transformation of ICT is characterized as a technological paradigm and, arguably, the root of the industrial age.

Informationalism is manifest through the pattern of change in ICT hardware. The revolution in computing technology began in the 1940s, as computer hardware pioneers such as Atanasoff and Berry (ABC Computer), Aitken and Hopper (Harvard Mark I) as well as Eckert and Mauchly (ENIAC 1) invented the first models of freely programmable computers.<sup>34</sup> As demand for computing power grew, the invention of the integrated circuit by Kilby and Noyce in 1958 evolved into the Intel products of the first random-access memory (RAM) computer memory and first microprocessor in 1970 and 1971 respectively.<sup>35</sup>

From this evolution of computer hardware developed the need for interconnectivity. In 1969, the technological paradigm branched to the network paradigm with the development of the Advanced Research Projects Agency Network (ARPAnet). The Defense Advanced Research

27. Mackay, 30.

28. David S. Alberts and Richard E. Hayes, *Power to the Edge: Command and Control in the Information Age* (Washington, DC: CCRP Publications, 2003), 74.

29. Manuel Castells, “Epilogue: Informationalism and the Network Society,” in *The Hacker Ethic and the Spirit of the Information Age*, ed. Pekka Himanen (New York: Random House, 2001), 158.

30. Ibid.

31. Stevenson, 192.

32. “Paradigm,” Merriam-Webster, <http://www.merriam-webster.com/dictionary/paradigm> (accessed November 13, 2012).

33. Castells, “Informationalism, Networks, and the Network Society,” 10.

34. “The History of Computers,” About.com, <http://inventors.about.com/library/blcoindex.htm> (accessed November 13, 2012).

35. Ibid.



Projects Agency (DARPA)<sup>36</sup> is a branch of the United States (US) military that conducts advanced research and development on weapon systems and associated operational concepts.<sup>37</sup> While ARPAnet was designed to protect the flow of information between military installations by creating a network of geographically separated computers that could exchange information via a newly developed Network Control Protocol (NCP), DARPA's former director, Charles M. Herzfeld, claimed that ARPAnet was created, "out of our frustration that there were only a limited number of large powerful research computers in the country and that many research investigators who should have had access were geographically separated from them."<sup>38</sup> The connectivity of ARPAnet invigorated innovation in hardware and software to achieve the standards of connectivity in the present Internet.

In our modern era, advances in technology (be it hardware, software applications or connectivity) have converged to the development of the network and the network society. The transformation of ICT is proof of the power of this convergence. Landline telephones ceded to cellular phones, whose primary use was for voice communications. Cellphones have given way to multifunctional communications devices. The third generation (3G) "smartphone," as they are coined, handles voice, text messaging, email and web 2.0 supported Internet.<sup>39</sup> Certain models, like Apple's iPhone and Google's Nexus One, enable thousands of applications from global positioning system (GPS) support, Friend Finder applications (apps), Rich Site Summary (RSS) feeds and many more. This does not take away from the device's ability to store and play audio and video files, capture photos like a camera and shoot home movies like a camcorder. From one device, users can be completely connected to their personal network of friends and interests. Their ability to access, collect and manipulate information assists them in their personal quest to achieve information dominance over their sphere of influence. The technological paradigm of informationalism has converged ICT based on the needs and demands of the user community. The human factors are the drivers of the technological change, and through those influences, the technology has been readily adapted by society.

We have discussed the theories of technological determinism and informationalism. One constant throughout the discussion of both theories has been social change. While the argument for determinism puts its primary focus on the technology itself as the catalyst for change, its consideration that human factors and cultural arrangements have secondary influences on social change is a substantial flaw. The theory of informationalism gives focus to the human influences on the use of new media and how the societal value of information reach and the quality of interactions between users affect our use of converging ICT technology. Informationalism establishes that organizations such as the CF need to understand and appreciate the human factors—the value and economics of information as well as the need for social network connectivity—that will influence the need and methods of using new media within operations.

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36. The organization DARPA was originally known as ARPA (Advanced Research Projects Agency) and has interchanged between these two titles in 1972, 1993 and 1996. This paper refers to it as DARPA, as this is its present name. ARPAnet was the original name for the network and is similarly referred to as DARPAnet.

37. Mary Bellis, "Inventors of the Modern Computer: ARPAnet - The First Internet," About.com, <http://inventors.about.com/library/weekly/aa091598.htm> (accessed November 13, 2012).

38. Ibid.

39. 3G technology is the common name that refers to the International Mobile Telecommunications – 2000 (IMT-2000) standards established by the International Telecommunications Union (ITU). 3G networks allow for simultaneous use of voice and data services at minimum established data transfer rates. See <http://www.itu.int/osg/spu/ni/3G/technology/index.html#Cellular%20Standards%20for%20the%20Third%20Generation> (accessed November 13, 2012) for more information.



### The economics of information

Throughout time, economics and power have been acutely connected. The information age is distinguishable from previous ages twofold: (1) by the economics of information and (2) by the nature of the power of information. What is new in our historical period is the technology of information processing and the impact it has had on the application of knowledge.<sup>40</sup> A society's increased access to information provides an opportunity for its collective to rethink the ways in which information is organized, managed and controlled.<sup>41</sup>

Sir Francis Bacon (1561–1626) emphasized the age-old precept: *knowledge is power*,<sup>42</sup> conveying the notion that an individual's worth was related to their possession of information. The more exclusive the possession of knowledge; the more valuable the information. Hence, information is a commodity like any other commodity, whose value is related to scarcity.<sup>43</sup> Throughout history, knowledge and information, and their technological enablers, have been adroitly akin to political/military domination, economic prosperity and cultural exclusiveness. So, in a sense, all economies are knowledge-based economies, and all societies are, at their core, information societies.<sup>44</sup> In previous ages, the commodity of knowledge was easily attained by royalty, governments and corporations to leverage their rule on the masses due to their predisposed wealth, higher position in society and higher levels of education. This advantage has diminished, as the economics of information have changed. With the cost of information and its dissemination dropping dramatically, information has become a dominant factor in the value chain for almost every product or service<sup>45</sup> and within our individual social circles to attain personal authority, value and a sense of belonging.

Informationalism enabled the widespread adoption of Internet Protocols (IP), browser technology as well as the creation of Web pages and portals. Alberts and Hayes in *Power to the Edge* recognize that such technological advances provide an increase in the economic value of information in richness, reach and the quality of virtual interactions.<sup>46</sup>

Informationalism has narrowed the concept of space and time between users due to continual connectivity. It has created both a real-time environment where delays between communications are no longer tolerated as well as the ability to coordinate and collectively submit ideas and inputs over once divisive organizational, cultural and political boundaries. Informationalism unlocks the monopoly from the few to attain and retain exclusive knowledge. The ability of individuals to be collectively connected to leverage knowledge changes the economics of information and redefines the concept of information power.<sup>47</sup>

The economic theory of the information age identifies that as society increases its access to information all levels of society become more empowered. The once divisive organizational, cultural and political boundaries of society have become porous, as the ability to collaborate among peers and broadcast group interest to the world is currency in the new globalized civilization. As Castells submits, “the theoretical understanding of this culture and of its role as the source of innovation and creativity in informationalism is the cornerstone in our understanding of the genesis of the network society.”<sup>48</sup>

40. Castells, “Epilogue,” 159.

41. Alberts and Hayes, 71.

42. Francis Bacon, *Meditationes Sacrae. De Haeresibus* quoted in “Sir Francis Bacon Quotes,” <http://www.luminarium.org/sevenlit/bacon/quotes.php#txt12> (accessed November 13, 2012).

43. Alberts and Hayes, 72.

44. Castells, “Epilogue,” 159.

45. Alberts and Hayes, 73.

46. Ibid.

47. Ibid., 72.

48. Castells, “Epilogue,” 177.

### The network society: A new social structure

Castells identifies that information and knowledge are essential for the economy and in society at large. However, on the basis of informationalism, a new social structure has emerged—a structure made of electronic communication technologies and powered by social networks.<sup>49</sup> The network society has surfaced as the dominant form of social organization in our time. It is a social structure made of information networks powered by information technologies characteristic of the informationalist paradigm.<sup>50</sup> The idea of a network society offers a different model of the capitalist economy, a rethinking of the link between communications and politics. The network society, then, is the attempt to provide a social theory of mass communication that takes both the rise of the new media and the shift to knowledge-based societies seriously. New information and communication technologies do not bring about a new society, but they provide the means that make it possible.<sup>51</sup>

There are three dimensions to informationalism as it pertains to the network society. The first essential dimension is connectivity and access to networks. These two traits are achieved through the continued evolution of ICT. The second dimension is the information that resides on the networks. Easily accessible, the information must also be of significant value to the user in order to provoke them to share it with other users. This information may either be already resident on the network (i.e., data or files) or generated by the user (i.e., user-to-user or user-to-network communications). The third dimension is the human capacity to utilize ICTs. There must be an intellectual capability to manipulate the technology and process the information it provides as well as a will of the individuals within the society to communicate and socialize via this medium. There is also the barrier of cost. In a developing nation such as Afghanistan where the gross domestic product per capita is a mere US\$800,<sup>52</sup> the cost of living and annual wages do not support or justify the cost of owning ICT. Yet, over 8.5 million Afghans own a cellphone. The consumer must possess the will to own and have a belief in the importance of such technology. The proper combination of connectivity, information and will of society becomes the key to ensure productivity, competitiveness, innovation, creativity and, ultimately, power and power sharing.<sup>53</sup>

In his work, “Informationalism, Networks, and the Network Society,” Castells defines the importance of the network society to the present information age:

[T]he notion of the information or knowledge society is simply a technological extrapolation of the industrial society, usually assimilated, to the Western culture of modernization. The concept of the network society shifts the emphasis to *organizational transformation*, and to the emergence of a globally interdependent *social structure*, with its processes of domination and counter-domination. It also helps to define the terms of the fundamental dilemma of our world: the dominance of the programs of a global network of power without social control or, instead, the emergence of a *network of interacting cultures*, unified by the common belief in the use value of sharing.<sup>54</sup> (emphasis added)

The three concepts that are of primary significance in Castells’ previous passage to our study of new media and the CF are: the shift of the network society to emphasize the requirement for

49. Castells, “Informationalism, Networks, and the Network Society,” 64.

50. Castells, “Epilogue,” 166.

51. Stevenson, 184–85.

52. “CIA - the World Factbook – Afghanistan,” <https://www.cia.gov/library/publications/the-world-factbook/geos/af.html> (accessed February 2, 2010, content updated). Afghanistan is 219<sup>th</sup> out of 227 nations for GDP per capita. It is 221<sup>st</sup> for the rate of inflation (30.5% in 2009).

53. Castells, “Informationalism, Networks, and the Network Society,” 65.

54. *Ibid.*, 66.

organizational change; the emergence of an interdependent social structure; and the emergence of a network of interacting cultures. These three concepts, when applied in the military environment, instill a requirement to focus on the network society if the organization wishes to adapt to its present—and future—demographic. The development of the network society has caused a cultural change within the CF to which we are slow to react.

### Summary

I believe that Castells' theory on informationalism as a catalyst for social evolution is the correct interpretation of what we as a society are witnessing today in the global adoption of new media. Informationalism has decisively shaped a new culture focused on information and knowledge. Informationalism has disposed the economic theory of the information age, empowering all levels of society through the increased access to information and providing a global voice to be heard. The currency of real-time collaboration and projection has assisted in the development of the network society.

The network society focuses on connectivity that virtually eliminates the barriers of time and space communications. The currency of information is predominant in the network society. The value of information is dictated by the society's inputs to ensure accuracy of the information and the access that they have. The third aspect of the network society is the capacity and the will to use information and communications technologies. Technology has given even the poorest nations the opportunity to become a part of the network society, and new media is filling an enormous gap in the daily structure of their lives. It has led to organizational and social structure transformations and has enabled differing cultures to interact and network

Understanding informationalism and the network society has established the importance of our focus on the human factors on the use of new media. Without such an appreciation, the CF will not understand the importance that information and connectivity play within the present digital culture of younger CF members. The study of informationalism has established that we cannot ignore the human element of new media and the new media characteristics that are expected within today's society. Section 3 will consider these characters and characteristics of the new media paradigm.

## 3. The new media paradigm

*When a thing is current, it creates currency.*<sup>55</sup>

H. M. McLuhan

### Introduction

Organizations, like the Canadian Forces, are experiencing an evolution towards increasing connectivity, both from the adoption of new information and communications technologies and from the recruitment of young personnel who are completely submerged in the digital world. This "culture of connectivity" that the network society inculcates into the workplace brings to light many challenges that senior managers must consider. But before we address the challenges, we have to get a full appreciation of what new media brings to the environment and how it directly affects the connectivity, information and societal will of the network society.

55. "McLuhanism," Marshall McLuhan, <http://www.marshallmcluhan.com/mcluhanism/> (accessed November 13, 2012).

Section 2 established that the CF needs to fully understand the present day network society in order to realize the influences new media will have on the operational environment. The methodology to both of these challenges is to understand the new media sources and how they are used by today's network society. It is also imperative that we examine the main characters within the network society who are both influencing and influenced by new media.

The goal of this section is to outline the characteristics of new media and to provide an appreciation of how these characteristics will affect the CF. I will start by formally defining new media. From there, I will identify the main characteristics of new media (pervasiveness, instantaneous, social and interactive) and how they shape the present network society. I will also define the characters at play within the network society: the digital natives and digital immigrants.

By the conclusion of this section, I will have established that there is a digital divide between the leadership of the CF and the younger generation of soldiers, sailors and air personnel that presently reside within the ranks. Without senior leadership fully understanding the characteristics of new media, its integration into the CF society will continue to be a challenge. Attrition of the older generation is not a viable option. It bodes well for the CF to be more immediately engaged in the impact that new media will have on the organization and on the operational art.

### Defining new media

First, what do we define as new media? New media is a generic term for the many different forms of electronic communication that are made possible through the use of computer technology. The term is in relation to "old" media forms, such as print newspapers and magazines that are static representations of text and graphics. Lev Manovich is quoted in *The New Media Reader*<sup>56</sup> as describing new media as "a computer technology used as a distribution platform."<sup>57</sup> His definition of new media is deduced from how the term is used in popular press:

[N]ew media are the cultural objects which use digital computer technology for distribution and exhibition.<sup>58</sup> Thus, Internet, Web sites, computer multimedia, computer games, CD-ROMs and DVD, Virtual Reality, and computer-generated special effects all fall under new media. Other cultural objects which use computing for production and storage but not for final distribution—television programs, feature films, magazines, books and other paper-based publications, etc.—are not new media.<sup>59</sup>

This definition is implicit that new media is categorized by the use of digital technology to distribute the message that is created within the digital environment.

The new media technological hardware of today is the result of convergence between computing properties of computers and convenience of consumer electronics. "Computers and the Internet are becoming the music source for stereo systems as well as an alternate video source for televisions (TVs)."<sup>60</sup> The digital home experience now consists of medium to high-end TV sets, audiovisual (A/V) receivers, home theatre gear and gaming consoles that include Ethernet or Wireless-Fidelity (Wi-Fi) capability. "Business and entertainment are also converging with the 'smartphone,' which

56. Noah Wardrip-Furin and Nick Montfort, *The New Media Reader* (Cambridge, MA: The MIT Press, 2003).

57. Lev Manovich, "New Media from Borges to HTML," in *The New Media Reader* (see note 56), 16, [http://www.manovich.net/DOCS/manovich\\_new\\_media.doc](http://www.manovich.net/DOCS/manovich_new_media.doc) (accessed November 13, 2012).

58. Lev Manovich, *The Language of New Media* (Cambridge, MA: The MIT Press, 2001) quoted in *The New Media Reader* (see note 56), 16–17.

59. Manovich, "New Media," in *The New Media Reader* (see note 56), 17.

60. "Definition of: Digital Convergence," PCMag.com, [http://www.pcmag.com/encyclopedia\\_term/0,2542,t=digital+convergence&ci=41316,00.asp](http://www.pcmag.com/encyclopedia_term/0,2542,t=digital+convergence&ci=41316,00.asp) (accessed November 13, 2012).

wraps Internet access, music, video, camera, voice recorder, game machine, GPS navigation and mini versions of nearly every software application imaginable into a do-it-all [cellphone]. The smartphone is truly the personal computer of the 21<sup>st</sup> century because the cellphone is the single most 'personal' machine people keep with them all the time."<sup>61</sup>

New media goes beyond just the hardware. It also includes the "concept that new methods of communicating in the digital world allow smaller groups of people to congregate online and share, sell and swap goods and information. It also allows more people to have a voice in their community and in the world in general."<sup>62</sup> This ability is afforded through the characteristics of new media: pervasiveness, instantaneous, social connectivity and the ability to be interactive.

### New media characteristics

#### *The pervasiveness and ubiquity of new media*

Technology is so woven into the fabric of modern life that it has become all but invisible.<sup>63</sup> It is hard to conceive modern society without technology. Our health, welfare, transport, communications and social life are all inundated with technology to a point that it would be difficult to exhaustively describe all that influences our lives each day.

New media is certainly both pervasive and ubiquitous in our society. The two descriptors are very similar in their meaning and use when describing ICT. By definition, pervasive technology is one that has become diffused throughout every part of our environment.<sup>64</sup> A ubiquitous technology is one that exists or is everywhere at the same time.<sup>65</sup> The Internet is an excellent example of pervasive new media. The Internet is used in virtually every aspect of our society to communicate, research, download and advertise. Institutions, businesses and individuals all have websites and continually bombard us with their web addresses in print media, television and online advertising. The Internet helps cities administer systems and subsystems, run their transit systems, manage their hospitals and control infrastructure. It is an enabler that is everywhere running in the background of society. Similarly, cellular networks are pervasive: we take them for granted that they are there and have naive expectations as to where connecting coverage should be. We expect connectivity in public places like cafés, airports and libraries. Our reaction to the technology is when there is no coverage or there is an interruption to the services. The saturation of cellular phones, smartphones, laptop computers and other new media devices into society demonstrate how ubiquitous technology is in today's world.

The ubiquity of ICT is not just a product of Western modernization. As of 30 September 2009, there were over 1.7 billion Internet users worldwide, of which North America, Europe and Australia made up only 40 per cent. Asia alone accounted for 43 per cent of Internet users with only 19.4 per cent of total population penetration.<sup>66</sup> The International Telecommunication Union (ITU) reported that by the end of 2009, there were an estimated 4.6 billion mobile cellular subscriptions, corresponding to 67 per cent of global inhabitants.<sup>67</sup> In today's network society, there is an inherent

61. Ibid.

62. "Definition of: New Media," PCMag.com, [http://www.pcmag.com/encyclopedia\\_term/0,2542,t=new+media&i=47936,00.asp](http://www.pcmag.com/encyclopedia_term/0,2542,t=new+media&i=47936,00.asp) (accessed November 13, 2012).

63. "Pervasiveness of Technology," <http://www.nac.edu/nac/techlithome.nsf/weblinks/KGRG-55SPVK?OpenDocument> (accessed March 16, 2010, site discontinued).

64. "Pervade," Merriam-Webster, <http://www.merriam-webster.com/dictionary/pervade> (accessed November 13, 2012).

65. "Ubiquitous," Merriam-Webster, <http://www.merriam-webster.com/dictionary/ubiquitous> (accessed November 13, 2012).

66. "World Internet Usage Statistics News and World Population Stats," Internet World Stats, <http://www.internetworldstats.com/stats.htm> (accessed March 19, 2010, content updated).

67. "Measuring the Information Society," International Telecommunications Union, [http://www.itu.int/ITU-D/ict/publications/idi/2010/Material/MIS\\_2010\\_Summary\\_E.pdf](http://www.itu.int/ITU-D/ict/publications/idi/2010/Material/MIS_2010_Summary_E.pdf) (accessed March 19, 2010, site discontinued).

expectation of connectivity and reachability. ICT's pervasiveness permits this expectation in all facets of our modern landscape.

Joseph Weizenbaum<sup>68</sup> refers to the pervasiveness of ICT as a "condition." He states:

No one planned it, ... and no one can say, "We're getting rid of it." The condition has grown, just like [the] use [of] automobiles today as a matter of course. But even with this example, you can ask yourself if it makes sense, given the traffic jams, exhaust, and the use of oil resources. Today, many people use a huge number of computers—many of them networked—with exactly the same lack of reflection. The condition has consequences: many of them a blessing, others the opposite.<sup>69</sup>

Dr. Weizenbaum's observations on the pervasiveness of communication technology should be considered given that society expects to react very quickly in an environment where everyone can be reached at any time and this expectation has driven the continual evolution of technology to attain instantaneous connectivity.

The pervasiveness of new media has had a direct impact on the citizens within the network society. As I will discuss later, it has established the environment of the digital native.

*Immediate digital awareness: Instantaneous access to information*

New media has promoted the individual's ability to connect with others to sublime proportions. Paired with connectivity is the expectation of real-time, instantaneous answers. For those who have owned a BlackBerry, iPhone or any other 3G smartphone device, the difficulty to resist the ringtones of an incoming call, email or short message service (SMS) text is proof of the new habits that result from instantaneous communications in the network society.

New media is also outpacing old media. With application add-ons such as RSS feeds, users can now subscribe to interest feeds that allow them to monitor changes to websites without the time-consuming chore of manually monitoring favourite websites. Once the RSS feed is subscribed, it "pokes" the user to alert them of any changes that they themselves have deemed important. Users now have instant updates on the subjects in which they are interested, and the user is only one click away from accessing the information.<sup>70</sup> This RSS approach directly supports Alberts and Hayes' view of the characteristics of a networked environment. RSS allows users to act upon an automated *smart pull* of information rather than relying on the media networks or marketer's *push* of blanket coverage for information. Moving from a *push* to a *post and smart pull* approach shifts the problem from the owner of information having to identify a large number of interested parties to having the individual who needs information identifying potential sources of that information. The instantaneous access to *post and smart pull* applications makes it simpler for the user who has a requirement for information to determine its utility than for the producer to make this judgment.<sup>71</sup>

68. Professor emeritus of the Department of Computer Science, Michigan Institute of Technology (MIT).

69. "The Pervasiveness of Technology Degrades Personal Responsibility," SAP.info, <http://en.sap.info/the-pervasiveness-of-technology-degrades-personal-responsibility/3525> (accessed November 13, 2012).

70. "What is RSS?" PRESSfeed, <http://www.press-feed.com/howitworks/what-is-RSS.php> (accessed November 13, 2012).

71. Alberts and Hayes, 82.



The phenomenon of mobile Internet is also fuelling the expectations of instantaneous access to information. The combination of the portability of small handheld devices and the mobility enabled by the coverage of the cellular networks is facilitating the phenomenon of “immediate digital awareness.” Mobile Internet is just one of the many enablers of this real-time reality that the present generation is accustomed to.

### *Social and interactive connectivity*

New media has leveraged social connections between people based on language, shared interests, family and past shared social experiences.<sup>72</sup> The global media forecasting company Bloggerwave Inc. reports that people spend the most time overall on social networks and blogs. For the juggernaut Facebook, the statistics on the impact it has on daily social communications is staggering. This social networking site alone has over 400 million active users in 2010 of which half log in to the application each day. There are 5 billion pieces of content (web links, news stories, blog spots, notes, photo albums, etc.) shared each week. One quarter of all current active users access their accounts through a mobile device. Facebook reports that mobile users are twice as active on Facebook than non-mobile users.<sup>73</sup> As Internet usage worldwide increases, so too will the social functionality of applications.

The social characteristics of new media are one of the primary concerns of the present network society. Users are heavily reliant on the technological means to “stay in touch” in real time and have invested heavily into mobile media to achieve this connectivity. Organizations fear that social networking within the workplace will compromise operational security and negatively impact productivity.

The value of new media spans beyond the immediacy of access; it also allows for interactive communication of an unparalleled magnitude. It expands past the peer-to-peer communications of SMS, email and basic cellular calls. The functionality of applications allows users to put content online so that it is accessible to all parties who have interest in reading it and provides the functional flexibility of responding, commenting or correcting the information that the initial user provided. While social networks like Facebook provide that instant gratification of comments from friends and associates, other applications like web log (blog) sites and micro-blogs like Twitter provide the peer-to-peer public interactive environment. The interactive nature of the Internet now allows any user in relative anonymity to comment on any entry. News outlets, like the Canadian Broadcasting Corporation (CBC.ca), allow readers to comment on all posted articles and also support web application programming interfaces (API) that allow interaction or direct comments to threads on other predominant social networking sites. For example, when Prime Minister Stephen Harper’s Conservative government sparked controversy in their Speech from the Throne on 3 March 2010 proposing to change the words of the Canadian national anthem,<sup>74</sup> bloggers, Twitterers<sup>75</sup> and casual surfers flooded forums and online news outlets with their outrage at the idea. Within two days, the Prime Minister’s Office, gauging the negative public outcry, quickly dropped the proposal.<sup>76</sup>

Interactive new media gives a voice to the public. As discussed in Section 2, the depreciating cost of accessing information has enabled virtually any member of society, and not just the social elite, the ease of mass interaction. This allows anyone—including the fringe radicals—to get their message out in an inexpensive, instantaneous and anonymous means.

72. Deirdre Collings and Rafal Rohozinski, *Bullets and Blogs: New Media and the Warfighter* (Carlisle Barracks, Pennsylvania: Center for Strategic Leadership, US Army War College, 2008), [http://www.carlisle.army.mil/dime/documents/Bullets\\_&\\_Blogs\\_new\\_Media\\_&\\_warfighter-Web\(20%20Oct%2009%20w-%20link%20\).pdf](http://www.carlisle.army.mil/dime/documents/Bullets_&_Blogs_new_Media_&_warfighter-Web(20%20Oct%2009%20w-%20link%20).pdf) (accessed November 13, 2012).

73. “Statistics,” Facebook.com, <http://www.facebook.com/press/info.php?statistics> (accessed March 19, 2010, site discontinued).

74. “Speech from the Throne,” Government of Canada, <http://www.speech.gc.ca/eng/media.asp?id=1388> (accessed November 13, 2012).

75. Twitterers are also known as Tweeters. The online debate continues as to the proper term for “users who Twitter.”

76. “CBC News - Canada - National Anthem Won't Change: PMO,” <http://www.cbc.ca/canada/story/2010/03/05/national-anthem.html> (accessed November 13, 2012).

*New media characteristics: Summary*

The characteristics of new media correspond to the expectations of the network society. Today's digital users demand extensive information reach and anticipate quality interactions within their network. New media provides the immediacy of accessing real-time information, the social connectivity and interactive communications in a transparent and ubiquitous environment. There is a value of these new media characteristics to the CF. It allows for improved capabilities to plan, coordinate and operate in a military environment. It allows for real-time collaborative intelligence gathering from all users that are tied into the network. It also allows for two-way interactive communications between the leader and subordinates with limitless potential for training, improving tactics and procedures as well as feedback. The CF needs to consider the importance of these new media characteristics, as their pervasiveness will affect operations and influence the way people work and interact within the organization.

**Digital generations: Natives vs. immigrants**

The CF is, by its very nature, a hierarchical organization. Higher ranks and positions of authority are occupied by people who have experience in their environment and motivation to further their organization's agenda. Officers and senior non-commissioned members (NCM)—the rank of sergeant to chief warrant officer—comprise 40.2 per cent of the personnel in the CF.<sup>77</sup> Within that demographic, senior officers and chief warrant officers typically have 18 to 35 years of service. Therefore, those officers and NCMs who are in highly influential positions all come from the same technical generation. They lead troops that have lived their entire lives in the information age. As baby boomers leave the workplace in droves and new recruits are being ushered in at a breakneck pace, on our present horizon lies a major challenge in the wide use of new media in the CF: the technical generation gap.

In 2001, Marc Prensky wrote an article on the effects that the arrival and rapid dissemination of digital technology has had on students in the 20<sup>th</sup> century and how their teachers had to adapt to the younger generation's thinking patterns. His findings identified that today's students "think and process information fundamentally differently from their predecessors."<sup>78</sup> The largest separation of adaptation to technology was between the students and the teachers themselves. Prensky coined two designations that categorize the technological generations: the *digital natives* and the *digital immigrants*.

*Digital natives*

The generation born roughly between 1980 and 1994 has been characterized as the digital native<sup>79</sup> because of their "familiarity with and reliance on ICT."<sup>80</sup> This demographic is the "native speaker" of the digital language of computers, video games and the Internet who are living their lives immersed in technology.<sup>81</sup> They learn differently than previous cohorts and are regarded by most social researchers as active experiential learners, proficient in multitasking and dependent on ICT to

77. Jungwee Park, "A Profile of the Canadian Forces," *Perspectives* (July 2008): 19, Table 2 Characteristics of Military Personnel, <http://www.statcan.gc.ca/pub/75-001-x/2008107/pdf/10657-eng.pdf> (accessed November 13, 2012).

78. Marc Prensky, "Digital Natives, Digital Immigrants – A New Way to Look at Ourselves and Our Kids," *On the Horizon* 9, no. 5 (October, 2001): 1, <http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf> (accessed March 21, 2010, site discontinued).

79. Ibid.

80. Sue Bennett, Karl Maton, and Lisa Kervin, "The 'Digital Natives' Debate: A Critical Review of the Evidence," *British Journal of Educational Technology* 39, no. 5 (2008): 776, <http://api.ning.com/files/AkclmKAQ9nT0vPJucYL9261SknCvwP1UJ-RaVQ7kZumzWZVPq5iNlfGrqf0Jpc3wUnK8A07FuVmRXQ1WRqnre5q2z53PRnT0/TheDigitalNativesdebatecriticalreview.pdf> (accessed March 21, 2010, site discontinued).

81. Prensky, "Digital Natives, Digital Immigrants," 2.

access information and for social interaction.<sup>82</sup> Digital natives are, through their pervasive exposure to technology, able to piece information together from multiple sources. Oblinger and Oblinger summarize five observations from Prensky<sup>83</sup> about how the digital native processes information:

- a. **Ability to read visual images.** They are intuitive visual communicators.
- b. **Visual-spatial skills.** Perhaps because of their expertise with games, they can integrate the virtual with the physical.
- c. **Inductive discovery.** They learn better through discovery than by being told.
- d. **Attentional deployment.** They are able to shift their attention rapidly from one task to the other and may choose not to pay attention to things that do not interest them.
- e. **Fast response time.** They are able to respond quickly and expect rapid responses in return.<sup>84</sup>

Digital natives are in synch with their technological environment. In fact, they do not realize their interaction with technology as ICT has always been a pervasive resource for them to use. Their abilities to multitask and to proficiently process information are prevalent in the culture of connectivity.

But how connected are the digital natives? As Prensky's student demographic moves from learning institutions to the workforce, industry has been keen in understanding the impact of the uprising of the digital native into the business world. In 2008, Nortel sponsored International Data Corporation (IDC) to conduct a survey to take a global look at the exploding "culture of connectivity" and its impact on the enterprise.<sup>85</sup> Their results further solidify the dependency of digital natives on ICT and categorize our digital immigrants.

IDC fielded a global survey in March 2008 where 2367 participants across 17 countries in various industries, company-size classes and age segments were questioned.<sup>86</sup> Survey questions ranged from device and application adoption of technology to location of use, attitudes about connectivity and assessment of their companies' effectiveness deploying these new technologies. IDC used a data analysis technique called a cluster analysis, a procedure that determines natural groupings derived from the respondent's adoption and usage of technology.<sup>87</sup> As a result, four well-separated clusters with distinct demographics and technology adoption and usage were identified. The clusters were categorized (from highest to lowest) as: *hyperconnected*, *increasingly connected*, *passive online* and *barebones*.<sup>88</sup>

Our definition of digital natives includes the clusters of *hyperconnected* and *increasingly connected*. Hyperconnected individuals, of which 60 per cent are under the age of 35, have fully embraced the digital world and utilize more ICT devices and applications than the other clusters. IDC reported that the average hyperconnected person has reported using seven devices for work and home life

82. Bennett, Maton, and Kervin, 2.1, 2.5, 2.7, 2.11.

83. Marc Prensky, "Digital Natives, Digital Immigrants Part II: Do They Really Think Differently?" *On the Horizon* 9, no. 6 (December, 2001), <http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part2.pdf> (accessed November 13, 2012).

84. Bennett, Maton, and Kervin, 2.5. Oblinger and Oblinger's abridged review reflect Prensky's observations.

85. Romina Aducci and others, "The Hyperconnected: Here They Come! A Global Look at the Exploding 'Culture of Connectivity' and Its Impact on the Enterprise" (Framingham, MA: IDC, 2008), [http://www.nortel.com/promotions/idc\\_paper/collateral/hyperconnectivity\\_idc.pdf](http://www.nortel.com/promotions/idc_paper/collateral/hyperconnectivity_idc.pdf) (accessed March 22, 2010, site discontinued).

86. Ibid.

87. Ibid.

88. Ibid.

and an average of nine applications.<sup>89</sup> Digital natives also include the *increasingly connected* cluster, as their main distinction from the *hyperconnected* is the use of fewer devices and applications; they are half as likely to be involved with social networks and a third as likely to use VoIP.<sup>90</sup> The migration from *increasingly connected* to *hyperconnected* will grow over time. In the next five years, as much as 40 per cent of the total information workforce will fall into the *hyperconnected* category.

### *Digital immigrants*

But what of the lower two clusters? They are the digital immigrant. Prensky defines digital immigrants as those in society who “were not born into the digital world but have, at some later point in their lives, become fascinated by and adopted many or most aspects of the new technology.”<sup>91</sup> One of the major traits of the digital immigrant that Prensky proposes, however, is the fact that even though the digital immigrant learns to adapt to the new technological environment, they will always retain a tendency to rely on the more standard ways of doing things. This tendency is what he refers to as the digital immigrant’s “accent.” These accents are obvious in individuals who, for example, have a tendency to print out hard copies of computer generated text or presentations in order to edit them by hand—those who use the new technologies but still rely heavily on their traditional pre-digital habits.

Digital immigrants can be categorized into IDC’s clusters as the *passive online* and *barebones* demographics. One-fifth of personnel fall into the *passive online* cluster; in the workplace they are slow to accept ICT. They use a few devices, are beginning to experiment with some applications like SMS, but are not using the social-interactive applications like Facebook and Twitter. People in the *barebones* cluster tend to be ICT minimalists in the workplace, using email to communicate, relying on desktop access only to use the Internet, and using cellphones uniquely for voice calls.<sup>92</sup> At 28 per cent of the population, this is a large demographic that have no buy-in to the culture of connectivity.

Overlapping the CF’s demographics with the clusters identified by IDC, the CF faces a considerable technical divide between digital natives and digital immigrants.

### Summary

The characteristics of new media are the framework for future communications in the CF. Characteristics like instantaneous connection and interactivity are important, not only for a soldier’s personal communication needs, but also for the structured, classified command and control networks of the Army, Navy, Air Force and special forces. As the digital divide narrows, the expectation of what is achievable on commercial networks—both from a technological and informational perspective—will be transferred over to the expectations of the military’s private networks. The CF will benefit from the present capabilities of the pervasive and social new media in the public domain.

The digital divide between the digital immigrants and digital natives will be with us for another 15 years. Until such time that all of the digital immigrants have retired from the Forces, senior leadership will be responsible for identifying and mitigating the perceived risks that they identify as the roadblocks to complete integration of new media. I will address those risks and mitigations in Section 5. Failure to understand the impact that new media will have on the organization and on the operational art will ultimately disadvantage the command and control of the organization both in garrison and on operations.

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89. Ibid.

90. Ibid.

91. Prensky, “Digital Natives, Digital Immigrants,” 1–2.

92. Aducci and others, “The Hyperconnected,” 3.

#### 4. New media effects: War and the operational art

*I say to you: that we are in a battle, and that more than half of this battle is taking place in the battlefield of the media. And that we are in a media battle, a race for the hearts and mind of our Umma [community of believers].*<sup>93</sup>

al-Qaeda leader, al-Zawahri, 9 July 2005

Advocates of the “revolution in military affairs” champion the belief that advances in information and communication technologies have altered the nature and practice of warfare. Gathering, processing and distributing information using the technology of the information age enables a clear operating picture of the battlefield while other technologies deny the same degree of knowledge to the enemy.<sup>94</sup> The fusion of advances in IT and the operational art has altered the nature and practice of warfare. Informationalism has contributed to information overflow as commanders and command staff have to sift through large amounts of collected information from a multitude of sources before they are able to apply their planning craft. The CF doctrine on *Command in Land Operations* identifies the pressures that information technology places on commanders and cautions of its challenges:

Technological improvement in range, lethality and information gathering continue to compress time and space, and create even greater demand for information. There is no denying the increasing importance of technology to command, and to command and control systems. Advances in technology provide capabilities not envisioned even a few years ago. However this trend presents inherent dangers ... [U]sed unwisely, technology can become part of the problem, contributing to information overload and feeding the dangerous illusion that certainty and precision in war are not only desirable, but also attainable. Commanders must resist the desire to become over-reliant on technology.<sup>95</sup>

New media enables not only the collection of information but its modification. It is all about taking information developed for one purpose and using it in a different manner. An intelligence officer in theatre who combines the content of a blog commentary with photographs taken by troops on patrol and embeds these sources into a networked collaboration platform like Microsoft SharePoint is best leveraging the resourcefulness of new media. In order to bring success to the operational plan, the staff officer must be able to use this ability to modify and collaborate to their advantage.

Without the appropriate leverage, ICT innovations will produce unexpected consequences for military strategists. A largely unexpected consequence was noticed during Operation ENDURING FREEDOM involving US and allied troops in Afghanistan. Global access to the Internet made the battle for the “hearts and minds,” as the US DoD put it, “all the more difficult.”<sup>96</sup> The ease of insurgent propaganda involving valid information or a valid incident is laced with disinformation, misinformation or excessive information causing the intended message to be bastardized from its original intent and refocused towards the insurgent’s benefit. New media provides greater opportunities for alienated activists to intercommunicate, interact and intervene together.<sup>97</sup> In both examples, unwarranted effects impact military operations when new media is not leveraged to the military’s advantage.

93. “Letter from al-Zawahri to al-Zarqawi July 9, 2005,” Released by the Office of the Director of National Intelligence, [http://www.dni.gov/press\\_releases/letter\\_in\\_english.pdf](http://www.dni.gov/press_releases/letter_in_english.pdf) (accessed March 24, 2010, site discontinued).

94. John Lynn, “The Evolution of Army Style in the Modern West, 800–2000,” *International History Review* xviii, no. 3 (August, 1996): 506.

95. Canada, Department of National Defence (DND), B-GL-300-003/FP-001, *Command in Land Operations* (Kingston: DND, 2007), 1–8.

96. Hall Gardner, “War and the Media Paradox,” in *Cyber Conflict and Global Politics*, ed. Athina Karatzogianni (New York, NY: Routledge, 2009), 13.

97. *Ibid.*, 14.



We concluded in Section 2 that both information and knowledge are sources of power. As technology improves and the demographics of hyperconnected digital natives increase, organizations such as the Canadian Forces need to leverage the changes in the networked society and their effects on the military, social and political elements of war.

The goal of this section is to consider how new media is challenging the operational art of the staff officer and impacting the political, informational and military elements of conflict. I will discuss the impact that new media has on each of the three elements and identify how they affect the operational art of the military planner.

### New media and the operational art

Commanders and their staffs need to fully comprehend not only the military but also the non-military (diplomatic, political, economic, financial, social, religious, etc.) aspects of the situation in a given theatre when they plan, prepare and execute major campaigns or operations. By better utilizing the tools of operational art, they can make decisions that will greatly contribute to the accomplishment of the overall operational or strategic objective.<sup>98</sup> The skillful application of operational art within the military environment ensures obtaining and then maintaining the initiative of war.<sup>99</sup> In generic terms, operational art can be defined as:

a component of military art concerned with the theory and practice of planning, preparing, conducting, and sustaining campaigns and major operations aimed at accomplishing strategic or operational objectives in a given theater.<sup>100</sup>

Operational art involves the employment of one's military forces to accomplish strategic objectives in a theatre of war or theatre of operations through the design, organization and conduct of campaigns and major operations. It involves fundamental decisions about when and where to fight and whether to accept or decline combat.<sup>101</sup> The core of operational art is to win decisively in the shortest time possible and with the least loss of human lives and materiel. This is especially important in the present era of smaller forces, limited resources and low tolerance of casualties by the political leadership and the public.<sup>102</sup>

To complement this, Canadian Forces Joint Publication, *Canadian Military Doctrine* outlines diplomacy, information, military and economics (DIME)—the four principle instruments of national power<sup>103</sup>—as the primary lines of operation that require consideration within a conflict. The focus of this research will be on the diplomatic, informational and military lines of operation<sup>104</sup> as well as the consequences new media has on operational art.

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98. Milan Vego, *Joint Operational Warfare* (Newport, RI: US Naval War College, 2007), I-7.

99. Ibid, I-6.

100. Ibid. I-7.

101. Scott A. Marcy, "Operational Art: Getting Started," *Military Review* 9 (September 1990): 107.

102. Vego, I-6.

103. Canada, Department of National Defence, CFJP 01, *Canadian Military Doctrine* (Ottawa: DND, 2009), 2-22.

104. Economics was not considered within this portion of the research. Defined in *Canadian Military Doctrine* as: "liberal or restrictive trade policies [that] can open up or deny markets, [and] the provision of foreign aid can be used to entice nations to behave in certain ways. Specific economic activities in support of national objectives may include disruption of trade, withdrawal of aid, or direct economic sanctions. The instrument of economics may require the application of military force to give it effect, as in the case of sanction enforcement operations." Although important at the strategic and operational levels of campaign planning, it has no tie-in to new media and, therefore, is disregarded.



## Diplomacy and new media

Diplomacy is “the management of international relations by negotiation”<sup>105</sup> and is dependent on the power of persuasion. Principally through their role in deterrence and coercion, armed forces play a major part in diplomacy and provide resources to counter hostility, build and maintain trust as well as assist in international development.<sup>106</sup> The operational planner, then, has to be cognizant of how new media will impact the consideration of diplomacy within a campaign.

The rise and spread of non-governmental organizations and other civil society actors is attributable to achieving diplomatic solutions in conflict. Echevarria states that globalization—the spread of information and information technologies coupled with greater public participation in the world’s economic and political processes—is transforming every aspect of human affairs.<sup>107</sup> Indeed, globalization has enhanced the real and virtual mobility of people, things and ideas as well as increased social, political and economic interconnectedness worldwide.<sup>108</sup> These factors directly affect the consideration of diplomacy within operational planning.

The social network capabilities of new media make it easy to form virtual communities, mobilize support and effect political change. Causes of all dimensions seek and find support on a global basis, and consequently, local politics now plays itself out on a global scale. But as Deibert and Rohozinski identify, “the technological explosion of global civil society has not emerged without unintended and even negative consequences, particularly for non-democratic and authoritarian states.”<sup>109</sup> The Internet has enabled new, nimble and distributed challenges to these regimes, apparent in enthusiastic opposition movements, protests and even revolutionary changes to long-established political authority. Even among democratic states, the explosion of global civil society has presented serious challenges: as social justice groups have made use of new media to advance their position, so too have the militant groups, extremists, criminal organizations and terrorists.<sup>110</sup>

In *Smart Mobs: The Next Social Revolution*, Rheingold illustrates the use of mobile phones as a social instrument in the 2001 “People Power II” demonstrations in the Philippines. Over 1 million people used text messaging to coordinate and mobilize peaceful demonstrations to protest the sudden halt to the impeachment trial of President Joseph Estrada. Political instability in a country that had seen significant increase in the availability and use of ICT capabilities—a population where 40 per cent make less than one dollar a day, 5 million people own cell phones—led to the masses of protesters.<sup>111</sup> The military withdrew support from the regime, and Estrada was overthrown. The proliferation of new media to the masses is empowering social groups who previously did not have a voice or the medium to connect with like-minded members of their culture.

Diplomacy is meant to influence the members of a targeted society. The increasing ability of people in most parts of the globe to access international sources makes targeting particular audiences more difficult. Information intended for foreign audiences, including public diplomacy, increasingly is consumed by domestic audiences and vice versa. Messages disseminated to any audience except individual decision makers (and perhaps even then) will often be replayed by the news media for

105. *Canadian Oxford Dictionary*, 2<sup>nd</sup> ed., 424.

106. Canada, DND, *Canadian Military Doctrine*, 2-24.

107. Antulio J. Echevarria II, “Globalization and the Clausewitzian Nature of War,” *European Legacy* 8, no. 3, (2003): 317.

108. *Ibid.*

109. Ronald J. Deibert and Rafal Rohozinski, “Good for Liberty, Bad for Security? Global Civil Society and the Securitization of the Internet,” in *Access Denied*, ed. Ronald Deibert and others (Cambridge, MA: MIT Press, 2007).

110. *Ibid.*

111. Harold Rheingold, *Smart Mobs: The Next Social Revolution* (Cambridge, MA: Basic Books, 2002), 158–60.

much larger audiences, including the Canadian public. This difficulty in distributing the diplomatic message can be alleviated by using new media to our advantage and getting accurate and relevant information out to the masses first, in a format that is easy to understand.

The effect of new media on diplomacy will affect the planner's considerations of the employment of forces within the battlespace. Different operational courses of action are dependent on the stability of governments, the number of non-governmental organizations (NGOs) and aid agencies that are employed within the area of operations, and the diplomatic effect we have had with both domestic and foreign audiences. New media can play a role in assisting in our diplomatic end states by getting the informing and influencing messages of public affairs (PA) and IO to a target audience. It can also hinder diplomacy by acting as a social instrument to empower social groups to counter the diplomacy that is ongoing between governments and regimes. Therefore, the planner has to consider how the diplomatic message—or lack of one—will affect courses of action in the operational plan.

### The informational line of operation

Information itself is a strategic resource vital to influencing national interests. Military operations, in particular, are dependent on many simultaneous activities, relying on timely flow and dissemination of information to aid real-time effective decision making.<sup>112</sup> Information influences domestic and foreign audiences including citizens, adversaries and governments.

Mattox affirms that the free flow of information from the battlefield and from the deliberative chambers of government—enabled by new media technologies such as smartphones, television and the Internet—has more acutely exposed the issues and results of war and has rekindled the unwillingness of average citizens to accept critically moral valuations about war. While, in earlier eras, the lack of information from the battlefield may have afforded strategists and policymakers the leeway to conduct war without regard to public reaction over issues with obvious moral implications, those days are forever gone.<sup>113</sup>

The end state of balancing government and society within the elements of war is difficult to achieve in perpetuity. For example, societal issues such as the plight of women and girls in Afghanistan and child labour issues in Africa and Asian-Pacific regions are brought to the forefront because the reach of new media is able to influence the operational and strategic goals of governments and militaries. This is not to say, of course, that the network society is necessarily more morally judicious, or even more morally sensitive, simply because it now has almost immediate access to vast amounts of data with moral implications.<sup>114</sup> Knowledge does not guarantee virtuous conduct. Rather, it simply means that the access to information afforded by the information age now enables the public to form, to an unprecedented extent, moral judgments (accurate or not) concerning the political and military decisions directing the conduct of war.<sup>115</sup>

The view of society on the social issues related to the theatre of war directly impacts operations. In April 2009, Afghanistan's President Hamid Karzai proposed to introduce a law that included a provision making it illegal for a Shia Muslim woman to refuse to have sex with her husband and also making it illegal for a woman to leave the house without her husband's permission, or have custody

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112. Canada, DND, *Canadian Military Doctrine*.

113. John Mark Mattox, "The Clausewitzian Trinity in the Information Age: A Just War Approach," *Journal of Military Ethics* 7, no. 3 (November 2008): 203.

114. Ibid.

115. Ibid.

of children.<sup>116</sup> As new media promulgated this story to the forefront of the news cycle and the blogs of the Internet, it created enormous pressure on NATO member governments to influence such a law. Jaap de Hoop Scheffer, NATO Secretary General, realized that public outcry over such a law could negatively affect commitments to ISAF. “How can I defend—or how can the ... Canadian government ...—that our boys and girls are dying there in the defence of universal values, and you see a law almost coming into effect ... that fundamentally violates women’s rights and general human rights, then I have a problem.”<sup>117</sup> Karzai immediately acquiesced to international pressures and called for a review of the law through parliament. Although the end result was a “softening” of the wording,<sup>118</sup> it eventually became law in July 2009.<sup>119</sup>

This example demonstrates how information plays a role in affecting operations. New media enabled the relevant social issues of a war to be disseminated worldwide. It stirred the emotions of the public and also provided the interactive venue to state their opinions on the matter. This voice applied pressure on the Canadian government to address the issue to the Afghan government and to NATO. The ramifications of this particular example on the operational art had the potential to affect government foreign policy and military troop deployment (should a topic like this have been a deciding factor of renewing commitments to NATO). These are all components that will affect the decision-making process of the commander and the staff as well as how the political and informational lines of operation are developed.

### Military effects and new media

Military power is applied as appropriate to achieve national objectives. Military power is normally used only as a means of last resort when other instruments of national power have failed, or are at risk of failing, to protect national interests.<sup>120</sup>

The dominant tendencies of war’s “uncertainty and chance” are counterbalanced by the command and control (C2) the commander employs on the battlefield. ICT is the backbone of C2 and provides a direct bridge between the political-strategic and the tactical levels. Modern information technology has greatly improved the operational commander’s knowledge about the locations and movements of friendly and enemy forces. The beginnings of what is called the *common operating picture* for commanders at all levels of command are becoming a reality. Wide-area communications are greatly improved; garbled or incomplete information is being replaced by standardized messages in easy-to-access formats that offer less chance for confusion or ambiguity.

This, however, is a double-edged sword, as strategic players have direct ability to influence the tactical battle. ICT is an unfortunate enabler that erodes mission command and staff planning. The “5,000 mile screwdriver” effect that modern communication allows undermines the purpose and functionality of the operational staff. Add on the social layer of new media, and the complexity of situational awareness greatly expands.

116. “Rape Law Hurting Efforts to Sell NATO Role in Afghanistan: NATO Chief,” CBC News, <http://www.cbc.ca/world/story/2009/04/04/law-nato.html> (accessed November 14, 2012).

117. Ibid.

118. The wording of the law defining a woman’s role as “readiness for sex and not leaving the house without the husband’s permission,” was changed to requiring Shiite women to give their husband “their sharia rights” when it comes to sex, a reference to Islamic law, and allowing women to leave their own homes “according to local customs.”

119. Jim Sciutto, Bruno Roebert, and Nick Schiffrin. “Afghanistan President Hamid Karzai Passes Controversial Law Limiting Women’s Rights,” ABC News International, <http://abcnews.go.com/International/story?id=8327666&page=1> (accessed November 14, 2012).

120. Canada, DND, *Canadian Military Doctrine*.

Much is also unclear about current technical developments in military networks. While considerable faith is placed on network-enabled operations or network-centric warfare (NCW), academics such as Mitchell state that concepts like NCW are still in their infancy and, therefore, difficult to determine if they are of decisive advantage at the operational level. Mitchell states, “[a]s in the case of nuclear weapons, it may ultimately prove impossible to implement information technologies militarily in the manner predicted by NCW’s early proponents.”<sup>121</sup>

What is irrefutable is that the importance of information is growing rapidly and that it has a critical impact on the application of operational art. Information must be accurate, timely and relevant.<sup>122</sup> With new media technology, almost any information can be transmitted instantaneously and at very little cost. Yet the sheer volume of information available makes it extremely hard to distinguish what is accurate from what is false. The volume of information can also fluctuate greatly. Information is received, evaluated and transmitted to users. However, the enemy can also take it away without the commander’s knowledge. It is extremely difficult to know what the enemy knows and when they obtained that knowledge. An almost unlimited amount of information often impairs the ability to understand it. Then the important information cannot be distinguished from the unimportant, and too-large amounts of information simply cannot be absorbed.<sup>123</sup>

Information overload also fuels the “uncertainty and chance” of war. The ubiquitous accessibility of new media puts the tools required to collaborate, create value and cooperate at everyone’s fingertips.<sup>124</sup> Similarly, although there is recognition that quality, not just quantity, of information is an important consideration, capitalizing on the accuracy, relevancy and timeliness of information is critical. A planner who is to coordinate a resupply convoy to a forward operating base (FOB) has to ensure that the information they have on the enemy threat, the conditions of the route, the volume of traffic on the road and other missions deploying to the area is accurate. If information that is populating the network is outdated, inaccurate in its observations or there is a conflict in the content of two differing sources, the planner will have to assume risk on taking more time to evaluate the information or collect collaborating information from other sources or accepting the accuracy of the information in the judgement of their plan. Collaboration at all levels of planning within a network-centric environment does not eliminate the risk that information is not easily verified or validated for use; it potentially increases the “fog” of war for commander and staff as to what information is accurate or even useful.

It can be argued that network-centric information sharing is far from reaching maturity. As the present-day staff officer has become more reliant on technology to complete operational art, they also have to deal with the potential of information overload and will have to develop the skill of being able to quickly assess the accuracy and relevancy of information and collaborate that information with the right person within the battlespace at the right time.

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121. Paul T. Mitchell, *Network Centric Warfare and Coalition Operations: The New Military Operating System* (New York, NY: Routledge, 2009), 31.

122. Vego, III-66.

123. Myriam Dunn, “Part II – Theory: Concepts to Explain a Changing International System,” in *Zuercher Beitrage zur Sicherheitspolitik und Konfliktforschung Nr. 64* (Information Age Conflicts: A Study of the Information Revolution and a Changing Operating Environment), ed. Kurt R. Spillman and Andreas Wenger (Zurich: Forschungsstelle fuer Sicherheitspolitik und Konfliktanalyse der ETH Zuerich), 72, quoted in Vego.

124. Don Tapscott and Anthony D. Williams, *Wikinomics: How Mass Collaboration Changes Everything* (New York: Penguin Group, 2006), 1, quoted in Mitchell, 9.

### The enemy and new media

Informationalism and new media technology know no geographic or geopolitical boundaries. As I have alluded to throughout this paper, insurgent and terrorist organizations are leveraging new media to advance their cause, recruit and fundraise as well as communicate covertly. Their actions directly affect all three of the diplomatic, informational and military lines of operation.

In *The Mind of the Terrorist*, Post (after ample description of the history, motivations and threats of nationalist-separatist, social-revolutionary and religious extremist terrorists) identified that the US and other nations that are combating terrorism have not fully entered “the arena of strategic communications, let alone developed a strategy for countering the highly effective media strategy developed and refined by ... terrorist adversaries.”<sup>125</sup> He posits:

The major terrorism organizations have media committees whose main tasks is to get their message out quickly and effectively, putting their own spin on events, playing optimally both to their external and internal audiences. They are adroit at portraying themselves as victims whose actions were defensive and were required by their enemy's actions.<sup>126</sup>

Post confirms that terrorist organizations have effectively employed new media in their efforts to incite activism, share tactical and operational information and conduct their terrorist act. For example, Hezbollah has proven highly effective at mobilizing modern-day technologies to suit their terrorist agenda. Hezbollah employs computer and information technology experts to disseminate their agenda using Internet websites, computer games and their own satellite broadcast Al-Manar TV (the beacon).<sup>127</sup>

Another group that has proven particularly effective at mobilizing new media is Hamas—the Islamic Resistance Movement and Palestinian military wing. The Internet site for the al-Qassam Brigades<sup>128</sup> maintains websites that allow communications between Hamas members and other sympathizers who may wish to engage in acts of violence.<sup>129</sup> They also use these sites to entice non-members who are sympathetic to the cause along the path of violence. Their use of new media has allowed them to provide instructions for the production and exploitation of terrorist weapons. Al-Qassam has also instituted an online “military academy” which provides courseware for bomb making, manufacturing plastic explosives and the selection of terrorist targets.<sup>130</sup>

The enemy has understood the power of the Internet and has used digital media to incite the “violence and passion” of the global audience. Moreover, the public statements by enemy leaders such as bin Laden in periodic releases of video messages through mainstream media sources like Al Jazeera, or through videos and voice messages on the Internet, demonstrate that insurgent leadership can address support bases to give guidance, motivate or garner further support, while at the same time challenging or vexing the opponents of al-Qaeda.<sup>131</sup> The advances in ICT and the ability to mass distribute their message give power to the enemy as Western governments and militaries struggle to disrupt their psychological operation's observe, orient, decide and act (OODA) loop.

125. Jerold M. Post, *The Mind of the Terrorist: The Psychology of Terrorism from the IRA to Al-Qaeda* (New York: Palgrave Macmillan, 2007), 245.

126. Ibid., 245–46.

127. Ibid., 169.

128. The Izz ad-Din al-Qassam Brigades are named as the military wing of Hamas.

129. Post, 188.

130. Ibid.

131. Echevarria, 324.

## Summary

In this section, I set out to demonstrate how new media is challenging the operational art of the staff officer and impacting the political, informational and military elements of conflict. Commanders and their staffs need to fully comprehend not only the military but also the diplomatic, political, economic, financial and social aspects of the situation in a given theatre when they plan, prepare and execute major campaigns or operations. New media does challenge the diplomatic, informational and military lines of an operation or campaign.

The influence of diplomacy on a targeted society is more difficult because of new media's ability to enable people to access international informational sources. Likewise, the information from the military or government intended for foreign audiences, including public diplomacy, is increasingly consumed by domestic audiences and vice versa. This difficulty in distributing the diplomatic message can be alleviated by using new media to our advantage and getting accurate and relevant information out to the masses first, and in a format that is easy to understand. The military planner, then, has to leverage new media in order to get the diplomatic message out to influence the population.

The view of society on the social issues related to the theatre of war directly impacts operations. New media enabled the relevant social issues of a war to be disseminated worldwide, stirred the emotions of the domestic and foreign public and also provided the interactive venue to state their opinions on the matter. This voice applies pressure on the government to address these issues and directly influences foreign policy. As foreign policy shifts, so too does the focus of operations in theatre.

New media has greatly improved the operational commander's common operating picture and situational appreciation for the battlespace. There is considerable potential for further application of new media technologies into the battlespace in order to assist commanders to make timely and accurate decisions. Military forces, however, have to deal with the abundant volume of information available, making the modern-day planner more reliant on technology to complete operational art. They have to contend with the potential of information overload and will have to develop the skill of being able to quickly assess the accuracy and relevancy of information and communicate that information with the right person within the battlespace at the right time.

The influences of new media on the operational art require focus by the Canadian Forces at the operational and strategic levels. Section 5 will address the problem space and explore why new media is of concern within the CF.

## 5. The challenges of new media in information operations

*The proactive approach in the implementation of new media is not without risk, and there have been less than perfect results, but the benefits far outweigh the concerns.*<sup>132</sup>

### Introduction

It is an understatement to say that information technology has fuelled significant changes, enormous improvement and advances in society. Our dependence on new media has simultaneously created a myriad of liabilities that threaten these same advancements. McNamara observes that the search for solutions must incorporate an increased awareness of the human behavioural dimension of this complex problem. While new media has introduced a new set of problems, the issue is not

<sup>132</sup>. "Public Relations: Exploring New Media ... Shaping the Battle Space," *Naval Forces* 31 (2010): 53, <http://search.ebscohost.com/login.aspx?direct=true&cdl=mth&AN=48181360&site=ehost-live> (accessed November 14, 2012).



with the technology but the human use and misuse of that technology. Apprehension towards the use of new media in the battlespace must be founded upon such an understanding, since people are both the source and the solution to the problem.<sup>133</sup>

This section focuses on information operations and new media. Two core activities of information protection and influence will be discussed. New media will introduce challenges and risk to information protection in both operational security and information security domains. Influence activities, as defined by perception management, will also have to consider the impact of new media on the message that the operational commanders want to portray to target audiences. The future application of new media technology in the battlespace will also be discussed as to how new technologies will enhance intelligence and information within an operational theatre.

### Information operations and new media

The use of new media within the battlespace is subject to the functions of information operations IO. CF doctrine *Land Operations* defines IO as:

[C]oordinated actions to create desired effects on the will, understanding and capability of adversaries, potential adversaries and other approved parties in support of overall objectives by affecting their information, information-based processes and systems while exploiting and protecting one's own.<sup>134</sup>

*Land Operations* affirms that IO is not an operation unto itself. Instead, it is a coordinated collection of capabilities related to maximizing the use of information, while at the same time denying it to the adversary.<sup>135</sup> Dearth identifies a synergy within IO between information assurance, critical infrastructure protection, information dominance and operational effectiveness.<sup>136</sup> A critical aspect to IO, however, is perception management (PM).

Seigel defines PM as the ability to shape worldwide perceptions in one's favour to foster compliance and facilitate mission accomplishment.<sup>137</sup> Public affairs, public diplomacy, psychological operations (PSYOPS) and deception all play significant roles with PM. According to Seigel, PM seeks to:

- a. build and preserve public opinion support (at home and abroad) to gain and maintain legitimacy;
- b. communicate intent and objectives to hostile and/or third parties to establish a high degree of credibility so they fully understand the consequences of their actions; and
- c. influence the attitudes and behaviors of the local populations so they act in accordance with US objectives.<sup>138</sup>

133. Michael R. McNamara, "Dysfunction in Cyberspace: The Insider Threat," in *Cyberwar 3.0: Human Factors in Information Operations and Conflict*, ed. Alan D. Campen and Douglas H. Dearth (Fairfax, VA: AFCEA International Press, 2000), 75–85.

134. Canada, Department of National Defence, B-GL-300-001/FP-001, *Land Operations* (Kingston: DND, 2008), 5–44.

135. Ibid.

136. Douglas H. Dearth, "Operationalizing Information Operations: C2W...RIP," in *Cyberwar 3.0* (see note 133), 97–109. Information assurance combines the confidentiality, integrity and availability of information. New media demonstrates that it is no longer adequate to secure information by physical means. Information dominance requires timely and accurate all-source intelligence on the adversary and the operational environment as well as the timely and accurate information on the location and capabilities of one's own forces. (Col John Boyd's OODA Loop).

137. Pascale Combelles Siegel, "Perception Management: IO's Stepchild," in *Information Warfare: Separating Hype from Reality*, ed. E. Leigh Armistead (Washington, DC: Potomac Books, 2007), 27.

138. Ibid.

PM will target many audiences. Domestic audiences require information about the operation's rationale, risks and benefits, for without public support, democracies cannot sustain military engagement. Meanwhile, adversaries' and third-party perceptions have to be managed so that they reorder their priorities and strategies in accordance with the military's goals and objectives.

Garfield suggests that PM presents itself as the element of greatest gains and risks within IO. The goal of the adversary is to undermine the public support for the allies' military action. The campaign waged by General Aideed in Somalia, which resulted in the withdrawal of US forces, largely undermined domestic support because of the images seen on TV and in the print media. During the Kosovo war, Milosovich's regime presented images designed to sow doubts in the minds of wider alliance publics, in the hope that it would result in declining support for military action.<sup>139</sup> The "first to post" adage carries significant weight within the conduct of an IO campaign. The important element to grasp in Dearth's focus on IO is the shift from the concept of purely kinetic attacks intended to destroy, to the concept of influence designed to manipulate the opponent into a disadvantageous situation—the idea of imposing one's will on the enemy.<sup>140</sup>

Canadian doctrine identifies several core activities inside of IO;<sup>141</sup> the two addressed in this paper are: information protection activities (which safeguard friendly information, thereby inhibiting an adversary's understanding) and influence activities (which are the primary means of influencing will). New media within these two core activities will offer challenges which commanders within the CF need to overcome.

### Information protection activities

#### *Operational security*

One of the 10 "principles of war" that govern the application of military power is security. The effective application of security forms the fundamentals of military operations and must be understood by commanders and staff at all levels.

Security protects the cohesion of a force and other elements of its combat power. During operations it serves to guard vulnerabilities and protect vital interests. In the case of operations security (OPSEC), the protection of information must be assured at all times, not just during the conduct of operations. Security further provides the freedom of action to achieve objectives as well as preventing the enemy from gaining an unexpected advantage. Security does not, however, imply undue caution and avoidance of risks, as bold action is essential to success in war.

The publication *CF Information Operations* identifies OPSEC as a "methodology that can be applied to any operation or activity for the purpose of denying critical information to the enemy. OPSEC is applied to all military activities at all levels of command."<sup>142</sup> A sound OPSEC plan by the commander outlines the critical incidents and actions that can be observed by adversary intelligence systems or that can be pieced together or interpreted to derive critical information that will jeopardize the secrecy, timing or execution of operations.<sup>143</sup>

The challenges to OPSEC are many. The commander has the internal challenges of commanding digital natives; most of whom embody a culture of communicative openness, with few qualms about

139. Andrew Garfield, "Information Operations as an Integrating Strategy: The Ongoing Debate," in *Cyberwar 3.0* (see note 133), 261–74.

140. Dearth, "Operationalizing Information Operations."

141. Canada, DND, *Land Operations*, 5–45.

142. Canada, Department of National Defence, B-GG-005-004/AF-010, *CF Information Operations* (Kingston: DND, 1998), 2–2.

143. Ibid.

sharing private information and thoughts on “personal” communication media.<sup>144</sup> Some members of younger generations may not have a sound understanding of the potential for the enemy to view personal postings or listen in on cellphone conversations. Douglass observes that they display naivety towards the domains of social networking.<sup>145</sup> They consider their private space on social networking is exclusive to them and to those who they choose to share it with. Many do not seem to share the healthy paranoia related to new media that digital immigrants had with traditional communications—letters and phone calls—in earlier operations.<sup>146</sup>

The reluctance of using new media within the military environment is due to the openness of access that new media applications have within cyberspace and the effect this openness will have on OPSEC. A singular occurrence of critical information that is inadvertently—or carelessly—broadcast on a Facebook account, blog, YouTube or email can be compiled by search engines and correlated with other open-source information to provide an adversary accurate intelligence.

Some OPSEC occurrences are more blatant than others. YouTube, for example, houses hundreds of home-made movies from troops in combat situations or comedic videos of troops relieving the pressures of battle. However, the information that resides behind or in the clip provides considerable information that endangers OPSEC. For example, a YouTube video<sup>147</sup> released in 2004 demonstrated how military videos impacted OPSEC in theatre. For years, soldiers have been posting videos of improvised explosive devices (IED) from operations in Iraq and Afghanistan. While the intent of each author who posted a video can only be speculated, the effect of the 2004 video was that it demonstrated the blast’s power and resulting damage to the convoy. One unintended result, however, was a change in training, tactics and procedures by the insurgents employing IEDs. An analysis of these IED videos (and notably, some of the video that insurgents captured during roadside attacks) saw the soldiers’ reactions at the site of the blast: what offensive and defensive postures they took, where they parked their vehicles, how many people showed up on site, and how long it took follow-on forces to arrive on scene. The 2004 video in question shows a second IED blast at the same location, striking the exposed military personnel assisting the victims of the first blast and protecting the blast site. The videos of US and allied forces exposed the security gaps of vehicle convoys, not by the intended content of the footage, but by analysing the background content.

### *Information security*

Another associated risk of new media technology is the compromise of confidentiality, integrity and accuracy of information. The enemy will purposefully publish and promulgate inaccurate information on actual incidents in order to compromise the integrity of available information. A military blogger could make comments or state facts that may misrepresent the mission and undermine the operation. Military forces must react to the accuracy and confidentiality of information that is posted online. Inaction or a slow response by military officials to set the record straight will only support the enemy’s lies. For example, a bomb dropped by ISAF forces strikes a military target and produces the desired effect. Collateral damage reports two locals injured in the blast. Al Jazeera, however, picks up the Taliban correspondence through their website that ISAF had purposefully targeted a local market and killed 23 civilians, including children. This message is first to post and, therefore, has a certain “stickiness” to the audience. ISAF publishes a statement after the fact; however, the sensationalism of the Taliban’s message washes over the truth.

144. Collings and Rohozinski, 54.

145. Fred Douglass, “On Social Networking and Communication Paradigms,” *IEEE Internet Computing*, 12, no. 1, (Jan./Feb. 2008): 4–6, <http://csdl.computer.org/dl/mags/ic/2008/01/mic2008010004.pdf> (accessed November 14, 2012).

146. Ibid.

147. “IED in Afghanistan,” YouTube, <http://www.youtube.com/watch?v=PKcNvIHC6hs> (accessed November 14, 2012).

To protect the integrity of military designated<sup>148</sup> networks such as the CF Defence Wide Area Network (DWAN), new media sites are inaccessible from the DWAN, and new media technologies cannot integrate with the network. Other devices, like smartphones, have their integrated online capabilities restricted or removed. Denying access on military unclassified systems will only drive digital natives to connect to the social network through their personal means.

Adopting new media into the mainstream of DND is inevitable. There remains little choice but to engage new media as a part of the larger media explosion. Failure to accept new media would leave an undesirable vacuum in which the adversary's version of reality would become the dominant perception.<sup>149</sup> US Department of Defense realized this inevitability and published new policy in February 2010 that will allow US military personnel access to social networking sites from the military's non-classified computer network, Non-classified Internet Protocol Router Network (NIPRNET).

An article in *The New York Times* comments that this development is considered a step forward by advocates of social networking in the military.<sup>150</sup> Advocates have criticized that local commanders, sometimes for vague or arbitrary reasons, have shut down personal blogs or restricted access to social networking. Now with the new directive in hand, all DoD components will reconfigure NIPRNET to provide access to Internet-based capabilities including collaborative tools, social media, user-generated content, social software, email, instant messaging and discussion forums (e.g., YouTube, Facebook, MySpace, Twitter and Google Apps).<sup>151</sup> The American directive is sound: it equally restates the rules and regulations on official use, OPSEC, representation of policies and official positions of DoD as well as records management. The office of the Deputy Secretary of Defense is assuming risk on the employment of external new media to the outside world. When the CF follows in their footsteps, they too will have to assume risks.

#### *Dealing with the risks of information protection activities*

Education and training in the use of new media are essential to mitigating the risks of information protection. Our time invested in work-ups prior to deployment for tactics and drills, weapon and communication systems as well as knowledge and understanding of the environment to which they are to be deployed is considerable.<sup>152</sup> Education and training on the use of new media is critical for operational success and must be continually in the forefront of training and simulation. National assets such as the Canadian Forces Network Operations Centre (CFNOC), Canadian Forces Electronic Warfare Centre (CFEWC) and 21 Electronic Warfare Regiment need to red team interception, collection and analysis of personnel during work-ups to deployment in order for soldiers to understand how easy it is to collect and analyse personal information in the hopes that, confronted with real-time examples and data of open source intelligence (OSINT), they will become more sensitive and cautious with open-source social networking. OSINT needs to expand efforts

148. Designated information is not classified. Designated information pertains to any sensitive information which does not relate to national security and cannot be disclosed under the access and privacy legislation because of the possible injury to particular public or private interests. Designated information (PROTECTED A and PROTECTED B only) can be processed on computers residing on the Defence Wide Area Network. Classified information can be designated *top secret*, *secret* or *confidential*. These classifications are only used on matters of national interest. Classified information is processed on dedicated private secure networks.

149. William Caldwell, Dennis Murphy, and Anton Menning, "Learning to Leverage New Media: The Israeli Defense Forces in Recent Conflicts," *Military Review* (May–June 2009): 3.

150. James Dao, "Military Announces New Social Media Policy," *The New York Times*, <http://atwar.blogs.nytimes.com/2010/02/26/military-announces-new-social-media-policy/> (accessed November 14, 2012).

151. United States, Department of Defense, Deputy Secretary of Defense, "Directive-Type Memorandum 09-026 - Responsible and Effective Use of Internet-based Capabilities," Feb 25 2010, <http://www.defense.gov/NEWS/DTM%2009-026.pdf> (accessed November 14, 2012).

152. This is certainly the case for Canadian and other Western forces. Levels of pre-deployment training for other nations will vary significantly based on their national contributions and training philosophy.

in using social networking against the enemy as well. The tools that we use to train our forces also need to be put into play to collect our own intelligence on the enemy's actions through the global network of open source.

A renewed effort in education and training in regard to new media is important; however, one cannot overlook the necessity for the chain of command to trust the digital native. Trust is the linchpin in most secure environments. Rules and regulations can be enforced for the physical security of information, but retained knowledge—the information in the minds of the soldier—is a consideration of trust in the individual. When an officer or NCM receives a security classification, the military has deemed that their background is suitable—there are no overt indications of criminal activity or conditions that would make the individual an easy target for coercion—to trust the individual to collect, process and safeguard sensitive information. Yet, we treat information different than we do weaponry. A soldier is issued a whole battery of weapons and is authorized to use them in theatre, and we trust the individual that they will not shoot their comrades. We have trained that soldier to use those weapons properly. We have to do the same for new media.

All members of the CF need to be properly trained on how to engage audiences, sanitize the information they post and protect the critical information they have on operations from being placed in the open-source realm. The creation of new media “rules of engagement” have to be established and applied.

### **Influence activities**

#### *The message*

Similarly, the soldier can be a vital participant in the CF's influence activities. Allowing the CF member to be an active participant in the global social network will enable a broader swath of information and exposure to many different sources and interest groups. A soldier who has been educated and trained as to what the focus of the message should be is able to be influential within his or her social group. Enabling the soldier to get the story out in a manner that gives credit to the operation and the organization is an effective tool in winning the IO campaign. As we discussed in Mattox's views in Section 4, the access to information that new media has afforded to the public has provided the public with the ability to form moral judgments concerning political actions and military conduct. This requires adaptability by both the government and the military to society's new medium of communication—one that is able to harness the “violence and passion” of the global audience and influence their perceptions.

The CF's first challenge in the operating environment is achieving meaning with key audiences. This will be achieved by getting the message out on the media that they frequent, in a vernacular that they understand, and through speakers that they trust.<sup>153</sup> Their second challenge is the speed of the message. As we discussed with perception management, shaping the conditions of acceptance and perceptions of society in the information age requires the message to be first to the post, accurate and influential. Finally, the CF's challenge with new media within the social element is the ability to be proactively interconnected with the network society so that influence can be attributed to the “citizen journalist” or blogger. All three of these challenges will require change in process and a shift in organizational responsibilities.

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153. Collings and Rohozinski, 65.



“The medium is the message.”<sup>154</sup> The infamous quote that the great Canadian Marshall McLuhan wrote in *Understanding Media: The Extension of Man* in 1964 enlightened generations that a medium affects the society in which it plays a role not by the content delivered over the medium but by the characteristics of the medium itself.<sup>155</sup> Distinctly enough, McLuhan also wrote that the “content” the medium broadcasts becomes itself a medium. To achieve meaning with key audiences, the CF has to be effective in its use of the “new medium” and influential in the message.

The CF needs to play both an offensive and defensive role in the conduct of IO. Our focus is on the societal elements of war; therefore, both offensive and defensive roles play equally among our adversaries and our home audience. Offensive IO is adopted against audiences (adversarial or friendly) who do not support the campaign while defensive IO is used on audiences that demonstrate interest and support to operations. Both types of IO are achievable through the use of media operations (public affairs) and PSYOPS.

The purpose of media operations is to protect the legitimacy and credibility of operations and promote widespread understanding of the operations.<sup>156</sup> It communicates through PA who facilitate information to audiences through all media sources. PSYOPS, however, influence the perceptions, attitude, and behaviour of selected individuals or groups. Unlike PA who manage the information communicated by third party sources, PSYOPS retain direct control over content and dissemination.<sup>157</sup> While the idea of using PSYOPS against our own citizens may not sound palatable to some, the fact is, the CF needs to invest in the production and dissemination of an influential message in a manner to target the audience without damaging the reputation and credibility of the role of PA. This is achievable through new media.

We have already commented on the pervasiveness and interaction of new media. Canadian trends in social media sites have been gaining momentum. In 2008, the Canadian Radio-television and Telecommunications Commission identified that conversational media and social networking sites had over 20 million unique visitors accounting for over 85 per cent reach of the Internet audience. Blogs were visited by 15 million unique visitors, a 63 per cent reach of the audience.<sup>158</sup> This is a growing demographic that needs to be influenced by the CF.

The CF needs to seize this opportunity by directly influencing the “message.” This can be accomplished in different manners. First, by directly administering social networking sites and blogs. Present exposure of the CF within new media is sparse at best. There is no official CF site on Facebook, for the Chief of Defence Staff or other major figures within the organization.<sup>159</sup> The official media publication, *The Maple Leaf*, does not have a blog application, “share” API or other commentary function besides a “comments” tab.<sup>160</sup> There is also an absence of official CF coverage on military blogging websites like [www.milblogging.com](http://www.milblogging.com) that hosts over 2600 military blogs in 43 countries. This site, an Internet database for organizing military blogs, has only 25 milblogs

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154. “Commemorate 100 years of McLuhan!” Marshall McLuhan, <http://www.marshallmcluhan.com> (accessed November 14, 2012).

155. Herbert Marshall McLuhan, *Understanding Media: The Extensions of Man* (New York: McGraw-Hill, 1964), 9.

156. *Ibid.*, 5–48.

157. *Ibid.*, 5–47.

158. Gerry Sinclair, Julie Ziber, and Ed Hargrave, “Regulating Content on the Internet: A New Technological Perspective,” Canada, Industry Canada, <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09030.html?Open&pv=1> (accessed November 14, 2012).

159. There are Facebook sites that are titled “Canadian Forces” or “Canadian Army”; however, they are not listed as official pages and lack considerable amount of detail. These are private pages.

160. Canada, Department of National Defence, *The Maple Leaf*, <http://www.forces.gc.ca/site/commun/ml-fe/index-eng.asp> (accessed March 31, 2010, site discontinued).



from Canadian participants.<sup>161</sup> The forum for choice to whet the appetites of Canadian military conversationalists is Army.ca.<sup>162</sup> This is an unofficial site that has an array of military forums and boasts over 850,000 posts, 51,000 topics by 25,650 members. The site also contains a “wiki”<sup>163</sup> of CF and DND information. The CF needs direct input into the creation of blogs for comment by the people and by CF members. The engagement of third party bloggers that would provide highly indexed content with chosen keywords for maximum exposure are options, if manning and skills are lacking within the present cadre of military personnel. This would accomplish two effects: proactive interconnection with society and connection in a media frequented by the target audience. Video sites, like YouTube, need to have CF channels that adhere to the challenges of OPSEC and still portray troops in action, soldiers lives in austere conditions and evidence of the effects that Canadians are having in theatres such as Afghanistan and Haiti. The CF needs to be “first to post” to get the message out on what is being accomplished in the tone and framing that influences the audience. Should these productions be PA led or PSYOPS led? I would say both. It would accomplish both offensive and defensive IO in influencing key audiences.

### *The technology*

The CF has an opportunity to commence an information engagement through the use of new media on the battlefield. Military research and development in the use of new media tools has the potential to increase protection of soldiers on the ground and the collection of information for intelligence sources. New technologies that permit augmented reality (AR) will assist the soldier in operations. AR adds graphics, sounds, haptic<sup>164</sup> feedback and smell to the natural world as it exists. Both video games and cellphones are driving the development of augmented reality. AR will enable the user to benefit from the ability to place computer-generated graphics in their field of vision.<sup>165</sup>

AR developers like Layar<sup>166</sup> have applied the technology to browsers that show what is in your environment by displaying real-time digital information on top of the real world as seen through the camera of your mobile phone. Layar works by using a combination of the mobile phone’s camera, compass and GPS data to identify the user’s location and field of view, retrieve data based on those geographical coordinates and overlay that data in the camera view.<sup>167</sup> Data can be stored as wiki notes on the screen that, when activated on a mobile touch screen, opens to provide a multitude of information and intelligence. AR applications like this would be useful for military personnel in operations. As they walk or drive the ground, AR can give the user constant overlapped data on route directions, historical IED strike locations and names of important features. Future new media capabilities like this can be projected on windshields or even inside protective eyewear.

The soldier can also use new media as a HUMINT source on the ground. Snapping photos and sending them back to the all source intelligence centre (ASIC) or scanning a local’s fingerprints or other biometrics to be compared with a centralized database would provide information to the soldier on the ground about whether to release or detain locals. The real-time collection of video, photos or reports from within the battlespace will assist the commander to make better, sound and timely decisions and speed up the production of media releases with accurate and credible information.

161. “The Story of Milblogging.com,” Military.com, <http://www.milblogging.com/about.php> (accessed November 14, 2012).

162. “Army.ca Forums,” <http://forums.army.ca/> (accessed November 14, 2012).

163. A “wiki,” meaning “fast” in Hawaiian, is a website that allows easy creation and editing of interlinked web pages via a web browser.

164. Haptics is a tactile feedback technology that takes advantage of a user’s sense of touch by applying forces, vibrations and/or motions to the user.

165. Kevin Bonsor, “How Augmented Reality Works,” How Stuff Works, <http://www.howstuffworks.com/augmented-reality.htm> (accessed November 14, 2012).

166. <http://layar.com> (accessed November 14, 2012).

167. “What is Layar – Augmented Reality Browser: Layar” <http://layar.com/download/layar/> (accessed April 3, 2010, site discontinued).

There are many facets of new media that can be developed into better, more flexible technological tools that will provide more succinct information to the soldier and enable the intelligence and PA branches of the military to better influence the message. The application of new media technology in operations will assist the commander and their staff to achieve information dominance in the battlespace and information engagement with target audiences.

### Summary

IO and new media do not diminish the role of the commander. However, they do necessitate significant changes in the nature of command to ensure the potential of IO and the digitization of the battlespace are fully exploited. At the same time, commanders must adapt to the significant changes that have occurred and that are still taking place in the strategic environment.<sup>168</sup>

The commander has succinct challenges in the complete implementation of new media within a theatre of operations. Information protection activities such as OPSEC and information security (INFOSEC) are challenged by the openness of new media, and the ease of information to be promulgated through social networking means that it can be collated and analysed by the adversary to gather intelligence on operations, key leaders as well as tactics, techniques and procedures. New media also enables the adversary to threaten the confidentiality, integrity and accuracy of information and allows our own users to do the same.

New media is also pivotal in the influence activities of IO. The media is the outlet for the message; the challenge for the CF is to deliver that message to the target audiences with timely, accurate and relevant information. Enabling the soldiers in theatre to provide that message will close the timelines in getting the message out in the domain that the audience uses, and in a language that they understand. Shaping the conditions of acceptance and perceptions of society in the information age requires the message to be first to the post, accurate and influential. Adopting new technologies like AR that evolve new media capabilities will be a challenge but will also be a considerable benefit to the soldier in the provision of real-time information in the battlespace.

The reality is that IO is still far from a mature concept, and it comes at a cost as well as with benefits. It is an integrating strategy that creates new vulnerabilities as well as significant opportunities. The challenge to the CF is two-fold: first, to develop a better understanding of the strategic context and real-world conditions influencing the employment of new media within the military environment and second, to identify and highlight the changes that our political, military and intelligence communities need to introduce in order to fully exploit the benefits of the new media environment of IO.

## 6. Conclusion

This paper argues that new media and informationalism have a profound impact on CF operations and that the effects of new media on the battlespace must be considered within operational planning in order to ensure strategic success. It describes the technological paradigm of the information society and supports the theory of informationalism as a catalyst for social evolution in the global adoption of new media. Informationalism has empowered all levels of society through increased access to information and providing them with a global voice. Understanding informationalism and the network society has established that we cannot ignore the human element of new media and the new media characteristics that are expected within today's society.

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168. Garfield.

This research identified that the characteristics of new media are the framework for future communications in the CF. Characteristics like instantaneous connection and interactivity are important, not only to a soldier's personal communication needs but also to the structured command and control networks of the Army, Navy, Air Force and special forces. As the divide between our digital immigrants and digital natives narrows, the expectation of what is achievable on commercial networks—both from a technological and informational perspective—will be transferred over to the expectations of the military's private networks. The CF will benefit from the present capabilities of the pervasive and social new media in the public domain.

Section 4 demonstrated how new media is challenging the operational art of the staff officer and impacting the political, informational and military elements of conflict. Commanders and their staffs need to fully comprehend not only military but also the diplomatic, political, economic, financial and social aspects of the situation in a given theatre when they plan, prepare and execute major campaigns or operations. New media does challenge the diplomatic, informational and military lines of an operation or campaign.

The influence of diplomacy on a targeted society is more difficult because of new media's ability to enable people to access international informational sources. The military planner, then, has to leverage new media in order to get the diplomatic message out to influence the population. The view of society on the social issues related to the theatre of war also impacts operations. This paper identifies that new media has enabled the relevant social issues of a war to be disseminated worldwide, stirred the emotions of the public and directly influenced the government's foreign policy.

On the military line of operation, new media has greatly improved the operational commander's common operating picture and situational appreciation for the battlespace. Military forces, however, have to deal with the abundant volume of information available, making the modern-day planner more reliant on technology to complete operational art. They have to contend with the potential of information overload and will have to develop the skill of assessing the accuracy and relevancy of information.

The commander has succinct challenges in the complete implementation of new media within a theatre of operations. This paper established that information protection activities and influence activities of information operations are challenged by the openness of new media, the ease of information to be promulgated through social networking means, and the ability of the adversary to threaten the confidentiality, integrity and accuracy of information.

New media is the outlet for the message; the challenge for the CF is to deliver that message to the target audiences with timely, accurate and relevant information. Adopting new media technologies that will evolve new media capabilities will be a challenge but will also be a considerable benefit to the soldier in the provision of real-time information in the battlespace.

The "uncertainty and chance" of war is never fully avoided. Commanders and staff officers apply their operational art to the best of their abilities and training in hopes that their operational courses of action contain enough actionable knowledge so as to mitigate the risks of the plan to achieve success. New media is, and will be, a discernable source of information and knowledge for military operations. It has the potential to turn every soldier into a real-time digital sensor within the battlespace, empower social subgroups that exist within the military to work collaboratively, and instantaneously influence perceptions both at home and in theatre. The CF has to develop an implementation plan to adopt new media and foster its development. This plan, however, will result

in the assumption of risks in its employ. Mitigating those risks will occur through more resilient education and training on the employment of new media, better discipline on the use of new media throughout the chain of command and a higher sense of trust between the digital immigrants and digital natives of the CF.

The CF is not seizing the full potential that new media and the digital natives have to offer. New media is a “centre of gravity” for the success in influencing the “hearts and minds” of Canadians and other audiences within operations. Organizational efforts have to be implemented in earnest to develop a better understanding of the strategic context and real-world conditions influencing the employment of new media in order to positively affect the desired end states of military operations.

## Abbreviations

<b>3G</b>	third generation
<b>API</b>	application programming interface
<b>AR</b>	augmented reality
<b>ARPAnet</b>	Advanced Research Projects Agency Network
<b>AWCC</b>	Afghan Wireless Communication Company
<b>C2</b>	command and control
<b>CF</b>	Canadian Forces
<b>DARPA</b>	Defense Advanced Research Projects Agency
<b>DND</b>	Department of National Defence
<b>DWAN</b>	Defence Wide Area Network
<b>GPS</b>	global positioning system
<b>HUMINT</b>	human intelligence
<b>ICT</b>	information communications technology
<b>IDC</b>	International Data Corporation
<b>IED</b>	improvised explosive device
<b>IO</b>	information operations
<b>ISAF</b>	International Security Assistance Force
<b>IT</b>	information technology
<b>ITU</b>	International Telecommunications Union

<b>NATO</b>	North Atlantic Treaty Organization
<b>NCM</b>	non-commissioned member
<b>NCW</b>	network-centric warfare
<b>NIPRNET</b>	Non-classified Internet Protocol Router Network
<b>OODA loop</b>	observe, orient, decide and act loop
<b>OPSEC</b>	operations security
<b>OSINT</b>	open source intelligence
<b>PA</b>	public affairs
<b>PM</b>	perception management
<b>PSYOPS</b>	psychological operations
<b>RSS</b>	Rich Site Summary (alternate term is Really Simple Syndication)
<b>SMS</b>	short message service
<b>TV</b>	television
<b>US</b>	United States
<b>VoIP</b>	voice over Internet Protocol

## Chapter 8 – Hauling Down the Jolly Roger: Canada's Stake, Obligation and Participation in Countering Maritime Piracy

Lieutenant-Commander David Patchell

### Abstract

Maritime piracy is a complex problem that has existed as long as commerce has transpired at sea. In the 21<sup>st</sup> century, piracy still occurs off the coasts of Asia, South America and Africa but is most prevalent in the Gulf of Aden off the coast of Somalia. In response to the problem, and because of the potential for the impact of piracy to increase, the United Nations (UN) has issued resolutions condemning piracy; Canada has responded to the United Nations' mandate by committing a significant maritime force to combat the scourge. But what is Canada's stake in suppressing and mitigating the piracy problem? After all, piracy currently has a low economic impact for Canada and does not occur in Canadian waters. However, given the potential economic threat should piracy proliferate, the potential security and environmental threats as well as the heinousness of the crime and because of the country's commitment to the United Nations, Canada has a stake in countering maritime piracy.

Canada's Navy is obligated to stop the piracy it encounters, and as a beneficiary of world trade, Canada is arguably morally obligated to actively deploy forces in counter-piracy efforts. However, in order for Canada to continue to contribute to counter-piracy efforts, the country will need to invest in the recapitalization of its maritime forces, possibly by building modularized patrol vessels; these vessels could potentially be less expensive to build than cold-war focused conventional warships and could be adapted for a multitude of potential missions. As a self-professed internationally engaged country, Canada should invest in its maritime forces and continue to work collaboratively with other nations in mitigating piracy to an acceptable level.



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## 1. Introduction

As long as there has been maritime commerce, piracy has existed. Historically, piracy has been a challenge for the marine industry and governments alike. The piracy of the past is sometimes romanticized in books and movies, but in today's context, the majority of the world's governments, and the United Nations, consider maritime piracy a "crime against nations."<sup>1</sup> The significant press coverage of the bold attacks off Somalia has increased the public's awareness of the issue. The capture of Captain Richard Phillips, taken hostage by pirates, made front-page news and thrust the war against piracy into the spotlight.<sup>2</sup> The encore attack on the same vessel, the motor vessel (MV) *Maersk Alabama* on 18 November 2009, confirmed that piracy was rampant off the northeastern coast of Africa and throughout the globe as it was the 362<sup>nd</sup> recorded pirate attack worldwide in 2009.<sup>3</sup> The contemporary pirates who conduct these attacks use new equipment and tactics to meet the same ends as pirates of yesteryear: armed robbery at sea. Piracy is an old problem with new variants. The increased size of merchant ships, the shipping of volatile material and the use of modern weapons make today's pirates capable of inflicting damage on a tremendous scale, posing a potential disaster to economies, the environment and security throughout the world.

Piracy may be a global problem, but it does not occur equally in all parts of the world. Maritime piracy predominantly takes place beside weak states that lack the means to enforce law and order and also happens on the high seas, where law enforcement is virtually non-existent. In the 21<sup>st</sup> century, piracy most frequently occurs in the vicinity of Somalia, but Nigeria, Indonesia, Bangladesh and Tanzania are also high-risk areas.<sup>4</sup> The combination of economic inequality, opportunity to seize high value targets and the lack of central authority and law enforcement makes these areas ripe for pirate attacks. The global, interconnected economy of the 21<sup>st</sup> century has seen a tremendous increase in international trade, with over 45,000 ships transporting cargo worldwide.<sup>5</sup> These ships present opportunities for pirates, especially when transiting through narrow waterways where maritime forces are scarce or non-existent.

Pirates have proliferated in areas where they are sanctioned by local or national authorities, where they can circumvent international law or where coastal security is lax. Piracy is often more prevalent where maritime security forces are either too small or ineffectual. As well, small arms, used to inflict the violence of piracy, are readily available throughout the world, including assault rifles, knives and rocket-propelled grenades. Acts of piracy generally fall into three broad categories: (1) low-level piracy or robbery, often netting the perpetrators US\$5,000–15,000, consists of robbers attacking ships in harbour or at anchor and stealing cash or high-value personal items; (2) mid-level piracy is robbery that occurs at sea and often involves injuries or deaths for the victims; and (3) high-level piracy includes the outright theft or hijacking of ships which can net the criminals millions of dollars in ill-gotten profits.<sup>6</sup> Piracy has a real human cost for the mariners who experience it first hand and an economic impact for the shipping companies and countries involved.

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1. Jack Gottschalk and Brian Flanagan, *Jolly Roger with an UZI* (Annapolis: Naval Institute Press, 2000), 28.

2. Jason Straziuso, "Maersk Alabama Repels 2<sup>nd</sup> Pirate Attack with Guns," *Associated Press*, [http://news.yahoo.com/s/ap/20091118/ap\\_on\\_re\\_af/piracy](http://news.yahoo.com/s/ap/20091118/ap_on_re_af/piracy) (accessed November 28, 2009, site discontinued).

3. International Chamber of Commerce (ICC), International Maritime Bureau (IMB), *Piracy and Armed Robbery against Ships Annual Report 1 January – 31 December 2009* (London: ICC International Maritime Bureau, 2010), 82.

4. Peter Chalk, "Maritime Piracy: Reasons, Dangers and Solutions" (Santa Monica: RAND Corporation, 2009) [http://www.rand.org/pubs/testimonies/2009/RAND\\_CT317.pdf](http://www.rand.org/pubs/testimonies/2009/RAND_CT317.pdf) (accessed October 11, 2012).

5. United Nations (UN), International Maritime Organization (IMO), "International Shipping: Carrier of World Trade," <http://www.marisec.org/shippingfacts/uploads/File/worldtradeflyer.pdf> (accessed October 11, 2012).

6. Peter Chalk, *The Maritime Dimension of International Security: Terrorism, Piracy and Challenges for the United States* (Santa Monica: RAND Corporation, 2008), 6.

Maritime piracy is a current and serious problem, deemed by the United Nations as deserving of attention. To some, piracy may seem like simple thievery; the pirates are sometimes idolized as Robin Hood figures, stealing from the rich merchant. But that view simply indicates an unawareness of the vulnerability of a ship in the volatile environment of the sea. The international authorities, the United Nations and the International Maritime Bureau (IMB), have concentrated their efforts to define piracy and resolve what can and should be done in response to the global crime that piracy is. The UN and the IMB have carefully defined piracy, singling it out from simple robbery due to the use of violence at sea. The legal definition, adopted by the United Nations Convention on the Law of the Sea (UNCLOS) in 1982, states:

Piracy consists of any of the following acts:

- (a) any illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed:
  - (i) on the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft;
  - (ii) against a ship, aircraft, persons or property in a place outside the jurisdiction of any State;
- (b) any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft;
- (c) any act of inciting or of intentionally facilitating an act described in subparagraph (a) or (b).<sup>7</sup>

The key components in the UNCLOS definition are that piracy has to occur on the high seas and has to involve at least two ships. This definition, however, is limited for the statistical purposes of the International Maritime Bureau. The IMB, the lead international agency for compiling data on pirate attacks, chooses a broader definition that includes acts committed outside of the high seas, acts within harbours and also acts of terrorism. The IMB defines piracy as “the act of boarding any vessel with an intent to commit theft or any other crime, and with an intent or capacity to use force in furtherance of that act.”<sup>8</sup> Though the UN and the IMB use different definitions to describe maritime piracy, they agree that the use of force at sea is fundamental to piracy. It is also important to note that through their use of the broader definition, the IMB includes more acts of piracy, making their statistics higher than events under the legal definition. The legal distinctions, while important for maritime forces chasing pirates and judicial systems prosecuting pirates, are perhaps less important for the attacked seafarers, who are the true victims of maritime piracy. Piracy at its base consists of armed robbers with weapons ruthlessly attacking ships where there is no escape for victims and there is little or no law enforcement; pirates, by force, seize goods and treat the crew violently and horrifically. On 30 October 2009, the Swiss-flagged bulk carrier MV *Silvretta*, while transiting about 20 nautical miles [37 kilometres] off Nigeria, was attacked by approximately nine pirates armed with automatic rifles. The pirates attacked, boarded and then opened fire on the ship; the resulting violence left nine crew members injured and three in critical condition. The master’s fingers were broken to force compliance during the attack.<sup>9</sup> The methods and intensity of this one

7. United Nations, “United Nations Convention on the Law of the Sea (UNCLOS),” Article 101, [http://www.un.org/Depts/los/convention\\_agreements/convention\\_overview\\_convention.htm](http://www.un.org/Depts/los/convention_agreements/convention_overview_convention.htm) (accessed October 11, 2012).

8. ICC, IMB, *Annual Report 2009*, 3.

9. Ibid., 32.

attack illustrate the violence of piracy, a historical trademark of pirates which is accentuated by the availability of powerful small arms to contemporary pirates. Maritime piracy is a heinous crime committed throughout the world. It takes advantage of the open vulnerability of the sea, a place where dominant force commands. It is in this environment that navies are needed to prevent piracy. With constant pressure and patrols, piracy can be managed; the collective international response will determine the extent to which it can be managed.

In the past two years, six resolutions have been written by the UN to allow navies to prevent piracy in Somali territorial waters. A window of opportunity has been created for the world to combat the specific issue of Somali piracy. In response, Canadian naval forces have been committed to join the navies of other countries patrolling the worst affected coastal areas. In August 2008, Her Majesty's Canadian Ship (HMCS) VILLE DE QUEBEC, a Canadian HALIFAX class frigate, was redeployed from the Mediterranean to the Gulf of Aden, off Somalia, in order to escort and protect World Food Program ships from the rise of pirate attacks.<sup>10</sup> The Canadian effort allowed much-needed aid to arrive in Somalia. In fact, during the past two years, Canada has contributed to counter-piracy operations by deploying three individual ships, HMC Ships VILLE DE QUEBEC, WINNIPEG and FREDERICTON and a task group consisting of HMC Ships IROQUOIS, CALGARY and PROTECTEUR to the region. This force constituted Canada's largest deployment of military personnel, outside of Afghanistan, during the 2008/2009 timeframe. Canada, with a maritime force comprised of only 17 major surface combatants, has committed significant resources to maritime security in the Gulf of Aden and, specifically, to the war on piracy. With a Navy of limited numbers and aging ships, the continued naval support of the UN mandate may be unsustainable. However, at the current time, Canada does have the forces to contribute and is doing so both to prevent the horrific violence associated with piracy and to demonstrate Canada's commitment to the United Nations.

With the recent increase of events off the Horn of Africa, journal and newspaper articles relating to maritime piracy have proliferated. In terms of book-length pirate accounts, many authors, including David Cordingly's *Under the Black Flag* and Peter Earle's *The Pirate Wars*, have chronicled the golden age of piracy in the 17<sup>th</sup> and 18<sup>th</sup> centuries.<sup>11</sup> What is interesting, even in these historical accounts, is that as much as people might want to romanticize piracy, at its essence, it is violent, barbaric and a crime against humanity. In 1985, Roger Villar's *Piracy Today* was the first to address contemporary maritime piracy. At the time, the book was the "most comprehensive" on maritime piracy although actual statistics and recorded accounts of piracy were difficult to acquire.<sup>12</sup> In 1985, the main scourge of piracy occurred in Western Africa, particularly off the coast of Nigeria, where a disgruntled population engaged in piracy against oil-bearing ships. Like others' accounts of maritime piracy, *Piracy Today* chronicles the use of knives and firearms in the extreme violence associated with piracy. In the years since 1985, piracy was not the subject of significant academic literature until the early 21<sup>st</sup> century.

The new century has seen a resurgence in piracy and accounts concerning the issue. In 2000, Jack Gottschalk and Brian Flanagan wrote *Jolly Roger with an Uzi*, a detailed look at piracy and its economic and security costs.<sup>13</sup> They argue that piracy is a problem to be taken seriously and that only military force has had a significant effect in countering piracy. Because the IMB had started collecting data on piracy in 1992, the book is actually quite comprehensive and includes

10. "Canadian Warship to Protect Food from Pirates off Somalia," Cable News Network, <http://edition.cnn.com/2008/WORLD/americas/08/06/somalia.piracy/index.html> (accessed October 11, 2012).

11. David Cordingly, *Under the Black Flag* (New York: Random House, 1996); and Peter Earle, *The Pirate Wars* (New York: St. Martin's Press, 2003).

12. Roger Villar, *Piracy Today* (London: Carmichael and Sweet, 1985), 7.

13. Gottschalk and Flanagan.

detailed analysis of where piracy occurs. In 2002, John Burnett's *Dangerous Waters: Modern Piracy and Terror on the High Seas*, a book inspired by his experience of being a victim of a pirate attack, provided further insight into the violence of maritime piracy.<sup>14</sup> Interestingly, Burnett asserts that a nexus exists between piracy and terrorism, a claim since disputed. Most recently, Martin Murphy's book, *Small Boats, Weak States, Dirty Money*, published in 2009, is a very thorough account both of modern piracy and maritime terrorism. Murphy defines contemporary piracy as beginning in 1983, the year in which the International Maritime Organization's (IMO) first commented on the increased number of incidents of piracy throughout the world.<sup>15</sup> As well, Murphy asserts that although piracy and terrorism may be very similar in execution, the motivations behind the two are very dissimilar and there is no proven relationship or nexus.<sup>16</sup> A common theme throughout the literature is that piracy is a real concern, as opposed to a mere nuisance. The authors assert that piracy needs to be taken seriously and addressed by the shipping industry, governments and international organizations. What is missing in the book-length literature concerning maritime piracy is the Canadian perspective and whether or not Canada is affected by piracy or has a role in its suppression. This gap is largely filled by *Canadian Naval Review* articles that relate to Canada's role in maritime piracy operations and similar material written by Canadian defence analysts such as Peter Lennox, Ken Hansen and David Mugridge. Ken Hansen specifically notes that "the relevance of distant pirate attacks to Canada has taken on a more human dimension than just a statistical one concerned with the cost of shipping commodities."<sup>17</sup> In other words, the impact to Canada's economy may be less important than Canada's stake in upholding the security and freedom of the seas.

Does Canada have a stake in the suppression of maritime piracy? This question is challenging to answer because all events of piracy recorded by the IMB during the last five years and reported by the world's press happened in waters well away from Canada, with the majority of attacks transpiring in Asian and African waters.<sup>18</sup> While piracy has a regional economic and security impact, the direct impact on Canada is arguably marginal. The world, however, is economically connected and events that happen on the opposite side of the globe may very well affect Canada. The closure of a major trade route, either through excessive piracy or because of an environmental disaster caused by piracy, could delay or increase the cost of global shipping. The effect of piracy on the global economy, and by proxy on Canada, has the potential to increase if piracy is allowed to proliferate, especially in the vicinity of major trading routes.

As an importing and exporting nation, Canada does have a stake in ensuring the freedom of the seas, but what are Canada's obligations to fight piracy? International law obliges navies to stop piracy whenever encountered on the high seas but does not specifically obligate a country to deploy for counter-piracy operations. To seek out piracy, a country would need to decide that doing so is either in its national interest or that a compelling enough moral obligation exists to entice the state to suppress piracy. This moral obligation can arguably be based on United Nations' direction. Canada subscribes to the international treaties and conventions written under the jurisdiction of the UN, which as reflected both in UNCLOS and in recent United Nations Security Council resolutions (UNSCRs) concerning maritime piracy off Somalia, considers maritime piracy to be a threat that should be fought because of the grave danger ongoing piracy poses to the "prompt, safe, and effective delivery of humanitarian aid to Somalia and the region, to international navigation and to the safety

14. John Burnett, *Dangerous Waters: Modern Piracy and Terror on the High Seas* (New York: Penguin Group, 2002), 310.

15. Martin Murphy, *Small Boats, Weak States, Dirty Money* (New York: Columbia University Press, 2009), 2–3.

16. *Ibid.*, 380.

17. Ken Hansen, "Piracy: How Will Canada Respond to New Developments," *Canadian Naval Review*, <http://naval.review.cfps.dal.ca/forum/view.php?topic=52> (accessed October 11, 2012).

18. ICC, IMB, *Annual Report 2009*, 7.



of commercial maritime routes, and to other vulnerable ships.”<sup>19</sup> Not only is piracy dangerous to ships, at its base level piracy is a heinous act committed by criminals against weaker victims in an unstable environment—the sea. Accordingly, Canada has demonstrated a willingness to contribute to the United Nations efforts in countering maritime piracy through the deployment of its small blue-water Navy to the hostile waters where piracy is most prevalent. Canada’s response shows its commitment to the UN and is a physical manifestation of Canada’s foreign policy of being internationally engaged. However, the challenge to Canada, given that the direct impact of maritime piracy is minimal, is to ensure that Canada’s response is appropriately weighed with Canada’s other security concerns and international commitments.

Canada’s stake in countering maritime piracy is based on Canada’s roles as an internationally engaged country, in guaranteeing safety for mariners and in ensuring freedom of the seas. These intangibles could be left to other nations, but Canada would be remiss in not doing its part. As a trading nation, Canada benefits from world security and has a vested interest in protecting worldwide sea lanes of communication. Canada’s Navy is legally obligated to stop the piracy it encounters and is obligated to fight maritime piracy under international law and under UNSCRs which call for all states to suppress piracy. Canada does have the authority to stop maritime piracy and is encouraged by the UN to do so. However, it will only be through a moral, rather than legal, obligation that Canada will deploy its maritime force to actively suppress the pirates. The utility of navies, working collaboratively, in suppressing maritime piracy is paramount, a fact proven throughout history. Canada has the capacity to contribute ships to countering piracy; however, the current make-up of the Canadian Navy, comprised of a small number of ships and aging equipment, means that decisions have to be made concerning employment. If Canada does believe that maritime security, and countering piracy, is important, it will have to continue to invest in its Navy and ensure there is an appropriate force structure for meeting the security challenges of the 21<sup>st</sup> century. There are challenges in using navies to fight piracy which include cost; the willingness to sustain operations; the loss of assets to other operations; and the argument that navies can only combat the symptom of piracy, not the root socio-economic causes ashore. However, in places of the world where piracy occurs, there is often a lack of regional security, and it is only through international intervention that the injustice of piracy can be repressed. Overall, given the potential economic threat should piracy proliferate, the potential security and environmental threats, the heinousness of the crime and because of the country’s commitment to the UN, Canada has a stake in countering maritime piracy.

## 2. Canada’s stake in suppressing maritime piracy

Canada has a stake, arguably for both economic and security reasons, in suppressing piracy. Because of its investment in the global economy, the economic stake to Canada as a trading nation in mitigating piracy is real, even though the direct and measurable impact to the Canadian economy may be low. The contemporary pirate has an effect on regional economies, but the direct financial impact that a Somali pirate has on a country across the globe, such as Canada, is statistically minimal.<sup>20</sup> In terms of piracy being a direct security threat, there has not been a recorded incident of maritime piracy in Canadian waters, even North American waters, during the 21<sup>st</sup> century, and as reported by the IMB, only once in the past five years has a Canadian-flagged vessel been afflicted by piracy.<sup>21</sup>

19. United Nations Security Council (UNSC), “Resolution 1897,” <http://www.un.org/en/sc/documents/resolutions/2009.shtml> (accessed October 11, 2012).

20. Peter Chalk, Laurence Smallman, and Nicholas Burger, “Countering Piracy in the Modern Era: Notes from a RAND Workshop to Discuss the Best Approaches for Dealing with Piracy in the 21<sup>st</sup> Century” (Santa Monica: RAND National Defence Research Institute, 2009), 2.

21. ICC, IMB, *Annual Report 2009*, 8.



However, piracy has festered throughout the world for hundreds of years, shifting and breaking out based on prevailing conditions. Even though the proliferation of piracy off the coast of Canada seems unlikely, the potential for a deteriorating situation caused by piracy does exist in other parts of the world. The possibilities that could cause such a situation include a piracy-terrorism nexus, a major environmental disaster caused by piracy or the proliferation of piracy to such an extent that shipping companies would have to avoid certain trade routes. If a major shipping route shut down, the world's economy could be strongly and negatively affected; the second- and third-order effects from such an occurrence would likely touch the globally linked Canadian economy. Canada should, therefore, help to ensure the freedom of the seas and promote the stable seaborne transportation of people and goods, regardless of whether Canadian citizens or Canadian-flagged vessels are involved. As a trading nation, it is in Canada's interest to promote a secure global system which includes the mitigation of maritime piracy.

Contemporary piracy does not occur in Canadian waters and rarely affects Canadian citizens, but a stake exists because of the vital importance of maritime transport to Canada's economy. Although piracy shifts over time and Canada has both the geography and shipping volume that might entice maritime piracy, capable maritime security prevents piracy from proliferating in Canada. As well, the overall financial impact of maritime piracy to the global economy, although inherently difficult to measure, is assessed to be low. However, maritime shipping is vital to the world's economy, and if piracy were allowed to proliferate, it could have a destabilizing effect on major shipping routes and, thus, on the global economy. Canada has a vested interest in a robust international economy, and the importance of global trade is reflected in Canada's foreign policy. Economics and security are linked; secure waterways will allow goods to travel safely throughout the world and will increase trade among nations. On a global scale, the overall economic impact of piracy will remain small so long as the associated security issues are kept in check by internationally engaged countries. Canada can work collaboratively with other countries in minimizing these security threats. Canada, as an internationally engaged country, has an interest in keeping global trade routes free from the violence associated with maritime piracy and, therefore, has a stake in suppressing piracy, a crime that history shows can not be eliminated but can be managed to acceptable levels.

### Contemporary maritime piracy

Piracy, although it has ebbed and flowed across the globe, has existed for thousands of years. The earliest recorded maritime piracy occurred in 800 BC and since that time has occurred in Europe, the Mediterranean, in the Americas and in Asia.<sup>22</sup> The 17<sup>th</sup> and 18<sup>th</sup> centuries saw the golden age of piracy, an age glamorized in Hollywood movies, upon which some of the modern romantic views of piracy are based. However, because of the dominance of the Royal Navy, and persistent military campaigns to dampen the scourge, piracy waned during the 19<sup>th</sup> century; by 1850, piracy was stated to have become "a minor sideshow and there it remained."<sup>23</sup> Unfortunately, pirates are no longer a historical phenomenon. They have resurged in the 21<sup>st</sup> century; largely because of the disruption to global shipping routes and because of the increased media attention, pirates have become a global issue.<sup>24</sup> The IMB's Piracy Reporting Centre, a specialized division of the International Chamber of Commerce, was established in 1992 to increase the accuracy of statistics on maritime piracy.<sup>25</sup> Since its formation, the IMB has documented credible reports that expose the scope of piracy

22. Alfred Bradford, *Flying the Black Flag* (Westport: Praeger Publishers, 2007), xii.

23. John Scott Cowan, "Is a War on Terror Possible? Lessons from the Long War Against Piracy," *Queen's Quarterly* 114, no. 1 (Spring 2007), <http://proquest.umi.com/pqdweb?did=1285304481&Fmt=7&clientId=17118&RQT=309&VName=PQD> (accessed October 11, 2012).

24. Bradford, 190.

25. ICC, IMB, *Annual Report 2009*, 2.

attacks worldwide. In the last five years, piracy has mainly occurred off South East Asia, the Indian subcontinent and Africa with an increase from 276 worldwide incidents in 2005 to 406 in 2009.<sup>26</sup> The increase is significant; however, during this time period, there were no incidents of piracy in North America and only three incidents in Europe. Since 2005, South East Asia has seen incidents of piracy decrease by 50 per cent (102 incidents in 2005 to 45 in 2009); whereas, in the Gulf of Aden and Somalia, where there are no regional maritime forces, piracy has jumped by over 400 per cent (45 incidents in 2005 to 196 in 2009).<sup>27</sup> These figures show the surge in recent incidents in the vicinity of Somalia and demonstrate the oscillating nature of piracy. Piracy occurs where there is no significant naval presence and conditions allow the monetary reward to exceed the risk.

Piracy tends to occur in coastal waters where authority is weak and pirates are able to avoid naval and maritime patrols. The oceans, much of which are composed of the high seas, are predisposed to maritime crime due to their anarchical nature.<sup>28</sup> The high seas belong to no nation, and no individual nation has responsibility for patrolling these waters. Without dedicated law enforcement, the high seas offer the ideal situation by which pirates take advantage. Arguably, even more precarious are coastal waters which offer “safe havens” where pirates can hide and attack ships close to shore. According to Villar, opportunities for attack, combined with poverty and a lack of law enforcement, will lead to piracy.<sup>29</sup> Alternatively, what pirates need for success are supply, limited detection, and safe havens.<sup>30</sup> What is consistent is that piracy depends on geography and lax security to create a “favourable hunting ground” where reward will exceed risk.<sup>31</sup> In terms of geography, piracy has the potential to flourish where there is an extended coastline with safe havens such as inlets or islands. Canada has 243,000 kilometres of coastline, a significant portion of which, including much of the Gulf Islands in the vicinity of Vancouver Island, is full of the natural islands that could facilitate maritime attacks.<sup>32</sup> Canada might also be said to have the aforementioned favourable hunting grounds with a supply of over 18,000 international ships arriving each year, often through choke points including the Straits of Juan de Fuca and the St. Lawrence Seaway.<sup>33</sup> However, geography and opportunity are not the only factors that allow piracy to flourish. Fortunately, at present, Canada possesses the necessary security forces both at sea and on land to deter pirates and make their ventures unprofitable. However, in places of the world such as current-day Somalia (where security forces have either been ill-trained, corrupt or non-existent) piracy is flourishing.

Piracy does not occur off the coast of Canada, and even with its oscillating nature, it is unlikely to spread to Canadian waters in the near future. It has been said that maritime piracy is a “global phenomenon but not a global problem.”<sup>34</sup> In other words, piracy occurs throughout many different parts of the world, but its regional effect is greater than any international effect. However, it has also been noted that, historically, piracy tends to “some extent shift over time.”<sup>35</sup> In other words, where it is happening today will not necessarily be where it happens next year. The data produced by the IMB and by historical accounts support this position. Piracy has existed and “there is little doubt that it

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26. Ibid., 5.

27. Ibid.

28. Chalk, *Maritime Dimension of International Security*, 2.

29. Villar, 20.

30. Gottschalk and Flanagan, 5.

31. Martin Murphy, *Contemporary Piracy and Maritime Terrorism: The Threat to International Security*, Adelphi Paper 388 (London: International Institute for Strategic Studies, 2007), 14.

32. Canada, Transport Canada, “Canada: Committed to Marine Safety, Security, Trade and the Environment – TP 14916 E,” <http://www.tc.gc.ca/eng/marinesafety/tp-tp14916-menu-182.htm> (accessed January 27, 2010, content updated).

33. Ibid.

34. Murphy, *Small Boats, Weak States, Dirty Money*, 21.

35. Ibid., 177.

will continue to grow.”<sup>36</sup> Though piracy may increase, its direct impact on Canada is likely to remain low in the near future, and therefore, the direct security threat or economic impact may be limited. However, as a trading nation, Canada still has a vested interest in keeping sea lanes open to global trade and in pushing the effect of piracy to a marginal level.

### Economic impact

Over 90 per cent of world trade is shipped by sea, and in 2008, it is estimated that the industry transported over 7.7 billion tonnes of cargo.<sup>37</sup> Canada is an exporting and importing nation; the total value of Canada’s maritime trade was Canadian dollar (Can\$) 190 billion in 2008.<sup>38</sup> This number is significantly large enough to have maritime transport considered vital to Canada’s economy. There is little doubt that maritime transport will continue to be the “life blood of the global economy,”<sup>39</sup> as it remains by far the least expensive way to ship goods. The IMO goes so far to state: “Without shipping, it would simply not be possible to conduct intercontinental trade, the bulk transport of raw materials or the import/export of affordable food and manufactured goods—half the world would starve and the other half would freeze!”<sup>40</sup> This statement is certainly bold and may be hyperbole, but it does highlight the importance of global shipping. Economically, nations, including Canada, depend heavily on maritime trade and any entity that attacks that trade is a cause for concern. While maritime piracy affects local shipping routes and can affect major shipping routes, its economic impact is small compared to the overall value of maritime trade.

The exact financial cost of maritime piracy to the shipping industry and to the global economy is, unfortunately, difficult to ascertain, but an exact figure may not be necessary to determine scale. It has been estimated that maritime piracy costs the shipping industry US dollar (US\$) 1–16 billion per year, up to a high estimate of US\$50 billion annually.<sup>41</sup> Like much surrounding maritime piracy, there are reasons why the figures vary so drastically. Analysts disagree on whether to include the increased insurance premiums, additional port costs due to investigations and related delays as well as salary increases that result from the rising incidents of maritime piracy. Furthermore, many incidents of piracy go unreported because shipping companies do not want the costs associated with the aforementioned factors. It is, therefore, challenging to put an exact dollar figure on the cost of maritime piracy. The high end numbers seem unlikely, yet even if valid, US\$50 billion is miniscule when compared to the worldwide maritime commerce estimated, in 2005, to be US\$7.8 trillion.<sup>42</sup> Therefore, even estimates at the high end have maritime piracy impacting only 0.64 per cent of world maritime commerce and at the low end it would be closer to 0.012 per cent. Thus, economically, piracy is a manageable problem and might be considered the cost of doing business. The current minimal financial impact of piracy leads some in the world and even in the shipping industry to consider piracy to be more of a “nuisance than a threat.”<sup>43</sup> In the Canadian context, the 0.012 per cent of our gross domestic product (GDP) that could be affected by maritime piracy equates to less than Can\$2.5 million annually. It should be recognized that this figure is fraught with error, but it is simply meant to demonstrate that the direct impact of maritime piracy on the Canadian economy might actually be marginal.

36. Villar, 10.

37. International Maritime Organization, “International Shipping and World Trade: Facts and Figures,” [http://www.imo.org/includes/blastData.asp?doc\\_id=8540/International%20Shipping%20and%20World%20Trade%20-%20facts%20and%20figures.pdf](http://www.imo.org/includes/blastData.asp?doc_id=8540/International%20Shipping%20and%20World%20Trade%20-%20facts%20and%20figures.pdf) (accessed January 20, 2010, content updated).

38. Canada, Transport Canada, “Canada.”

39. UN, IMO, “International Shipping: Carrier of World Trade.”

40. Ibid.

41. Murphy, *Small Boats, Weak States, Dirty Money*, 50.

42. Ibid., 51.

43. Gottschalk and Flanagan, 54.

Though piracy may statistically have a minor effect on the world's economies, if left unchecked, it could potentially disrupt major shipping routes and the repercussions could become much greater. In today's context, piracy is extremely prevalent in the Gulf of Aden, a key link between Asia and Europe that sees 21,000 ships pass through annually.<sup>44</sup> Because of piracy, the insurance premium per voyage for transiting the region increased from US\$500 to \$20,000 between 2007 and 2008.<sup>45</sup> However, piracy still affects less than 1 per cent of traffic transiting the Gulf of Aden, so the majority of shipping has not yet been "re routed as a result of piracy."<sup>46</sup> If piracy were to proliferate and shipping companies decided en masse to avoid the Gulf of Aden, it would cost at least US\$3.5 million annually of fuel per ship to alternatively transit the Cape of Good Hope.<sup>47</sup> These additional costs would presumably be passed on to the consumer and could potentially increase the cost of goods worldwide. In November 2008, the *Sirius Star*—a very large crude carrier, carrying 2,000,000 barrels of oil worth approximately US\$100 million—was hijacked by pirates off the east coast of Africa.<sup>48</sup> In this case, the direct market impact was measurable as the price of oil increased by a dollar a barrel after the news of the attack.<sup>49</sup> *Sirius Star* carried one quarter of Saudi Arabia's daily production of oil; this figure by itself represented only a small portion of the world's oil supplies, but the effect on world markets was significant. The pirates were ultimately able to garner a US\$3 million ransom for the return of the vessel. In 2009, over 12 per cent of all pirate attacks were against oil or gas carrying vessels.<sup>50</sup> This trend is worrying: a continued proliferation of attacks against energy carrying ships, given both their monetary and extrinsic value, would be devastating to the world's economy.

As part of Canada's foreign policy, it is in Canada's best interest to ensure the free movement of commercial shipping throughout the world. This interest would include mitigating maritime piracy to ensure that it does not close down a major shipping route. Canada's Chief of Maritime Staff (CMS) has stated that, "Canada's economy ... [is] inextricably linked with the oceans ..."<sup>51</sup> This idea is solidified by the fact that three quarters of the nation's GDP is derived from international trade and a large percentage comes from maritime shipping.<sup>52</sup> In other words, if Canada's ability to export and import goods via the sea were threatened, it could cause a significant downturn in the Canadian economy. As well, the CMS goes on to note: "the oceans are our highways to the world's market places. They are the backbone of the global transportation system, and as such, safe and secure navigable waters are critical to the functioning of the Canadian economy."<sup>53</sup> This statement does not specify waterways but, instead, is a general statement referring to the world's oceans. One trading route that is currently threatened by maritime piracy is the Gulf of Aden. The routes that directly supply the Canadian economy, both through the Pacific and Atlantic, are not currently affected by maritime piracy. Regardless of the lack of a direct link between maritime piracy and the Canadian economy, the protection of shipping routes by Canada as it relates to global commerce is important. The Department of Foreign Affairs and International Trade (DFAIT) states that "participation in

44. International Security Information Service Europe, "EU and NATO Efforts to Counter Piracy off Somalia: A Drop in the Ocean?" [http://www.isis-europe.org/pdf/2009\\_artrel\\_332\\_esr46-eu-nato-counterpiracy.pdf](http://www.isis-europe.org/pdf/2009_artrel_332_esr46-eu-nato-counterpiracy.pdf) (accessed January 27, 2010, site discontinued).

45. United States, Department of Transportation, "Economic Impact of Piracy in the Gulf of Aden on International Trade," [http://www.marad.dot.gov/documents/HOA\\_Economic%20Impact%20of%20Piracy.pdf](http://www.marad.dot.gov/documents/HOA_Economic%20Impact%20of%20Piracy.pdf) (accessed October 11, 2012).

46. Murphy, *Small Boats, Weak States, Dirty Money*, 20.

47. United States, Department of Transportation, "Economic Impact of Piracy."

48. Donna J. Nincic, "Maritime Piracy: Implications for Maritime Energy Security," *Journal of Energy Security* (February 2009), [http://www.ensec.org/index.php?option=com\\_content&view=article&id=180:maritime-piracy-implications-for-maritime-energy-security&catid=92:issuecontent&Itemid=341](http://www.ensec.org/index.php?option=com_content&view=article&id=180:maritime-piracy-implications-for-maritime-energy-security&catid=92:issuecontent&Itemid=341) (accessed October 11, 2012).

49. Nigel Hannaford, "Piracy on This Scale Must Not Be Allowed to Go On," *Calgary Herald*, 18 November 2008.

50. ICC, IMB, *Annual Report 2009*, 3.

51. Canada, *Department of National Defence*, "Fact File: Canada's Economic Prosperity," [http://www.navy.forces.gc.ca/cms/10/10-a\\_eng.asp?id=295](http://www.navy.forces.gc.ca/cms/10/10-a_eng.asp?id=295) (accessed October 11, 2012).

52. Ibid.

53. Ibid.

global commerce has helped Canadians build a strong stable economy” and that “Canada’s future prosperity hinges on how well we ... maintain our place as one of the world’s great trading nations.”<sup>54</sup> It is in the national interest to be internationally engaged and mindful of global shipping routes, and thus, Canada has a stake in suppressing the security concerns associated with maritime piracy.

### Security concerns

As difficult as it is to quantify the direct economic impact of maritime piracy for Canada, arguably it is even more challenging to quantify the security impact. Very few Canadians, or even Canadian-flagged vessels, have been subjected to attacks of piracy in recent history. While there have been some cases of Canadian yachts being attacked in the Caribbean, the IMB reports only one Canadian vessel being attacked since 2005.<sup>55</sup> This attack involved a Canadian-flagged yacht being assaulted by pirates while at harbour in the vicinity of Madagascar. Four robbers boarded the yacht, cut the skipper’s thumb and attempted to strangle his wife before stealing cash and escaping.<sup>56</sup> However, while one attack is enough to alert Canadians of the security threat that piracy poses, it certainly does not prevent shipping from reaching Canada, nor does it pose a threat to Canada on a national scale. Although the current security threat to Canada is miniscule, maritime piracy does pose a threat to the individual mariner; furthermore, potential exists for the security threats associated with piracy to increase. Canada has a vested interest in reducing the threat to its citizens and preventing the threat of piracy from increasing.

Piracy has a very real human security cost worldwide. In 2009 alone, there were 1166 mariners subjected to the violence associated with maritime piracy.<sup>57</sup> The violence includes assaults, threats, hostage-takings, injury and, in at least eight cases, murders.<sup>58</sup> These figures are only from the reported cases of piracy and the total numbers could potentially be doubled because of unreported cases.<sup>59</sup> A specific example, among many, occurred on 24 March 2009 off the coast of Thailand, when three pirates armed with knives and a hammer attacked a yacht; assaulted, killed and threw the body of the skipper overboard; and injured his wife.<sup>60</sup> Such attacks are horrific, and the after effects are more than just the injuries. Along with the physical violence, there are also unaccounted psychological costs for both mariners who have been attacked and mariners who have the potential to be attacked.<sup>61</sup> Canada has long championed the rights of humans throughout the world to be “free from fear,” and this arguably extends to the rights of mariners to be free from the violence of maritime piracy.<sup>62</sup> Piracy is a criminal activity, and DFAIT professes that they remain “committed to working with our domestic and international partners to effectively deal with the complex challenges posed by international crime.”<sup>63</sup> If true, it indicates that the Canadian government, and the people whose values they espouse, would have an interest in suppressing maritime piracy throughout the world.

54. Canada, Department of Foreign Affairs and International Trade (DFAIT), “Seizing Global Advantage: A Global Commerce Strategy for Securing Canada’s Growth and Prosperity,” (2009), <http://www.international.gc.ca/commerce/assets/pdfs/GCS-en.pdf> (accessed October 11, 2012).

55. ICC, IMB, *Annual Report 2009*, 16.

56. ICC, IMB, *Piracy and Armed Robbery against Ships Annual Report 1 January – 31 December 2007* (London: ICC International Maritime Bureau, 2008), 71.

57. ICC, IMB, *Annual Report 2009*, 12.

58. Ibid.

59. Chalk, *Maritime Dimension of International Security*, 7.

60. ICC, IMB, *Annual Report 2009*, 37.

61. Alison Kaufman, “China’s Participation in Anti-Piracy Operations off the Horn of Africa: Drivers and Implications,” *CNA China Studies*, <http://www.cna.org/documents/Piracy%20conference%20report.pdf> (accessed January 28, 2010, site discontinued).

62. Canada, DFAIT, “Evaluation of the Human Security Program,” [http://www.international.gc.ca/about-a\\_propos/oig-big/2003/evaluation/human\\_security-secureite.aspx?lang=eng](http://www.international.gc.ca/about-a_propos/oig-big/2003/evaluation/human_security-secureite.aspx?lang=eng) (accessed January 28, 2010, site discontinued).

63. Canada, DFAIT, “Transnational Organized Crime Overview,” <http://www.dfait-maeci.gc.ca/crime/index.aspx?lang=eng> (accessed January 28, 2010, content updated).



The threat to individual mariners is very real and should not be trivialized. It should be noted that even though piracy can be a threat to individual mariners, it has not passed the tipping point where it would have a considerable security impact on Canada, its citizens and its economy. It is in Canada's best interest to work collaboratively with other nations in ensuring that piracy remains marginalized because of not only the heinousness of the crime to the individual but also the significance of the potential threat it poses to the global economy, global security and to the environment.

A major event that could disrupt the security of the international community would be an environmental maritime disaster resulting from piracy. In the case of the *Sirius Star*, pirates could run the ship aground, either deliberately or unintentionally, causing the spill of millions of barrels of oil. A spillage of this amount of oil would cause damage to the marine environment and marine wildlife. There are numerous examples of pirates attacking ships, physically removing the crew from the bridge and leaving the ships "effectively not under command."<sup>64</sup> A vessel not under command poses a tremendous navigational hazard, not only to the environment but also to other ships. Piracy is often conducted in narrow straits with high traffic density, factors that enable the piracy to occur in the first place. It is, therefore, a real possibility for a hijacked ship, if not under command, to either run into another vessel or to run aground. On 19 September 1992, in the Malacca Strait, the 27,000 ton container ship *Ocean Blessing* ploughed full bore into the MT *Nagasaki Spirit*, a 100,000-ton crude carrier.<sup>65</sup> Forty-four crew members were killed either in the subsequent fires or by the pirates who had attacked both vessels and left them not under command, thus causing the collision. Fortunately, in this case, the oil spill from the *Nagasaki Spirit* was contained. However, the potential exists for a catastrophic event or major environmental disaster to result from piracy; therefore, Canada has a stake, as does the international community, in working collectively to prevent such a disaster. Similarly, Canada may have a stake in suppressing piracy because of a potential nexus with terrorism.

A potential security concern associated with maritime piracy is maritime terrorism. Maritime terrorists are ideologically motivated, distinguishing them from maritime pirates who are motivated by financial gain. The most significant example of maritime terrorism occurred in 2004 with the bombing by terrorists of the Philippine ship *SuperFerry 14*—an attack that killed 114 people.<sup>66</sup> There have also been reports of political extremists in South Asia boarding vessels in an apparent effort to learn how to pilot them for 9/11-style attacks.<sup>67</sup> While these acts were not associated with maritime piracy, and in fact no connection between maritime piracy and maritime terrorism has ever been conclusively proven, the potential exists. Pirates could aid terrorists in their nefarious endeavours by showing them how to attack ships, by attacking ships for them or by disguising a terrorist attack as an act of piracy. Peter Chalk presents a worst-case scenario that envisions pirates using their skills to hijack a liquefied-natural-gas ship which could then be used as a large-scale bomb in a major port city.<sup>68</sup> As well, there is potential for terrorists to use maritime piracy as a means of building wealth, such as Somali pirates providing funds to Al-Shabaab terrorists. It is wise, therefore, to combat maritime piracy in efforts to discourage terrorists from using it to their advantage. Even though the linkage between piracy and terrorism is difficult to quantify, Canada's stake in preventing a piracy-terrorism nexus is real. It is recognized that Canada is neither large enough nor possesses the security forces to prevent all of the threats associated with piracy. However, Canada can work collectively with other internationally engaged countries in protecting the world's seas.

64. ICC, IMB, *Annual Report 2009*, 26.

65. Burnett, 135.

66. Chalk, *Maritime Dimension of International Security*, 50.

67. *Ibid.*, xiv.

68. *Ibid.*, 31.



## Canada's stake

With Can\$190 billion of the Canadian economy depending on the continued freedom of the world's waterways, Canada does have a stake in ensuring the freedom of the seas, even if the extent of piracy's economic impact is challenging to quantify. This difficulty in quantifying the economic impact largely exists because the "second-order effects in markets affected by piracy ... [are] uncounted ..."<sup>69</sup> However, regardless of the direct impact, Canada has a stake in suppressing piracy because stable sea routes will permit the global trade from which Canada is a beneficiary.<sup>70</sup> As stated by analyst Roy Rempel, Canada has "global responsibilities[;] ... success is ultimately tied to a stable international order."<sup>71</sup> In other words, if Canada wants to have a successful economy, then it should do its part in ensuring the freedom of the seas. There is a link between economics and security, in that a stable world will allow prosperous international trade. However, "one attack on the wrong ship at the wrong time" could result in the closure of one of the strategic international waterways upon which so much of the world economy depends.<sup>72</sup> If the insurance rates became prohibitively high and the risk of pirate attack became greater than the savings in time and money, shipping companies would choose alternate and more expensive routes. This increased cost would be passed on to all consumers, including those in Canada. While piracy may not threaten all shipping routes, the threat of piracy or maritime piracy upon the sea lines of communication is a reality in parts of the world including the Gulf of Aden and the Malacca Strait. For a country such as Canada (whose economy depends on imports and exports), piracy may be more than just a regional concern because of the impact should major shipping routes be threatened.<sup>73</sup>

Ships travelling to North America should be able to do so as inexpensively and as safely as possible. In today's context, they are able to use both Pacific and Atlantic piracy-free sea lines of communication to North America, and it is important that the collaborative actions of government allow these routes to remain safe passages. Internationally oriented governments, including Canada, may be the only organizations with the financial resources and will to attack the maritime piracy problem. As Gottschalk and Flanagan note in *Jolly Roger with an Uzi*: "Whether the concern is viewed primarily as economic, human, or environmental, collective and individual action by governments represents the only likely solution to the global piracy problem."<sup>74</sup> In other words, governments should work together to push maritime piracy, and its associated violence, to the margins.

In the regions where it occurs, and to the mariners who are its victims, there are very real costs associated with maritime piracy. The violence associated with piracy can be absolutely terrifying. For this reason, the lead agency on compiling piracy statistics, the IMB, has been reluctant to put a financial cost on piracy, arguably because it would detract from the less quantifiable human and security costs.<sup>75</sup> If piracy is not suppressed, there is potential for incidents to increase, spread and become "more serious."<sup>76</sup> Canada should keep the world's maritime transit points, including the

69. John Patch, "The Overstated Threat," *United States Naval Institute Proceedings* 134, no. 12 (December 2008), <http://proquest.umi.com/pqdweb?did=1610026731&Fmt=7&clientId=1711&RQT=309&VName=PQD> (accessed October 11, 2012).

70. Gottschalk and Flanagan, 103.

71. Roy Rempel, *Dreamland: How Canada's Pretend Foreign Policy Has Undermined Sovereignty* (Montreal and Kingston: McGill-Queen's University Press, 2006), 155.

72. Stephanie Hanson, "Combating Maritime Piracy," Council on Foreign Relations, <http://www.cfr.org/publication/18376/> (accessed December 10, 2010, content updated).

73. Karsten von Hoesslin, "The Implications of Illegal Maritime Activities for Canadian Security and Methods of Enhancing Surveillance and Monitoring in East Asian and North Pacific Waters," Conference of Defence Associations, <http://www.cda-cdai.ca/cdai/uploads/cdai/2009/04/hoesslin03.pdf> (accessed October 11, 2012).

74. Gottschalk and Flanagan, 106.

75. Murphy, *Contemporary Piracy and Maritime Terrorism*, 20.

76. *Ibid.*, 86.

Gulf of Aden, free from piracy and free from fear for seafarers of all nationalities, however difficult the security impact might be to quantify. Therefore, in determining an appropriate level of participation in countering piracy, it is useful to discuss not only Canada's stake but also Canada's obligations, in collaboration with other internationally engaged countries, in combating that which is a regionally occurring problem with global implications.

### **3. Canada's obligation to counter maritime piracy**

International law (including articles from the UNCLOS, the Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation [SUA] and resolutions drafted by the United Nations Security Council) authorizes the armed forces of nation states to combat piracy. These legal frameworks sometimes use words like "shall" and "the UN calls upon all states" in order to invoke nation states towards action. An invocative resolution can be construed as an obligation. However, a UNSCR does not necessarily obligate nations to deploy naval and air forces immediately and specifically for the purpose of resolving a conflict. This situation is because nations, declared sovereign, are free to choose their own actions. When countering piracy, there is a long way between being authorized and being obliged to seize and prosecute pirates. International law may provide the groundwork, but each nation will decide how to respond, depending on its resources, its stake in the fight and its perceived moral obligations. No state, not even a superpower such as the United States, can respond militarily to all UNSCRs because resources are limited and, thus, choices must be made.<sup>77</sup> Under international law, the Canadian Navy is obliged on the high seas to combat the piracy it encounters, but that is not the same as seeking out pirates. With a navy of limited size, Canada must decide what its true obligations are.

Is Canada obligated to actively deploy its small, but capable, blue-water Navy to areas of the world where it can seek out and combat piracy in support of international organizations and laws? The answer is that Canada is not legally obliged; however, a more subjective, moral obligation does exist due to the human cost and the heinousness of the crime. It has been suggested that Canada has an economic stake in countering piracy, with the potential for the economic impact to increase. It has also been suggested that Canada has a stake in minimizing the security concerns and potential security impact associated with piracy. There is a role for Canada to play in ensuring that the international law concerning piracy is sound, relevant and useful; there is also a cooperative role in sharing information and intelligence with other nations regarding piracy patterns and locations. Moreover, international law and the conventions created under the UN both authorize Canada to fight piracy and compel Canada to act. The invocations of the UN to respond to piracy, combined with the moral compulsion that arises because of Canada's stake in suppressing piracy, indicate that Canada does have an obligation to counter maritime piracy.

Canada has the constabulary ability (under UNCLOS, SUA and numerous UNSCRs) to apprehend pirates and is, in fact, obligated to prosecute the pirates who are captured. The legal framework allows Canada to apprehend pirates both on the high seas and, in specific circumstances, in another state's territorial waters, but only within certain limitations. Statements in UNCLOS and the applicable UNSCRs, which obligate Canada to respond, show that Canada should act in countering piracy. These conventions contain specific clauses and articles that invoke action from nation states and the military forces under their purview. Ultimately, even though international treaties indicate that Canada should act in certain ways, an understanding of the country's moral obligations may indicate what Canada will do to counter the crime of maritime piracy.

<sup>77</sup> Jon Peppetti, "Building the Global Maritime Security Network: A Multinational Legal Structure to Combat Transnational Threats," *Naval Law Review* 55, <http://www.jag.navy.mil/documents/navylawreview/NLRVolume55.pdf> (accessed October 11, 2012).

**Countering maritime piracy: What Canada has the authority to do**

Piracy has been called the first universal jurisdiction crime and, as previously mentioned, a “crime against nations.”<sup>78</sup> Accordingly, international law, such as UNCLOS, has been written to allow nations to apprehend pirates on the high seas, an area of the Earth that belongs to no individual state. Completed in 1982, UNCLOS was designed to “promote the maintenance of international peace and security”<sup>79</sup> and, thus, includes provisions on maritime piracy. Although not ratified by the United States, UNCLOS has been ratified by 160 nation states and “is the best evidence of international law relating to the maritime regime, and is therefore binding on all nations.”<sup>80</sup> It is, therefore, important to examine the strengths and limitations of UNCLOS in the fight against piracy. Within the UNCLOS definition, piracy must be committed on the high seas, be committed for private ends, and involve two or more vessels.<sup>81</sup> Article 105 authorizes nations to combat piracy: “On the high seas, or in any other place outside the jurisdiction of any State, every State may seize a pirate ship or aircraft, or a ship or aircraft taken by piracy and under the control of pirates, and arrest the persons and seize the property on board.”<sup>82</sup> In addition, Article 107 of UNCLOS states that only a military ship or aircraft or appropriately marked government vessel can carry out this seizure, thus precluding vigilante justice among mariners.<sup>83</sup> As well, Article 110 specifies that having suspicion of piracy is one of only five reasons for which a warship may board another vessel without flag state consent.<sup>84</sup> The combination of these articles clearly indicates that Canadian naval warships are authorized to investigate and seize ships taken by piracy, within limitations.

UNCLOS allows for the apprehension of pirates but limits the circumstances and locations as to where this act can occur. Because piracy, by definition, has to occur on the high seas or within economic exclusion zones (EEZ), any act of piracy within territorial seas is considered armed robbery and only the territorial nation has jurisdiction. This limitation is, of course, restrictive because piracy often occurs next to states that are either unwilling or unable to patrol their territorial seas.<sup>85</sup> States are understandably reticent to have other countries impose on their sovereignty; thus, even the UN is cautious in authorizing the entry of third-party states into territorial waters except in the most severe circumstances.<sup>86</sup> Somali pirates were known to use this loophole to their advantage—committing acts of piracy on the high seas and then retreating back to Somali waters in order to avoid prosecution.<sup>87</sup> UNCLOS allows for hot pursuit of armed robbers, such as pirates, from territorial waters out towards the high seas as long as continuous tracking is maintained.<sup>88</sup> However, the reverse is not true. If a navy ship is pursuing pirates, once the pirates enter territorial waters, the naval ship must abandon the pursuit. It would only be through a change in international law, or through a UNSCR, that this limitation would be lifted. Similarly, the requirement for two vessels can be restrictive. For example, if a group of pirates or hijackers were to stow away on an oil tanker leaving Nigeria and then violently seize that vessel at sea, the act would not technically be piracy

78. Milena Sterio, “Fighting Piracy in Somalia (and Elsewhere): Why More Is Needed,” [http://works.bepress.com/cgi/viewcontent.cgi?article=1003&context=milena\\_sterio](http://works.bepress.com/cgi/viewcontent.cgi?article=1003&context=milena_sterio) (accessed October 11, 2012).

79. Tommy Koh, “A Constitution for the Oceans,” United Nations [http://www.un.org/Depts/los/convention\\_agreements/texts/koh\\_english.pdf](http://www.un.org/Depts/los/convention_agreements/texts/koh_english.pdf) (accessed October 11, 2012).

80. Peppetti.

81. UN, “UNCLOS,” Article 101.

82. Ibid., Article 105.

83. Ibid., Article 107.

84. Ibid., Article 110.

85. Murphy, *Contemporary Piracy and Maritime Terrorism*, 10.

86. Ibid., 12.

87. Sterio.

88. Sam Bateman, “UNCLOS and Its Limitations as the Foundation for a Regional Maritime Security Regime” (IDSS Working Paper No. 111, Institute of Defence and Strategic Studies, Nanyang Technological University, Singapore 2006), 25.

as only one vessel is involved, and therefore, the ability of a navy to respond would be restricted. Furthermore, the UNCLOS definition determines that piracy must be for private ends.<sup>89</sup> So, any state-affiliated group cannot be considered pirates. Terrorists, because of their political motivation, do not qualify as pirates under UNCLOS even though their actions in the maritime environment may parallel those of pirates.

Another challenge, while using UNCLOS as the basis in countering maritime piracy, lies in what to do with pirates once they are captured. If a naval vessel were to come upon two vessels on the high seas in the midst of an act of piracy and if the navy were able to stop this act and apprehend the perpetrators, who were committing said act for private ends, what is to be done with these pirates? UNCLOS states that the capturing nation may decide on the “penalties to be imposed.”<sup>90</sup> This statement is broad, which puts the onus on a state’s domestic laws to determine the exact penalty and, thus, makes the consistent prosecution of pirates challenging. As well, UNCLOS does not allow for pirates to be transferred legally to a third state for prosecution. Arguably, this limitation has been one of the chief hurdles for navies off the coast of Somalia who have had to release Somali pirates. The limitations of UNCLOS, as it pertains to piracy, caused the drafting of other international legal frameworks.

The SUA was drafted primarily to close the loopholes that existed in international maritime law and to bolster counter-terrorist legislation.<sup>91</sup> It does not specifically use the word *piracy* but does recognize that there is a “need for all States, in combating unlawful acts against the safety of maritime navigation.”<sup>92</sup> The following constitute offences under SUA:

1. Any person commits an offence if that person unlawfully and intentionally:
  - (a) seizes or exercises control over a ship by force or threat thereof or any other form of intimidation; or
  - (b) performs an act of violence against a person on board a ship if that act is likely to endanger the safe navigation of that ship; or
  - ...
  - (g) injures or kills any person, in connection with the commission or the attempted commission of any of the offences set forth in subparagraphs (a) to (f).
2. Any person also commits an offence if that person:
  - (a) attempts to commit any of the offences set forth in paragraph 1; or
  - (b) abets the commission of any of the offences set forth in paragraph 1 perpetrated by any person or is otherwise an accomplice of a person who commits such an offence ...<sup>93</sup>

89. UN, “UNCLOS.”

90. Ibid.

91. Robert C. Beckman, “The 1988 SUA Convention and 2005 SUA Protocol: Tools to Combat Piracy, Armed Robbery and Maritime Terrorism,” in *Lloyd’s MIU Handbook of Maritime Security*, ed. Rupert Herbert Burns, Sam Bateman and Peter Lehr (London: Taylor and Francis Group, 2009), 188.

92. “Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation (SUA),” *Admiralty and Maritime Law Guide*, <http://www.admiraltylawguide.com/conven/suppression1988.html> (accessed October 11, 2012).

93. Ibid.

It can be discerned from these statements that any maritime piracy involving violence will likely fall under the SUA definition. Thus, it provides states, such as Canada, the legal framework needed to apprehend and prosecute pirates as long as violence is involved. The SUA foregoes the two-ship rule, as well as the requirement for the act to be for “private ends,” and creates the legal basis that allows a country to transfer captured pirates to a third state for prosecution. Under SUA, the United States’ and United Kingdom’s transfer of Somali pirates to Kenya for prosecution was technically legal.<sup>94</sup> But, as discovered with UNCLOS, there are also limitations within SUA that restrict Canada’s ability to counter piracy.

Under SUA, acts of piracy are not limited to the high seas. The only requirement is that a vessel needs to be either transiting to or from international waters.<sup>95</sup> The SUA, however, does not specifically authorize the boarding of ships nor does it provide for the entry of a third party into a sovereign state’s territorial water. As well, SUA does not apply in the coastal waters of a state for vessels travelling internally. Many acts of piracy are committed against these very vessels—vessels transiting within 12 nautical miles [22 kilometres] of land within a state’s territorial seas.<sup>96</sup> Therefore, in order to truly provide for the effective pursuit and prosecution of pirates, the UN has had to draft and issue Security Council resolutions.

The UN Security Council’s resolutions concerning piracy off the coast of Somalia demonstrate both the evolution of the international commitment to fighting piracy and the legal framework necessary to authorize a response in conjunction with this commitment. Piracy off the coast of Somalia was first mentioned by the Security Council in 2006 in UNSCR 1676. The UN was concerned about the “rising incidents of piracy,” but the resolution did not authorize action contradictory to UNCLOS or SUA.<sup>97</sup> Concern was reiterated in the following years in UNSCR 1772 (2007) and UNSCR 1801(2008), where nations were urged to combat piracy off of Somalia. However, these resolutions still failed to provide the additional legal framework necessary to pursue pirates inside territorial waters.<sup>98</sup> Resolution 1816 was the first UNSCR concerning Somali piracy written with bolder measures for combating the scourge in mind. Like the previous resolutions, it urged states operating on the high seas off the coast of Somalia to be vigilant in deterring piracy, but it went further to state that navies were permitted to:

- (a) Enter the territorial waters of Somalia for the purpose of repressing acts of piracy and armed robbery at sea ... ; and
- (b) Use, within the territorial waters of Somalia, in a manner consistent with action permitted on the high seas with respect to piracy under relevant international law, all necessary means to repress acts of piracy and armed robbery.<sup>99</sup>

United Nations Security Council Resolution 1816 circumvented the location restrictions of UNCLOS and SUA and allowed navies to enter the territorial waters of Somalia in order to seize maritime pirates. The UN was able to do so with the permission of the Somalia Transitional Federal Government and by applying a time constraint within the resolution. United Nations Security Council Resolution 1816 was valid for a period of six months. In December 2008, Resolution 1846 extended the time allotment, increasing it by twelve months. United Nations Security Council

94. Sterio.

95. “SUA.”

96. Murphy, *Contemporary Piracy and Maritime Terrorism*, 12.

97. United Nations Security Council, “Resolution 1676,” <http://www.un.org/en/sc/documents/resolutions/2006.shtml> (accessed October 11, 2012).

98. United Nations Security Council, “Resolution 1772,” <http://www.un.org/en/sc/documents/resolutions/2007.shtml> (accessed October 11, 2012).

99. United Nations Security Council, “Resolution 1816,” <http://www.un.org/en/sc/documents/resolutions/2008.shtml> (accessed October 11, 2012).



Resolution 1846 also thanked nations, including Canada, for their assistance in counter-piracy patrols in the vicinity of Somalia.<sup>100</sup> The following year, the threat of maritime piracy off the coast of Somalia persisted, and in December 2009, UNSCR 1897 extended the authorizations a further twelve months.<sup>101</sup> The fact that the UN has had to renew the mandate indicates that, regardless of the authorizations, maritime piracy off the coast of Somalia has not been eliminated, or even mitigated to an acceptable level. This continuation of piracy may indicate that, because of the conditions ashore, naval forces working off Somalia can protect shipping but cannot eliminate piracy. Regardless, the UN has renewed the mandate, allowing the many diverse navies in the area to suppress piracy, even within Somali territorial waters.

It may be argued that the repeated resolutions to extend measures, which interfere with the sovereignty of a state, are a dangerous precedent. But importantly, these resolutions were made specific to the case of maritime piracy off the coast of Somalia, and the United Nations Security Council made it clear that they do not form the basis for changing international customary law.<sup>102</sup> United Nations Security Council Resolutions 1816, 1846 and 1897 allow for more robust measures in fighting Somali pirates but do little for the other acts of maritime piracy transpiring throughout the world, or for a future surge of piracy that will someday occur in vicinity of another problematic coastal state. Overall, UNCLOS and SUA provide the basis for Canadian warships to seize pirates on the high seas and to prosecute them in Canada or, in the case of SUA, to transfer them to a third-party state for prosecution. The series of UNSCRs concerning Somalia authorize Canada to enter Somalia's territorial waters to capture pirates until December 2010. It is clear, then, that Canada is presently authorized to seize and prosecute pirates, however, it is important to investigate the documentation indicating that it not only is authorized to counter piracy but also should do so.

### **Countering maritime piracy: What Canada should do**

Beyond giving legal authority to act, actual international pressures, or obligations, to counter maritime piracy occur in UNCLOS, SUA and relevant UNSCRs. The clearest example is UNCLOS Article 100, which very clearly lays out the obligation of states to cooperate in the repression of piracy: "All States shall cooperate to the fullest possible extent in the repression of piracy on the high seas or in any other place outside the jurisdiction of any State."<sup>103</sup> Though compelling, the caveats to Article 100 are that it is limited to the high seas and that it uses words inherently difficult to define such as "shall" and to the "fullest possible extent." Certainly, a Canadian warship coming across an act of piracy on the high seas would be obligated under international law to respond. But, "to the fullest extent possible" does not necessarily mean that Canada is obligated or expected to sail its entire fleet to various corners of the world to seek out and fight the problem of piracy. Individual states are obligated to respond but free to determine the extent of that response.

The SUA contains articles that can be construed as obligations; even though, ultimately, the convention still leaves nations free to determine the level of response. The actions that constitute offences under SUA have been previously mentioned. Within Article 6 of SUA, Canada is obligated to establish jurisdiction over any offence committed:

100. United Nations Security Council, "Resolution 1846," <http://www.un.org/en/sc/documents/resolutions/2008.shtml> (accessed October 11, 2012).

101. UNSC, "Resolution 1897."

102. Ibid.

103. United Nations, "UNCLOS," Article 100.



- (a) against or on board a ship flying the flag of the State at the time the offence is committed; or
- (b) in the territory of that State, including its territorial sea; or
- (c) by a national of that State.<sup>104</sup>

Furthermore, Article 7 of SUA obligates Canada to take any maritime pirate found in Canada “into custody or take other measures to ensure his presence for such time as is necessary to enable any criminal or extradition proceedings to be instituted.”<sup>105</sup> While the obligations of Articles 6 and 7 exist, they are of little practical use to Canada due to the lack of pirates in Canada and the lack of piracy committed in Canadian waters, against Canadian-flagged ships or by Canadians themselves. The pirates that are encountered, in today’s context, are on the other side of the world, presenting a difficult challenge to Canada’s ability to meet the obligations of international maritime law. Article 5 of SUA compels nation states that seize pirates to punish them appropriately with “penalties which take into account the grave nature of those offences.”<sup>106</sup> Arguably, by occasionally releasing Somali pirates after their capture, Canada is not living up to its obligations under SUA. *The Globe and Mail* and the United States criticized Canada’s “catch-and-release approach to countering piracy,” saying that it “is at odds with other Western navies and flouts Ottawa’s obligations under international law.”<sup>107</sup> It is easy to say that Canada is not living up to its obligations; it is much harder to provide a viable solution. Transporting the pirates from the Gulf of Aden back to Canada for prosecution would be logistically, financially and jurisdictionally prohibitive. Extraditing them to a third state also has its limitations. Both the United Kingdom and the United States have extradition treaties with Kenya, but even then, pirates have to be tried within 24 hours of capture and witness statements are not allowed—meaning the actual witnesses have to show up in court.<sup>108</sup> Canada is obligated under Article 5 of SUA to not only seize the pirates that it encounters on the high seas but also prosecute them appropriately. However, in practice this requirement has proven to be very difficult, even with full UN support in counter-piracy operations.

There are a multitude of Security Council resolutions that require states to counter maritime piracy. These UNSCRs use words such as *affirms*, *requests* and *calls on* to denote a level of obligation. A *request* would denote optional participation from member nations; however, the phrase *calls on* is meant to compel states into action. The most recent UNSCR concerning Somalia, still in effect, is the aforementioned Resolution 1897. On 30 November 2009, UNSCR 1897 set a 12-month mandate:

[The United Nations] [r]enews its call upon States and regional organizations that have the capacity to do so, to take part in the fight against piracy and armed robbery at sea off the coast of Somalia, in particular, consistent with this resolution and international law, by deploying naval vessels ...<sup>109</sup>

While applying to all states, the resolution specifically calls upon “flag, port, and coastal states, States of the nationality of victims and perpetrators” to suppress piracy.<sup>110</sup> This call is certainly

104. “SUA,” Article 6.

105. Ibid., Article 7.

106. Ibid., Article 5.

107. Paul Koring, “Ottawa’s Piracy Policy Flouts Law, Experts Say,” *The Globe and Mail*, May 1, 2009, <http://proquest.umi.com/pqdweb?iindex=0&did=1693832691&srchMode=1&sid=2&Fmt=3&VInst=PROD&VType=PQD&RQT=309&VName=PQD&TS=1266344161&clientId=1711> (accessed October 11, 2012).

108. Chalk, Smallman, and Burger, 1.

109. UNSC, “Resolution 1897.”

110. Ibid.

understandable given that international law under SUA is more readily applied when one of these factors is involved. However, Canada is a state that has naval vessels capable of contributing to the fight against piracy. The resolution calls upon all States with jurisdiction under international law to ensure the proper investigation and prosecution of maritime pirates.<sup>111</sup> Canada, and any Canadian military ship operating off the coast of Somalia and within the Gulf of Aden, is obligated to respond under UNSCR 1897. For Canada, the question becomes one of what level of response?

### Countering maritime piracy: Canada's moral obligation to respond

The international legal framework in existence allows Canada to seize pirates. As well, clauses in UNCLOS, SUA and relevant UNSCRs actually obligate Canada to respond and to ensure appropriate prosecution of pirates. However, there is no legal obligation to deploy on counter-piracy operations, which inherently remains a national decision. Even when the UNSC calls upon all member states to conduct a certain action, not all member states respond, and certainly, they do not all respond to the fullest extent of their ability. Therefore, it is not enough to know that Canada is obliged to respond by international bodies; it is also important to decide nationally that Canada should respond. The lack of a clear legal obligation leads to the challenging realm of a moral obligation, an obligation that arguably applies to Canada in the mitigation of worldwide maritime piracy. This moral obligation falls into three categories: an obligation to respond because Canada is engaged in the international economy, an obligation to respond because Canada professes to believe in human security, and an obligation to respond as a strong supporter of the UN.

Canada, as a trading nation, benefits from secure international shipping. As a country that greatly benefits from international trade, it can be argued that Canada not only has a stake but, in fact, is morally obligated to do its part in maintaining that trade. It is one thing to be a member of economic coalitions such as the G8 and G20; it is another thing to work actively by committing financial and human resources in ameliorating seaborne transit through the provision of security. The UNCLOS website states that “the oceans are the foundation of human life.”<sup>112</sup> The UN makes this bold statement because so much of the world depends on the food, resources and trade that flow from the oceans. Canada has a moral obligation to ensure the freedom of these oceans, and this obligation includes keeping maritime piracy on the margins.

Maritime piracy has a direct impact on its victims, and Canada has a moral obligation to do its part in protecting mariners worldwide. It would be impossible to protect all peoples using the oceans for business or pleasure; however, this challenge does not mean that Canada should not make an effort to work multilaterally in ensuring that the world's waterways are secure. DFAIT policy talks about Canada's desire to promote “human security” and of Canada's “responsibility to protect.”<sup>113</sup> It is recognized that the “responsibility to protect” doctrine came about to intervene internationally in cases of genocide or mass murder. However, the DFAIT policy goes on to note that “human security goes beyond traditional security concepts to focus instead on protecting the individual.”<sup>114</sup> It is, therefore, logical to state that Canada, if it follows through on its policy, does have an obligation, where possible, to ensure safety of life and freedom from fear. It is impossible to determine when Canadian citizens or Canadian-flagged vessels will be affected by piracy. Therefore, the obligation to fight piracy, based on human security, applies to all citizens, not just Canadians, and would imply that Canada should follow the UN's request to combat maritime piracy.

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111. Ibid.

112. United Nations, “UNCLOS.”

113. Canada, Department of Foreign Affairs and International Trade, *Canada's International Policy Statement: A Role of Pride and Influence in the World* (Ottawa: Department of Foreign Affairs and International Trade, 2005), 10.

114. Ibid., 14.

Canada has a moral obligation to follow through on its commitment to the UN and its policies. UNCLOS, SUA and UNSCRs all fall directly under the United Nations or its affiliated organizations. Canada is a signatory to SUA and UNCLOS and was even a co-sponsor of UNSCR 1816, the first UNSCR with maritime piracy as its primary focus.<sup>115</sup> DFAIT states: “at the international level, Canada remains firmly committed to the UN as the cornerstone of the multilateral system.”<sup>116</sup> If these words are true, and the UN is fully resolved to fight piracy, then Canada has an obligation to contribute in assisting and should respond to the call. After all, as noted by DFAIT, the United Nations “is an indispensable global organization for a globalizing world. ... [T]he UN helps to preserve our sovereignty, protect our key interests and defend our values.”<sup>117</sup> This statement certainly denotes Canada’s commitment to the United Nations and may indicate a moral, as opposed to legal obligation, to respond. It is with this moral obligation in mind that maritime piracy should be suppressed. Regarding piracy off the coast of Somalia, the UN has done its part in providing the legal authority and calling nations to act. There is no guarantee that the mandate will extend beyond 2010, and therefore, it is imperative that nations seize the initiative to suppress Somali piracy now.

### Canada’s obligation to counter piracy

Canada has a moral obligation to counter maritime piracy and a legal obligation to both seize the pirates it encounters and ensure their prosecution. Under international law, Canada has an obligation to bring pirates to justice and, therefore, should continue to work in conjunction with the international community in finding a solution for captured pirates. The legal frameworks currently exist in bold UNSCRs to seize pirates in the coastal waters of Somalia. However, it needs to be remembered that piracy occurs worldwide and where it does not exist today, it may exist tomorrow. In order to prevent piracy from spreading, it is vital that internationally engaged governments, the organizations with the resources and navies capable of suppressing piracy, combat piracy at its source.

In spite of the legal challenges, Canada and its maritime forces should respond to the request of the UN and contribute to the suppression of piracy. Piracy is a widespread issue, and the UNCLOS definition, the legal definition, may be too restrictive. It has been argued that a more comprehensive definition of piracy should be adopted to eliminate the loopholes that can make the pursuit and prosecution of piracy challenging. However, changing definitions will not stop pirates from committing their crimes; instead, it is through the actions of governments and maritime patrols that piracy can be mitigated. Canada does have a legal obligation to stop the piracy its maritime forces encounter and has a moral obligation to follow through on UN resolutions. However, the decision to respond to the UN’s call is a choice; if Canada truly wants to be seen as a committed and responsible member of the UN, it should do its part and commit resources to counter-piracy operations. This decision to respond would be in contrast to the decision to leave the suppression of the heinous crime of piracy to others, a decision that would indicate complacency. The way that Canada can act on a decision to respond to the UN’s request to suppress piracy is through the deployment of its maritime forces.

115. Koring.

116. Canada, DFAIT, *Canada’s International Policy Statement*, 9.

117. Canada, Department of Foreign Affairs and International Trade, “Canada at the United Nations,” [http://www.canadainternational.gc.ca/prmny-mponu/canada\\_un-canada\\_onu/can\\_un-can\\_onu.aspx?lang=eng&view=d](http://www.canadainternational.gc.ca/prmny-mponu/canada_un-canada_onu/can_un-can_onu.aspx?lang=eng&view=d) (accessed March 24, 2010, content updated).

#### 4. Canada's participation in countering maritime piracy

Not only does Canada have a stake in the fight against piracy, it is legally obligated to stop the piracy it encounters and morally obligated to work with the international community in suppressing the scourge. These factors, however, do not indicate what an appropriate method or level of response would be for Canada. Historically, it is through naval power that piracy has been pushed to the margins. Given the small size of its military forces, the Canadian naval response will have to be in collaboration with other partners in order to have significant effect in attacking some of the factors associated with piracy. Maritime piracy has always required favourable geography for its hunting grounds, lax law enforcement and the likelihood that reward will exceed risk. Navies can provide the missing element of law enforcement and make the risk to pirates greater than any potential reward; this can occur especially when maritime forces have the authority to use adequate force at sea and captured pirates receive significant punishment when prosecuted ashore. Ideally, the maritime forces combating piracy are national and regional and, thus, are able to fight piracy at its sources. However, when regional maritime forces are ineffectual, or non-existent, the international community may be required to assist in suppressing maritime piracy. To this effort, Canada has recently deployed elements of its maritime forces to the Horn of Africa to assist in a region that does not possess its own domestic maritime patrols.

Given the increased media awareness and the potential global ramifications of piracy, the world's nations have responded to the increased activity off the coast of Somalia. The UN has ratified UNSCRs authorizing the seizure of pirates. The international community has deployed a significant naval force to the region, with over 25 countries contributing assets. Canada has demonstrated a willingness to contribute to this mission; however, Canada's continued participation may be hampered by a maritime force facing the challenges of unit availability, aging equipment and modernization programs. Each naval deployment has its associated costs and must be examined closely. In fact, if Canada is dedicated to countering piracy and helping to ensure future maritime security, it will need to invest in its maritime forces and also build the required force structure suited to the threat. As proven throughout history, navies are required to counter piracy at sea, and if Canada is to assist in international efforts to thwart piracy, it will be through deploying maritime forces in the most economical way possible.

Deploying sufficient naval force has been effective in suppressing maritime piracy. Both the Royal Navy (RN) and the United States Navy (USN) have a history of using their collaborative might to push maritime piracy to the margins. In 2009, similar efforts to discourage piracy were made, with willing nations sending their warships to the coast of Somalia and the Gulf of Aden to counter maritime piracy; these forces have proven capable of reducing, although not eliminating, the incidents of maritime piracy. Therefore, in order to ensure the safety of merchant vessels, nations may need to contribute maritime forces for extended periods of time. Because the current and planned composition of Canada's maritime forces is numerically small and not expected to grow, the Navy's ability to deploy ships across the world for counter-piracy operations is limited and will be difficult to sustain long term. The challenge of few available units is not unique to Canada; in fact, the number of warships among Western nations has declined as countries have chosen to have fewer, more capable ships instead of larger fleets.<sup>118</sup> The government and public may be understandably hesitant to pay the high financial cost of deploying expensive conventional warships to fight pirates in small boats, especially when the direct economic benefit is challenging to measure. However, the financial and operational costs could potentially be mitigated if Canada were to build or purchase a fleet of modularized patrol vessels that could be custom fitted for constabulary tasks. At this time,

118. Norman Friedman, "Chasing the Pirates," *United States Naval Institute, Proceedings* 135, no. 6 (June 2009): 90–91.

a reshaped and redesigned fleet is a possibility and not an actuality; therefore, Canada must decide whether to contribute its few available units to combat pirates overseas. Ultimately, deploying on counter-piracy operations or other multilateral overseas maritime operations signifies Canada's role as a global player. The UN has called on countries with capable maritime forces, such as Canada, to do their part in combating piracy. Arguably, because of the international mandate, and because Canada has the capability to contribute, Canada should continue to support the UN by participating in counter-piracy operations.

### **Efficacy of navies in countering piracy**

Historically, naval forces have proven capable of reducing the effect of piracy. Gottschalk and Flanagan note that the primary peril to pirates is a warship and any solution to the problem has to include military force.<sup>119</sup> This assertion was demonstrated by the pirate wars of the early 19<sup>th</sup> century and by the significant reduction of piracy in the Malacca Strait in the 21<sup>st</sup> century. In both cases, the actions of naval forces successfully forced piracy to the margins. In today's context, there is less piracy where the "naval presence is greater and more effective."<sup>120</sup> This fact is evidenced by the lack of piracy both off the coasts of North America and in the Mediterranean, where robust naval forces and coast guards ensure the protection of mariners from pirates. However, in parts of the world where a naval presence is lacking, and conditions ashore are permissive, piracy does exist. While there may be calls for stronger laws to suppress piracy, the fact remains that "covenants without swords" will not deter the pirate criminals.<sup>121</sup> It simply takes armed presence, and willingness to use force, to make the risk greater than the reward. For maritime piracy, navies, such as the RN and USN during the 19<sup>th</sup> century, provide the sword and the ability to combat piracy in its element.

To combat piracy in its element means to combat it not only at sea but also with the resolve to use force. Piracy is an act in which the dominant force at sea is superior. Both the USN and RN finally used naval force in fighting lengthy, and ultimately successful, wars against piracy in the early 19<sup>th</sup> century: one in the Caribbean and one against the Barbary pirates off the northwest coast of Africa and in the Mediterranean. Similar to the modern day situation, European countries of the 19<sup>th</sup> century had the naval power to suppress piracy, but they often chose to pay ransoms to the pirates instead of taking military action.<sup>122</sup> Likewise, the American colonies made "peace payments"—a yearly stipend of US\$21,600 to the pirates for their ships to have safe passage, a significant sum in 1796.<sup>123</sup> The third president of the United States, Thomas Jefferson, decided that the ongoing cost was too great, and it would be more honourable for his nation to create justice by decreasing the crime of piracy and more respectable to not pay bribes to the pirates.<sup>124</sup> He sent his recently formed navy across the Atlantic to fight an ultimately successful war against the Barbary pirates. The American decision to fight piracy, and the subsequent naval action, is said to have "shamed the British into taking action."<sup>125</sup> Historian Paul Johnson argues that even without firing a shot, the mere presence of the powerful navies would have suppressed the Barbary Coast pirates.<sup>126</sup> The success of the mission to the Barbary Coast demonstrated the ability of navies, especially when working in coalition, to suppress piracy. This lesson was repeated in the Caribbean, an area (which before the intervention

119. Gottschalk and Flanagan, 11.

120. Ibid., 53.

121. Paul Johnson, "Recall the War Against Piracy: In the 19<sup>th</sup> Century, as Today, the Great Civilized Powers Acted in Concert," *National Post* (National Edition), October 18, 2001.

122. Keven Baker, "The Shores of Tripoli," *American Heritage*, (February 1, 2002): 17–18.

123. Neil Reynolds, "Jefferson's War on Terror," *Telegraph-Journal*, April 16, 2009.

124. Ibid.

125. Johnson.

126. Ibid.



of American and British navies) had seen some 3000 pirate attacks between 1815 and 1823.<sup>127</sup> The counter-piracy operations in the Caribbean turned a “pirate infested no-man’s-land” into a region of the world where seaborne trade could occur without being attacked.<sup>128</sup> The mission was immensely effective due to the close cooperation between the RN and USN in ensuring the prosecution of the pirates. The West India Squadron of the USN patrolled the Caribbean, sinking and burning pirate vessels. Americans, under their laws, would have been forced to send the pirates back to the United States for trial. So instead, when possible they favoured turning the pirates over to the British for execution.<sup>129</sup> There “was a multilateral effort grounded in a shared ideological conclusion that piracy had to be rooted out”<sup>130</sup> and the cooperative actions of the USN and RN allowed an outcome that was particularly lethal for the pirates. It was a decision to both use force at sea and enact significant prosecution ashore that made the risk to pirates greater than any possible reward.

The RN and the USN deployed lengthy distances, chased down, overwhelmed and overpowered the pirates, stopping the criminals and allowing safe shipping. Applicable to today’s context was the fact that the navies had to deploy significant distances, and work collaboratively, in order to suppress piracy and ensure the free movement of seaborne trade. The cooperation, especially in the Caribbean, was particularly effective because of the use of force and the use of executions, which would have sent a very clear message. This example of a successful counter-piracy operation might indicate both that the navies combating piracy off Somalia need the ability to use force at sea and that governments need to ensure severe prosecution ashore. In the early 19<sup>th</sup> century, the RN was a superpower navy and had the ability to deploy to diverse areas of the world to fight piracy. In the 21<sup>st</sup> century, no navy, not even the USN, has the resources, or arguably the will, to suppress piracy worldwide. Therefore, the suppression of piracy requires the efforts of other, lower-ranked navies to work collaboratively. Recently, these efforts are occurring in vicinity of Somalia, but even more effective is the regional cooperation in the Malacca Strait.

Even in current times, maritime forces working collaboratively have proven effective in suppressing piracy. In 1992, Indonesian, Malaysian and Singaporean forces adopted a policy of aggressively patrolling the Malacca Strait, a policy that resulted in the virtual elimination of pirate activity.<sup>131</sup> However, this initiative was abandoned after six months because of the high cost for the governments involved. Consequently, piracy was revived, and in 2000, there were 75 recorded pirate attacks in the Malacca Strait.<sup>132</sup> Once again in 2005, the three countries renewed their decision to collaborate and combat maritime piracy. The renewed aggressive patrols, commended by the IMB, reduced the reported incidents of piracy in the Malacca Strait to only two in 2009.<sup>133</sup> The Malacca Strait example demonstrates that regional cooperation from littoral states with a vested interest can be successful in fighting piracy, reducing its effect on a major shipping route. However, because of the focus of naval patrols on the Malacca Strait, fewer resources were available elsewhere and the “security situation in the sea lanes linking the Philippines, Indonesia and Malaysia was allowed to

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127. Peter M. Swartz and Christine Fox, “Piracy and the United States Navy: A Summary of the USN’s Historical Record of Dealings with Piracy and Observations on Lessons Learned,” *Canadian Naval Review* [http://naval.review.cfps.dal.ca/pdf/Schwartz-Fox\\_Dec08.pdf](http://naval.review.cfps.dal.ca/pdf/Schwartz-Fox_Dec08.pdf) (accessed October 11, 2012).

128. Ibid.

129. Ibid.

130. Cowan, 82.

131. Murphy, *Contemporary Piracy and Maritime Terrorism*, 17.

132. Catherine Zara Raymond, “Piracy and Armed Robbery in the Malacca Strait: A Problem Solved?” *Naval War College Review* 62, no. 3 (Summer 2009), <http://www.usnwc.edu/getattachment/7835607e-388c-4c70-baf1-b00e9fb443f1/Piracy-and-Armed-Robbery-in-the-Malacca-Strait--A-> (accessed October 11, 2012).

133. ICC, IMB, *Annual Report 2009*.



deteriorate.”<sup>134</sup> Though the nations surrounding the Malacca Strait had sufficient maritime security forces to provide a regional solution to the problem, where countries lack resources, it is through international intervention that piracy can be suppressed.

Where the littoral states do not have the will or resources to fight piracy, as is the case in modern day Somalia, then international intervention is needed. In 2009, in response to both the extensive media coverage and UNSCRs calling for action to suppress Somali piracy, over 25 countries, including Canada, sent warships to the region to patrol an area of over 2.5 million square kilometres.<sup>135</sup> While the number of attempted attacks continued, almost unabated, there was a significant decrease in the number of successful attacks.<sup>136</sup> It has been argued that the “mere silhouette of a warship on the horizon is enough to send pirates scurrying into their skiffs back to their hideouts.”<sup>137</sup> This contention may not always be the case if pirates grow bolder. If pirates are after a sufficiently valuable target, it is conceivable that the arsenal of weapons used by pirates could expand to contain anti-ship torpedoes or anti-ship missile systems. The sophistication of modern weaponry and its availability to pirates and terrorists with sufficient funds pose a new and greater threat to warships, making counter-piracy operations potentially much more challenging and dangerous. In the case of Somalia, the mere presence of maritime forces does not seem to be a deterrent for pirates who continue to attempt attacks, perhaps indicating that the risk does not yet exceed the potentially large reward. The reduced number of successful attacks does indicate that the naval patrols are effective in allowing safe passage but not in discouraging attempts. This situation, of course, leads to a quandary and highlights one of the challenges in using a naval presence to prevent contemporary piracy. The obvious conclusion is that mere presence and preventative measures are not enough, especially without prosecution ashore. But a decision to fight piracy in its element—that is, by authorizing navies to use force at sea—might result in significant reduction of piracy. Having the correct rules of engagement and having pirates effectively prosecuted ashore are only two of the challenges that are faced in suppressing maritime piracy.

### Challenges in using navies to counter piracy

While, historically, navies have proved to be a main factor in suppressing piracy, there are disadvantages, or perhaps more accurately challenges, which must be considered. These challenges include the cost for governments of utilizing warships, the difficulty of sustaining naval operations for long periods of time and the argument that naval forces are only able to combat the symptom, not the cause, of maritime piracy. It has been stated that a group of warships can do little to fight piracy and that the solution lies ashore instead of at sea.<sup>138</sup> In other words, the socio-economic roots such as poverty, lack of employment and ineffectual governance would need to be addressed to fully discourage piracy. However, there is no near-term solution to the shore-based problems in Somalia, and naval power may be the “only tool currently available to counter pirate attacks.”<sup>139</sup> International naval forces may be able to allow safe passage, but they are not stopping pirates from trying. This situation would indicate that if the forces leave, then piracy would flourish again, similar to the revival of attacks in the Malacca Strait in 2000. Therefore, the naval response will need to continue, an expensive proposition for all countries involved.

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134. Raymond.

135. Hanson.

136. International Security Information Service Europe, “EU and NATO Efforts.”

137. Patrick Lennox and Aaron Plamondon, “Build Ships, Be Heard,” *National Post*, January 8, 2009, <http://proquest.umi.com/pqdweb?di=1624668221&Fmt=7&clientId=1711&RQT=309&VName=PQD> (accessed October 11, 2012).

138. Kaufman.

139. Ibid.

The universal challenge of using naval forces to counter piracy is the high financial cost. Each frigate is pegged at costing approximately US\$50,000 per day to operate.<sup>140</sup> Sustaining a 7-month deployment costs over US\$10 million, and therefore, ironically, it would actually be cheaper to pay a Somali pirate ransom than to deploy a single Naval vessel to the Gulf of Aden. This high financial cost means that countries may be reticent to repeatedly contribute naval forces to counter-piracy operations. A RAND Corporation working group on the maritime piracy problem noted that the naval response off the Horn of African may be out of proportion with the scale of the problem. The report notes that the expense of naval deployments “has caused several analysts to question the appropriateness of the current international naval response that has been deployed off the Horn of Africa.”<sup>141</sup> There is no doubt that preventing piracy is an expensive proposition, but does it mean that the money is ill-spent? Naval units can reduce the success of pirate attacks and protect merchant shipping; furthermore, preventing crime increases justice for the individual mariner and globally demonstrates a will to fight international crime. It is a better message than complacency. American lawyer and scholar Milena Sterio contends: “Not fighting the Somali piracy signals a message of passivity and carelessness to all sorts of dangerous individuals and groups across the globe, looking to engage in similar types of criminal behaviour.”<sup>142</sup> Simply put, the international community, including Canada, can and should send a timely and strong message that will discourage piracy and its proliferation. With the majority of contemporary piracy occurring in Africa and Asia, it is through naval force, including portions of Canada’s capable maritime forces, that this message can be sent.

### Ability of the Canadian Navy to counter piracy

Canada has a small, professional, blue-water maritime force that is capable of contributing to current counter-piracy operations. The Canadian Navy has 12 HALIFAX class frigates, 3 IROQUOIS class destroyers, 2 replenishment ships (AORs), 4 conventional submarines and 12 maritime coastal defence vessels (MCDV). Of the 29 surface vessels, the frigates and destroyers are arguably the most capable of making valuable contributions to counter-piracy operations. The HALIFAX class frigates were designed and built primarily as cold war antisubmarine warfare vessels<sup>143</sup> and are very heavily armed, perhaps over-armed, for constabulary tasks. However, with their full range of conventional defensive capabilities, they can not only conduct counter-piracy missions but also react swiftly to other contingency operations, even in the face of conventional threats.<sup>144</sup> In other words, they are capable of countering piracy, even if the pirates were to obtain larger-scale weaponry. The IROQUOIS class destroyers are larger and significantly older. Although 40 years old and about to become the world’s oldest frontline naval combatant, their modernized systems allow them to command forces as demonstrated during command of Combined Task Force 150 in 2008.<sup>145</sup> Canada’s MCDVs are smaller than the frigates and do not have the conventional self-defence capability or speed that would be required to combat maritime pirates. As well, their limited size makes ocean transits challenging and limits both crew numbers and ability for prolonged operations. With the MCDVs being too small, and the frigates and destroyers heavily armed for conventional cold-war threats, neither platform may be ideal or economical for counter-piracy operations.

140. Chalk, Smallman, and Burger, 2.

141. Ibid.

142. Sterio.

143. Canada, Department of National Defence, “Halifax-Class Modernization (HCM) / Frigate Life Extension (FELEX),” [http://www.navy.forces.gc.ca/cms/3/3-a\\_eng.asp?id=618](http://www.navy.forces.gc.ca/cms/3/3-a_eng.asp?id=618) (accessed October 11, 2012).

144. Richard Gimblett, *Operation Apollo: The Golden Age of the Canadian Navy in the War Against Terrorism* (Ottawa: Magic Light Publishing, 2004), 30.

145. Ken Hansen, “The Mounting Cost of Maintaining Antique Warships and their Vital Capabilities,” *Canadian Naval Review*, <http://naval.review.cfps.dal.ca/forum/view.php?topic=57> (accessed October 11, 2012).

At the present time, Canada does not possess dedicated patrol vessels capable of patrolling both overseas and in harsh Canadian territorial waters. Such vessels (ideal for constabulary maritime operations, such as counter piracy) would need to be larger than the MCDVs but would arguably require less sophisticated command and control and weapons systems than frigates or destroyers.<sup>146</sup> Military analyst Vego has argued that multipurposed, fast and small, corvette-sized ships are better suited than destroyers or frigates for counterterrorism patrols, sanctions enforcement, counter piracy and counter smuggling.<sup>147</sup> Alternatively, military strategist Norman Friedman has argued that a modularized ship concept, built on larger but relatively inexpensive hulls, would be ideal because “much of the time the ship(s) simply do not need all possible capability.”<sup>148</sup> Expensive weapons and sensor systems would only be installed when the threat dictated their necessity. As well, with a larger hull than a corvette, the ship could have space for humanitarian supplies, boarding teams, fuel and so forth, if the situation and threat allowed. Because of the lower hull cost, there would exist the theoretical ability of a state to purchase more units, thus allowing the ships to be deployed in more regions and cover more area. In terms of piracy, this might equate to protecting more merchant ships. Regardless, ships deploying overseas will still require the ability to combat the wide range of conventional threats and weapons systems possessed by both states and non-state actors.<sup>149</sup> A basic self-defence capability is essential for protecting the ship and sailors as well as providing the flexibility to respond to contingencies in hostile areas. Terrorist groups have demonstrated the ability to use anti-ship missiles, and there exists the potential for terrorists or pirates to use surface or subsurface launched anti-ship torpedoes. There would, therefore, be an element of risk in sending ships across the world to conduct seemingly benign counter-piracy tasks, if they did not have the full range of defensive capabilities. The Navy’s strategic vision, *Leadmark 2020*, recognizes that: “Although many of the tasks assigned to naval forces may not require such a [conventional] capability, their probable deployment to areas of tension requires at least an ability to protect themselves in the event hostilities occur.”<sup>150</sup> In other words, patrol vessels could be used in counter-piracy operations, but they would still require at least a basic self defence capability. A fleet of patrol vessels, modularized depending on the mission and threat level, could eventually replace, or supplement, the Canadian fleet of conventional ships. Patrol vessels could be used for low-risk constabulary tasks, including sovereignty patrols off the Canadian coast, and then conventional systems could be added for higher-risk tasks or conventional warfare. However, the decision to build a more diversified fleet would need to be made sooner, rather than later, as the Canadian Navy faces the potential of even fewer available assets in the coming years.

Canada’s fleet faces numerous challenges in the upcoming years that will make contributions to maritime piracy operations even more challenging. The destroyers are aging and no official project for their replacement has been announced. An AOR replacement plan, the Joint Support Ship project, has been delayed due to unforeseen costs.<sup>151</sup> The frigates are commencing a modernization program that will see all 12 frigates taken out of service, periodically, over the next few years.<sup>152</sup> The planned Arctic offshore patrol ships (AOPS) will be designed to operate in Northern waters and are unlikely to be suitable for counter-piracy operations off the coast of Asia or Africa. Typical shipbuilding

146. Milan Vego, “Finding Our Balance at Sea,” *Proceedings Magazine* 136/1/1,283, (January 2010), [http://www.usni.org/magazines/proceedings/story.asp?STORY\\_ID=2165](http://www.usni.org/magazines/proceedings/story.asp?STORY_ID=2165) (accessed October 11, 2012).

147. Ibid.

148. Friedman.

149. Vego.

150. Canada, Department of National Defence, *Leadmark: The Navy’s Strategy for 2020*, (Ottawa: Chief of the Maritime Staff, 2001), 11, [http://www.navy.dnd.ca/leadmark/doc/index\\_e.asp](http://www.navy.dnd.ca/leadmark/doc/index_e.asp) (accessed October 11, 2012).

151. David Pugliese, “Why Is the Joint Support Ship Delayed?” Commentary, *Ottawa Citizen*, <http://davidpugliese.wordpress.com/2009/12/06/david-pugliese-ottawa-citizen-commentary-what-is-the-joint-support-ship-stalled> (accessed October 11, 2012).

152. Canada, Department of National Defence, “HCM/FELEX.”

programs take approximately 10 years from conception to completion. Since no contracts have yet been awarded, it can be deduced that there will be many years before Canada's maritime forces are recapitalized, and thus, the availability of blue-water platforms is expected to be limited over the next few years. Investing money in patrol vessels, which can contribute to both domestic and international constabulary duties, would give Canada more options and, arguably, be a less expensive option when deploying ships for counter-piracy operations. However, with no new ships on the horizon, Canada must make judicious choices when deciding where and how often to deploy the available platforms on counter-piracy operations.

Though difficult to prescribe an exact deployment schedule, it does seem unlikely that the current pace of counter-piracy operations will continue for the Canadian Navy. In 2008, Canada deployed 3 ships in a task group to combat piracy and terrorism off the Horn of Africa, a deployment that included taking command of 18 ships, from different nations, within a combined task force.<sup>153</sup> Because of the aging destroyers and the lack of near-term replacement for the AORs, it has been predicted that the operation may be the last Canadian task group to deploy for a number of years.<sup>154</sup> In 2009, both HMCS WINNIPEG and HMCS FREDERICTON deployed to the region for counter-piracy operations. With the commencement of the HALIFAX class modernization program in 2010, the number of available assets will diminish, and other tasks (such as sovereignty patrols, conventional training exercises and alliance commitments) need to be maintained. Therefore, deploying more than one ship annually seems unrealistic. However, conducting even one deployment annually would be of benefit and would demonstrate Canada's ongoing commitment to countering piracy and to the United Nations; even a single annual deployment, however, comes with challenges.

### Advantages and challenges for Canada in countering piracy

Although everything comes with a cost, Canada, and more so its Navy, has much to gain from deploying its maritime forces to join the fight against maritime piracy. The advantages to the government include having a military unit forward deployed across the world ready to respond to contingencies and, more importantly, demonstrating Canada's role as an internationally engaged country committed to the United Nations. Having a naval unit, or naval units, forward deployed and conducting counter-piracy operations in Africa, Asia or Europe can give the Canadian government and the Canadian Navy tremendous flexibility in responding to other contingencies.

During summer 2008, HMCS VILLE DE QUEBEC was already deployed to the Mediterranean as part of a NATO mission. Consequently, when the UN requested assistance, the Canadian government was able to redeploy the ship to the higher priority World Food Program escort mission. In the aftermath of 9/11, HMCS HALIFAX was similarly operating in the Mediterranean when the Canadian government retasked the ship to the Persian Gulf region, demonstrating Canada's swift response, and support to the United States, in the international war against terrorism. Conversely, when tensions increased in Lebanon in 2006, Canada did not have a warship in the area or forward deployed. A naval ship could have provided tremendous command and control to the Canadian evacuation efforts. Of note, a patrol vessel may not have been appropriate for this mission; instead, given the anti-ship missile threat, a frigate or destroyer would have been required to ensure adequate self-defence. Canada's Navy is certainly not large enough to be forward deployed throughout the world, waiting to respond to any contingency. However, by sending ships on a valuable mission such as Somali counter-piracy operations, it does give government the ability to respond to crises when

153. Patrick Lennox, "End of an Era; Canada's Command of CTF 150," *Vanguard: Canada's Premier Defence and Security Magazine*, <http://www.vanguardcanada.com/EndOfAnEraLennox> (accessed October 11, 2012).

154. Ibid.

they arise. A ship forward deployed on counter-piracy operations provides Canada with political and military flexibility and maintains interoperability with other allied navies, gaining practical operational experience while fulfilling Canada's obligation to the UN.

By deploying its maritime forces for counter-piracy operations, Canada not only contributes to the freedom of the seas but also demonstrates a commitment to its allies and to the UN. Other countries have sent their navies for different reasons; France, India, China and Russia only sent ships after their flag vessels were attacked.<sup>155</sup> Some countries recognize that a "contribution to anti-piracy operations can bring recognition and prestige to participating nations."<sup>156</sup> For an internationally engaged country there may be extrinsic value to deploying ships alongside allies in protecting trade routes. It is certainly important for nations to support the UN mandate: "Piracy affects the trade and security interests of many nations, and thus participation in Horn of Africa anti-piracy operations has become one way for a country to signal both its willingness and its ability to cooperate in issues of international concern."<sup>157</sup> Although written about China, this statement can just as readily apply to Canada, a country that has shown its willingness to participate in counter-piracy operations regardless of the size of the direct economic impact. Canada's participation in counter-piracy operations clearly demonstrates the willingness of the Canadian government to act on the volitions of the UN. Arguably, there is also a corollary benefit to the Canadian Navy. By working closely with its allies, and under a combined task force or NATO umbrella, Canada's Navy can not only achieve tangible results, as seen during both HMCS WINNIPEG's and HMCS FREDERICTON's actual prevention of pirate attacks, but also gain valuable interoperability skills.<sup>158</sup> One of the key skills is, quite simply, the ability to communicate with other nations. By participating as part of a coalition, conducting counter-piracy operations, Canada can gain and solidify the communication and integration skills necessary for future collaborative, irregular or conventional, naval operations.

## Participation

Navies have proven necessary in fighting piracy, an approach that the nations of the world are still pursuing in 2010. Canada has the naval capability to participate in this fight, but while this participation clearly demonstrates Canada's role as an international participant, it must be weighed against various operational and financial costs, including the small number of available units. With the direct economic cost of maritime piracy to Canada being potentially as low as Can\$2.5 million annually, deploying a frigate at US\$50,000 per day on a counter-piracy operation may appear to be a poor investment. However, Canada has a vested interest in the freedom of the seas and should fight piracy in areas of the world that "cannot afford the personnel, equipment or organisational resources needed to tackle the problem."<sup>159</sup> Deploying the Navy to contribute to counter-piracy operations demonstrates Canada's willingness to be a global actor. There is always a choice for Canada to adopt a more isolationist foreign policy and leave issues, such as counter piracy, to the United States or the European Union, both entities with much larger navies. However, if Canada is committed to its internationally engaged foreign policy, this commitment would indicate involvement in counter-piracy operations and the acceptance of the costs.

When Canada deploys a naval unit on counter-piracy patrols, there are both financial and operational costs. The operational cost occurs not only because the unit is not available for local

155. Chalk, Smallman, and Burger, 4.

156. Kaufman.

157. Ibid.

158. Canada, Department of National Defence, "NATO Ship Prevents Pirate Attack in Gulf of Aden," [http://www.navy.forces.gc.ca/fredericton/2/2-s\\_eng.asp?category=147&title=4382](http://www.navy.forces.gc.ca/fredericton/2/2-s_eng.asp?category=147&title=4382), (accessed March 6, 2010, site discontinued).

159. Murphy, *Contemporary Piracy and Maritime Terrorism*, 15.



sovereignty patrols, or other missions, but also because the conventionally armed frigate or destroyer is not training in conventional warfare. This cost would be mitigated if Canada were to build a fleet of modularized patrol vessels. While a future conventional threat cannot be discounted, current missions have been, and are likely to be, focused on constabulary-type missions against non-state actors. A larger fleet of modularized patrol vessels would provide less expensive, but still capable, ships that could be modified for diverse tasks but still be fitted with appropriate self-defence weapons systems when necessary. However, currently, Canada does not have such a fleet, and unless the decision is made to purchase ships overseas, instead of building them in Canada, it will be many years before the Navy is recapitalized. Therefore, in the interim, Canada should decide to use its limited assets for overseas patrols; deploying even one unit annually in support of the UN will indicate Canada's continued support. The cost of deploying a frigate for a seven-month counter-piracy operation is approximately US\$10 million, but this investment is worthwhile when it demonstrates Canada's willingness to be internationally engaged. Counter-piracy operations allow the Navy to gain real-world experience in operations, experience that is always preferable to simulation. More importantly, the deployment of Canada's Navy for UN-sanctioned counter-piracy operations sends a strategic message that Canada is opposed to the heinous crime of piracy, is an internationally engaged world player, and supports the UN in making the world a safer place.

Perhaps even more straightforward than any political goal is that the piracy problem requires a military response. This response must come not from a single country, but from a coalition in order to provide the "critical mass of warships and their air assets to maintain a constant presence in the region."<sup>160</sup> The presence would ideally be paired with the authority to use force. Canada being off the coast of Somalia does serve to indicate Canada's support to the UN even if significant force is not nationally authorized and pirates are not prosecuted ashore; however, robust rules of engagement permitting maritime units to use significant force, paired with appropriate prosecution ashore, will allow militaries to send a strong message and may go further in discouraging piracy. Countries, including Canada, may be hesitant to contribute to counter-piracy operations for extended periods because of the high cost of modern naval deployments and the challenges associated with prosecution. However, as long as maritime piracy threatens major shipping routes and as long as the UN requests its assistance, Canada should continue to participate in the fight.

## 5. Conclusion

As an internationally engaged country with a stake in global commerce, Canada has an obligation to continue to participate in counter-piracy operations and mitigate the associated threats. However, because piracy is a complex problem and because the direct impact is arguably minimal to Canada, an appropriate level of participation is challenging to ascertain. In fact, Canada has the option, regardless of any request from the UN, to do nothing at all concerning Somali piracy. However, a decision to be complacent, and not participate in counter-piracy operations, would be contrary to Canada's internationally engaged foreign policy and stated ethos for individuals to be free from fear. Even if Canada were to use softer measures, such as working to rewrite the international law concerning piracy, these measures might not hold the same weight in the international community as contributing maritime forces will. More importantly, words alone will not stop the pirates from committing their heinous acts, nor will words alone protect mariners. Instead, it is through the collective action of internationally engaged countries and their maritime forces that piracy can be mitigated to an acceptable level.

160. Patrick Lennox, "Contemporary Piracy Off the Horn of Africa," (Calgary: Canadian Defence & Foreign Affairs Institute, 2008), <http://www.cdfai.org/PDF/Contemporary%20Piracy%20off%20the%20Horn%20of%20Africa.pdf> (accessed October 11, 2012).



In terms of piracy occurring off the coast of Somalia, the UN has not only requested the assistance of capable states but also authorized robust measures, including entry into territorial waters, in efforts to reduce the impact. The UNSCRs concerning piracy off the coast of Somalia demonstrate not only the UN's concern but also its determination in fighting piracy. As long as there is a UN mandate to do so, Canada can demonstrate its commitment by dedicating assets to assist coalition efforts in suppressing piracy. This commitment to the UN is important, but the effective suppression of maritime piracy will also require the Canadian government to authorize its Navy to use significant force in order to strongly deter the pirate criminals. In terms of participation, it is not suggested that Canada should dedicate its entire Navy to countering piracy. However, a measured response would demonstrate Canada's willingness to work closely with allies in what the world sees as a current threat, evidenced by the world's response off Somalia. Although the direct impact of maritime piracy on Canada's economy is difficult to measure, Canadian naval vessels have had very real, tangible results in preventing ships from being attacked by pirates and have made the oceans safer for mariners, arguably, a more noble cause than merely protecting one's own commerce. The authorization of robust force and effective prosecution of the pirate criminals would permit the maritime forces to suppress piracy even further.

Throughout history, piracy has been suppressed, but not eliminated, and has moved throughout the globe based on changing conditions. In the current context, the decision to deploy on counter-piracy operations is facilitated because the bulk of maritime piracy, almost 50 per cent of the recorded incidents in 2009, occurs in one geographical area—the Gulf of Aden. Therefore, by deploying to this area of the world and working collaboratively with allies, Canada can have a very real effect in the mitigation of piracy. The decision to deploy for counter-piracy operations is similar to those of the great navies of the early 19<sup>th</sup> century. The USN and RN deployed their navies to specific parts of the world where maritime piracy was prevalent and threatened lives and legitimate shipping; the United States and Britain decided that pirates were criminals and naval force was required to bring punishment. Similar to the efforts in the Caribbean during the 19<sup>th</sup> century, the collective naval efforts off the coast of Somalia, if combined with action ashore and the effective prosecution of pirates, may eventually lead to the suppression of piracy. But in order to conclude that it is worth suppressing, nations must realize that piracy is the heinous and universal crime that those who have experienced it first hand describe it to be. The moral obligation from such a realization might compel nations to act.

Under international law, Canada is not only authorized to seize and arrest pirates, it is actually obligated to stop the piracy that it encounters. However, the definition of piracy, as written in UNCLOS, limits the ability to stop piracy because it does not allow one nation to enter another nation's territorial water, the area of the world's oceans where much of maritime piracy occurs. As mentioned, this difficulty can be resolved by UNSCRs authorizing entry into territorial waters, but this occurrence is rare. The creation of UNSCR 1897 is one such rare occurrence, a window created for such a time as this; it is a 12-month mandate to pursue pirates and prosecute pirates. If nations do nothing, this window may close and not open again for a long time, allowing piracy to grow and mutate to more dangerous proportions. The ideal solution is for nations to work collectively in developing regional solutions to suppress maritime piracy. Littoral states can potentially authorize foreign nations to enter their territorial waters when chasing pirates. Even when regional maritime security forces are insufficient or non-existent, nations could at least sign agreements that would permit allies to enter their waters for piracy suppression. For example, Yemen and Somalia, even without a UNSCR, could sign agreements with nations such as the United States and Canada, allowing them to enter territorial waters for the mitigation of both maritime pirates and terrorists.

Arguably, the single largest legal issue and challenge facing the coalition navies attempting to suppress piracy off the coast of Somalia concerns the prosecution of captured pirates. Canada should continue to work towards a solution to this problem that will make the risk of being caught conducting piracy greater than any reward. However, the legal issues are not the only challenges associated with fighting maritime piracy.

There are challenges, especially in sustaining naval operations, in the efforts to counter piracy. These difficulties include not only the high cost of naval deployments but also the difficulty of maintaining the will for sustained operations. Canada is only one of many nations that have deployed ships to the region to combat maritime piracy, some of whom may have sent ships to the region because of a “bandwagon” effect.<sup>161</sup> In other words, they are there because their allies are there. The negative aspect would be a reverse engagement. If nations begin to exit because of the high expense, or because the mission has lost its political appeal, the effect could influence other nations. This situation, of course, would indicate that as long as piracy remains rampant and the UN mandate remains in place, as a self-professed world leader in advocating human rights, Canada should commit to doing its part in countering the complex problem of maritime piracy.

Piracy is a complex problem. The economic impact, while large in specific regions, is small compared to the global economy or global shipping. The security impact, while serious to the individual victims, exists regionally but does not affect nations on a global scale. However, the potential does exist for a deteriorating situation, whether through an environmental disaster or piracy-terrorism nexus and, therefore, piracy should be mitigated. In today’s context, no individual nation has the resources, either monetary or physical, to suppress piracy alone; therefore, the response must be collective from internationally engaged countries. This collective response needs to be in the form of maritime forces that can counter piracy where it occurs—at sea. With piracy occurring in large areas of water, numerous units are required to adequately patrol the waters and protect merchant shipping. The individual units within this collective response would ideally be patrol vessels, vessels optimized for constabulary tasks. In other words, if Canada is to undertake counter piracy, or other similar tasks for the long term, the current force structure—ships designed to counter cold-war threats—needs to be diversified, and consideration should be made for purchasing large, modularized patrol vessels that can be fitted with mission appropriate equipment. However, Canada currently has a small fleet comprised of capable, conventionally armed ships. Even if arguably over-armed, these ships can very effectively assist in countering the odious crime of piracy and protecting the lives of mariners and the global shipping they facilitate. This participation will clearly indicate both Canada’s dedication to the UN and Canada’s willingness to be internationally engaged in the promotion of justice by forcing the hauling down of the Jolly Roger.

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161. Kaufman.

## Abbreviations

<b>AOR</b>	oiler replenishment (ship)
<b>CAN\$</b>	Canadian dollar
<b>CMS</b>	Chief of Maritime Staff
<b>DFAIT</b>	Department of Foreign Affairs and International Trade
<b>GDP</b>	gross domestic product
<b>HMCS</b>	Her Majesty's Canadian Ship
<b>IMB</b>	International Maritime Bureau
<b>IMO</b>	International Maritime Organization
<b>MCDV</b>	maritime coastal defence vessel
<b>RN</b>	Royal Navy
<b>SUA</b>	Suppression of Unlawful Acts Against the Safety of Maritime Navigation
<b>UN</b>	United Nations
<b>UNCLOS</b>	United Nations Convention on the Law of the Sea
<b>UNSC</b>	United Nations Security Council
<b>UNSCR</b>	United Nations Security Council resolution
<b>US\$</b>	United States dollar
<b>USN</b>	United States Navy

## Chapter 9 – Command, Control and Coordination of the Third Dimension: The Evolution of Army Airspace after the Cold War

Major Michael F. Notaro

### Abstract

Airspace coordination is inherently one of the most joint endeavours in today's military. Coordination and integration of air and ground assets can be the key to successful operations in the asymmetric battlefield. Command, control and coordination (C3) at the operational level can set the stage for success or failure. Advances in technology, changes in warfare and transformation of Army organization have led to rapid change in the world of C3 of the army airspace. Doctrine publications at all levels struggle to keep pace with changes. With this problem in mind, the primary question is whether current doctrine and tactics, techniques and procedures (TTP) have evolved sufficiently to ensure effective airspace command, control and coordination at the operational level in the current asymmetric operational environment.

This paper starts with a historical review of airspace coordination in the context of conventional warfare. It then compares current joint, air force, army and allied publications to understand how airspace coordination has evolved. Finally, professional papers and lessons learned articles for the Iraq and Afghanistan theatres are reviewed to identify disconnects with the current doctrine that might suggest there is an additional requirement for the new doctrine to further develop and evolve.

This paper confirms that the asymmetric battlefield has dramatically changed the way airspace coordination must be conducted. It also proposes concrete steps to achieve substantial improvements in this critical area of joint and combined combat operations. Finally and most importantly, this paper demonstrates that there remain significant areas for future research and analysis as technological advances continue to redefine the complexity of airspace management in peace and war.

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## 1. Airspace: Why we need to talk about it

*Late on the night of 17/18 April 2002, a section from “A” Company, 3<sup>rd</sup> Battalion, Princess Patricia’s Canadian Light Infantry BG (3 PPCLI BG) were conducting a live-fire exercise in the vicinity of Kandahar, Afghanistan, when they were mistakenly engaged by two American F-16 fighter aircraft. ...<sup>1</sup>*

*It is the opinion of the Board that current procedures between Coalition Ground Forces and Coalition Air Forces require review. ... The Board believes that if the procedures had been more stringently enforced, the chain of events that led to the incident at Tarnak Farm on 17 April 2002 could possibly have been avoided.<sup>2</sup>*

### Introduction

The modern battlefield must be considered in three dimensions: width, depth and airspace. Width and depth have traditionally been considered during operations and emphasized by land and sea commanders. The prevalence of asymmetric operations on the modern battlefield coupled with the rise and the ascendancy of unmanned aerial vehicles (UAVs) have indicated that the battlespace be equally viewed in terms of the third dimension—airspace. For the Canadian Forces this point was driven home when, as noted in the quote above, Canada lost its first four soldiers in Afghanistan, not to enemy fire, but to a friendly-fire incident. This, combined with the fact Canada was about to deploy its first UAV, drove the Canadian Forces to deploy its first ever Army-based airspace coordination centre (ASCC) in recent history.<sup>3</sup>

This section will introduce, in broad terms, why the low-level airspace has changed and what some of the problems are with coordinating the plethora of users in the army airspace. The aim of the paper will then be addressed, accompanied by some of the goals the paper proposes to achieve. Although introduced in the opening quote of the paper, discussion will be presented on why this issue is critical to the joint<sup>4</sup> airspace environment in asymmetric operations now being executed in places like Iraq and Afghanistan. Finally, the outline of how this paper will achieve its aim and goals will be reviewed in order to provide a roadmap on how this complex topic will be addressed.

### Goals of the paper

Airspace command, control and coordination has become an increasingly complex challenge for airspace coordinators that can no longer be addressed on the modern battlefield with simple pre-planned routes, static control measures and fixed altitudes. The conventional plan-centric and overly cumbersome method of coordinating the airspace use does not allow commanders to conduct real-time integration of airspace operations. The operational airspace environment has become increasingly complex with the proliferation of UAVs and the introduction of non-governmental agencies and civil aviation within the battlespace of a host nation. This presents commanders with new and unique airspace coordination challenges never seen before on the modern battlefield. In order to operate successfully in a complex airspace environment, commanders at all levels must understand and be capable of synchronizing airspace users and warfighting functions in the third dimension in near real time.

1. Canada, Department of National Defence (DND), *Tarnak Farm Board of Inquiry – Final Report* (Ottawa: DND, 2002), Executive Summary, <http://www.vcds.forces.gc.ca/boi-cde/tf-fr-rf-22-eng.asp> (accessed February 6, 2010, site discontinued).

2. Ibid., Part V – Recommendations.

3. Brigadier-General Peter Devlin, “Canadian Soldiers Deploy to the Kabul Multi-National Brigade—July 2003,” *The Bulletin* 10, no. 2 (2004): 3.

4. Joint occurs when the different environments (army, air force and navy) of the same country come together.

Unfortunately, there is a lack of cohesive doctrine on the third dimensional battlespace in asymmetrical warfare. Given that modern operations may be conducted in a non-linear, non-contiguous battlespace, with operational and strategic level assets pushed to the lowest tactical level, the antiquated cold war concepts (such as low-level transit routes or air corridors) no longer apply.

There is no common terminology or definitions, and there is a lack of cohesive doctrine because the North Atlantic Treaty Organization (NATO) only uses “one nation’s” doctrine, belonging to the United States (US), and all must adapt to it.<sup>5</sup> Even in Canada, there is no agreement between the land, air and maritime components of the Canadian Forces on the doctrine needed for coordination of the third dimensional battlespace. Part of the problem is that this doctrine has been slow to evolve from the cold-war doctrinal mentality to the non-linear, non-contiguous modern battlefield. This doctrinal void is currently hampering joint work in NATO, and it is causing problems with coordination and standardization.

This paper will analyse current army airspace command and control doctrine, and lack of it, across NATO. It will analyse and identify gaps and inconsistencies between the doctrines from the different allied countries and will propose potential solutions. It will then, using current doctrine and writings on operations in non-linear and non-contiguous battlefields, propose updated doctrine that accommodates the current reality of the airspace environment.

This paper aims to achieve two goals. The first goal is that the recommendations and proposals from this paper are suitable for recommendation to the NATO Joint Doctrine Board. The second goal is to propose joint doctrine challenges for further study for the third dimensional battlespace in the asymmetric modern battlespace.

### **Why is the coordination of the army airspace important?**

The end of the cold war has seen the emergence of a different world. Many argue this different world is less safe, now that the concept of mutual assured destruction has become less of a threat. Regional wars, often religious or ideology based, are the threat of today. There are often no uniforms to identify the enemy; wars today are fought by soldiers, civilians, terrorists, insurgents and religious fanatics not just in cities but also in remote areas, such as Sudan, and in places where they establish their training and support facilities. Gone are the concepts of rear area and front lines. There are no battle lines; there is no defined enemy territory and friendly territory. There are strong points and green zones.<sup>6</sup> Terms such as *three-block war* and *fourth-generation warfare* have been coined in an attempt to codify the new battlefield.

Similarly, the old structure of the airspace, where all air traffic traveled toward the forward edge of the battle area (FEBA), no longer exists. The old days, when aircraft were restricted to corridors and transit routes over friendly territory only to be set free beyond the FEBA to do what was required to hit their target and stay alive, no longer exist. The second pilots leave their airfield they are in a mix of enemy and friendly territory. Pilots are no longer free to do what is required to hit their target, as the target is not easily distinguishable between hostile forces, civilians or friendly forces. The friendly fire incident at Tarnak Farms in Afghanistan is a stark example of how pilots have a much more difficult task in identifying hostiles on the ground. Coordination measures designed to protect

5. LCol Barton Gauvin, *Defining the Battlespace*, 07 October 2009, copy in author's possession.

6. Paul Pike, “Green Zone,” *Globalsecurity.org*, <http://www.globalsecurity.org/military/world/iraq/baghdad-green-zone.htm> (accessed November 21, 2012). The “green zone” is a term coined to refer to the secure zone originally designated the International Zone of Iraq in Baghdad, Iraq. The term *green zone* remains the most commonly used term. It has come to signify a secure zone in a hostile region.

ground troops, such as no-fire lines (NFLs) or forward line of own troops (FLOT), no longer exist on the asymmetric battlefield to help guide pilots. The new reality is pilots can no longer assume that any observed fire is hostile.

A new dynamic was created when technological advances allowed us to use airspace for UAVs, helicopters, aircraft and long-range weapons. The airspace has become crowded, particularly at the low level. The proliferation of airspace users, particularly UAVs, and the absence of traditional boundaries have made the airspace environment infinitely more complex. This is still a relatively new concept in warfare, and militaries have yet to adapt in order to use the airspace to its full potential in modern military operations.

Five Canadians lost their lives to friendly-fire incidents in Afghanistan due to allied aircraft.<sup>7</sup> Many more allied soldiers have been killed or wounded. Improved and effective airspace coordination can limit these casualties. As well, UAVs have become a force multiplier for allied militaries. They allow for increased intelligence on enemy forces, and they allow allied forces to go places that were once too dangerous for manned aircraft or ground troops.<sup>8</sup> They allow a military presence over an extended area permitting commanders to exert influence on areas with no troops. Effective and flexible coordination of these assets will enable allied forces to successfully complete their mission. With proper and effective command, control and coordination of the army airspace lives will be saved.

### Paper outline

The evolution of the army airspace is a very technical and specialized field of study. This paper, although ambitious, will limit its scope to an analysis of a few of the doctrinal areas that affect the major users of the airspace. Section 2 will briefly discuss key concepts and definitions of airspace coordination in the combat zone. Explanation of these concepts will be helpful to put the issues discussed in this paper into context. Section 2 will continue with a review of the work militaries have done to date. Finally, a review of the old doctrinal approach toward coordination will be presented. Section 3 will discuss the methodology of this paper and the framework that will be used to analyse the various coordination issues presented. Section 4 will present some of the real world issues facing airspace coordination personnel. Through the use of anecdotes from operational theatres, the aim of the section is to help further an understanding of the complexity and interrelationship of the army airspace users in a manner more easily understood than a doctrinal study. With a basic understanding of some of the complexities and terms, Section 5 will focus on an analysis of old and new doctrine for issues facing each of the nine major airspace users. Conventional doctrine will be reviewed, and the new doctrine will be discussed in comparison. If there is a deviance from new doctrine to what is being practiced in the field, these new methods will be studied to determine their validity. The major findings of the paper will be reviewed in Section 6; in Section 7 the findings will be summarized, and areas for future work on airspace coordination will be proposed.

### Summary

Canada has deployed into a theatre unlike any that has come before; it is an asymmetric operating environment without clear delineation between friend and foe and takes place among the civilian and commercial population. Allies have recently purchased and operated several tactical-level UAVs in a theatre of operations, significantly affecting the army airspace. As well, the findings from the board of

7. Canada, Department of National Defence, "Fallen Canadians," <http://www.forces.gc.ca/site/news-nouvelles/fallen-disparus/index-eng.asp> (accessed November 21, 2012).

8. Oliver Sutton, "Mission Dull, Dirty or Dangerous? Call Up a UAV," *Interavia Business & Technology* 58, no. 672 (Jul, 2003): 2, <http://search.ebscohost.com/login.aspx?direct=true&db=mth&AN=10955031&site=ehost-live> (accessed November 21, 2012).

inquiry into the friendly-fire incident that killed four soldiers had several recommendations relating to airspace coordination. These two issues alone suggest that the Canadian Forces' understanding of the command, control and coordination of the third dimension must improve.

## 2. Background

### Introduction

As indicated in Section 1, there are an increasing number of users of the airspace; airspace control (ASC) provides the principles for deconflicting the airspace.

The objective of ASC is to maximize the effectiveness of military operations by promoting the ability of air, land, maritime and special operations forces to operate in an efficient, integrated and flexible manner with minimum mutual interference and without undue restraint and risk to friendly forces and non-combatant airspace users. ASC provides a commander with the operational flexibility to effectively employ forces according to mission priorities.<sup>9</sup>

There are two methods of control: procedural and positive. The airspace control means are the actual procedural measures used to coordinate the airspace.<sup>10</sup> These measures themselves are simple enough to understand and apply; however, it is the actual practice of deconflicting joint airspace users that is extremely complex. If the airspace is not properly coordinated, it could have a significant impact on joint operations. That is when positive control is exercised. Military forces today can expect to be involved in a wide variety of operations covering the entire spectrum of conflict, from peace support and conflict prevention, through to warfighting, including all post-conflict missions. Every operation requires airspace coordination, and each mission's airspace will be unique.

Airspace can no longer be the domain of any single service. Each component—army, navy, marines and air force—now has multiple users of the airspace. Furthermore, actions in the airspace can have significant effect on the operations of each component. The joint nature of the airspace today suggests that the command, control and coordination of the airspace must be conducted on a joint basis. Although airspace primacy within an operation, or part of it, may be given to a single commander, that decision must be taken at the joint force level of command, based on recommendations from joint and component staffs, including airspace control specialists. In any joint environment there will be pressures, as each component operates in a slightly different manner.

For example, for the Joint Force Air Component Commander (JFACC), the reach and pace of air operations require adherence to the fundamental principle of “Centralised Control and Decentralised Execution”; furthermore, his assets must be able to utilise, to the maximum extent, the available airspace throughout the [joint operations area] JOA. In contrast, for the Joint Force Land Component Commander (JFLCC), the inherent friction of the land environment requires decentralised command and individual commanders' initiative (‘mission command’); nevertheless, many land assets need rapid access to large volumes of airspace. In addition, maritime operations will be conducted both in deep water and in the littoral. Littoral operations will involve maritime units, using their specialised

9. NATO, AJP-3.3.5 (A), *Doctrine for Joint Airspace Control* (Brussels: NATO, 2006), 1-1.

10. NATO, ATP-40 (C), *Doctrine for Airspace Control in Times of Crisis and War* (Brussels: NATO, 2004), 2-2. “Airspace Control Means (ACM). Procedural measures that, when established, reserve airspace for specific airspace users, restrict the action of airspace users, control the actions of specific airspace users, and/or require airspace users to accomplish specific actions. ACM can also be used to identify friendly or neutral users, to avoid the risk of being engaged by friendly AD weapons.”

Anti-Air Warfare procedures, operating in an integrated manner within the JOA. Indeed, the Joint Force Maritime Component Commander (JFMCC) may be the Supported Commander for certain parts of the coalition operation.<sup>11</sup>

The coordination of the airspace affects all components. The differing approaches each component has towards warfighting must be fused into a common set of rules and procedures. This fusion reflects the true nature of the jointness of the airspace. The airspace in military operations is no longer the sole domain of military forces. Airspace is sovereign to a nation, or in the case of the airspace around airports, the airspace falls under the International Civil Aviation Organization's (ICAO) regulations. There are now political, legal and commercial interests involved. This must be factored into all planning.

This section will address some of the key concepts and definitions involved in airspace coordination. This will assist in understanding some of the broader concepts of how the airspace is coordinated and some of the issues associated with airspace coordination.

### Key concepts and definitions

Prior to discussing the challenges that are now present with airspace coordination, it is important to understand the old process for airspace C3. Airspace coordination and the structure of the airspace for an operational theatre are defined by the following key documents:

- a. **The Airspace Control Plan (ACP)** is a document that provides planning guidance and procedures for the airspace C3 within the area of operation. It lays out the structure and identifies responsibilities. The ACP is generally published prior to the commencement of operations and remains extant throughout the operational period.
- b. **The Air Tasking Order (ATO)** lists the missions subordinate units are to execute during the given period. It represents the planned tasks of all air assets. The ATO is normally produced on a 24-hour cycle.
- c. **The Airspace Control Order (ACO)** expands upon and implements the ACP. It provides the details of approved airspace control measures (ACMs), listing the location, use and duration of volumes of airspace. The ACO normally follows the same 24-hour cycle as the ATO.<sup>12</sup>

Historically, during conventional military operations, missions were planned 72 hours ahead of schedule.<sup>13</sup> The missions were coordinated with the air operations centre and included in the ATO. The ATO is published and disseminated 12 hours prior to implementation. The ACO is published to support the ATO, and it details the ACMs in effect that the aircraft will use during their missions. By coordinating the ACMs with the identified air tasks, airspace coordinators provide procedural controls, which help to mitigate the risks of an air incident or fratricide. The ACO accommodates and deconflicts all airspace users by allocating blocks of airspace, times and altitudes for use.

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11. ABCA and ASCC, *Quadripartite Advisory Publication – Coalition Airspace Control Manual*, 1<sup>st</sup> ed., Vol. 287, Primary Standardisation Office, Director, ABCA Armies, 2001), 4.

12. *Ibid.*, 7.

13. Short notice missions, such as combat search and rescue as well as strikes against time-sensitive targets, can be planned, disseminated and executed within hours or minutes as exceptions.



During Operation IRAQI FREEDOM, daily ACOs, on average, contained “over 1200 ACMs and [were] amended 12 times a day.”<sup>14</sup> Air C3 is a complex activity, which must be effectively planned, coordinated, disseminated and executed in a timely manner. This very structured system has been slow to evolve and keep up with the flexibility and speed in which asymmetric operations take place. While the ACP as a document outlining the structure of the airspace remains sound, the ATO and ACO processes need to be more nimble and flexible to respond to the new operating environment.

The process of airspace coordination is complex and must be adaptable to the new dynamic nature of asymmetric warfare. Airspace coordination has become increasingly complicated with the proliferation of guided munitions and airborne assets. Airspace coordination remains a largely manual process. Even after an ACO has been produced, the information must be disseminated in a timely manner to a wide array of organizations and coalition partners involved in or impacted by air operations. In almost all circumstances, interoperability between these organizations and coalition partners is extremely limited. The asymmetric battlefield poses a number of challenges for airspace coordinators that need to be addressed. The risk to both equipment and personnel, in the air and on the ground, may be adversely affected, and the risk of fratricide is significant unless the coordination of the airspace is sufficiently evolved to address the new realities of the modern battlefield. One of the key measures to coordinate between the ground and air forces is the coordination level.

### *Defining the third dimensional battlespace*

When defining the battlespace there generally are six dimensions to be considered. These are land, sea, air and space, electromagnetic spectrum (EMS), computer-generated space (cyberspace) and time.<sup>15</sup> No one dimension should be considered in isolation, and there must be a clear delineation of who is the controlling authority for each, to ensure effective coordination.

Traditional dimensions include air and space, land, sea and EMS; however, the intertwining of civilian and military operations along with recent theories such as effects-based operations (EBO) have fuelled a growing belief that local populations, the human dimension, also comprise part of the battlespace. Missions such as an air power show of force are specifically designed to influence populations; therefore, low-flying aircraft can have significant impact. Local traditions and religions can also influence how the airspace is managed. “There is everything to be said in favour of doing what we can to understand the people whose minds comprise the battlespace in irregular warfare.”<sup>16</sup>

Finally, altitude, an element of the third dimension, and time are considered dimensions. It should be noted that all of these factors could also be used as tools to help manage all other airspace dimensions. Airspace coordinators must consider all eight dimensions of the battlespace when controlling and coordinating the airspace.

### *Positive and procedural control methods*

As mentioned previously, there are two primary methods of exerting control over the airspace: positive control and procedural control. Positive control is defined as “a method of airspace control that relies on positive identification, tracking, and direction of aircraft within airspace, conducted

14. Lt Gen T. Michael Moseley, “Operation IRAQI FREEDOM – By the Numbers,” (Shaw Air Force Base: USCENAF, Assessment and Analysis Division, 2003), [http://www.globalsecurity.org/military/library/report/2003/uscentaf\\_oif\\_report\\_30apr2003.pdf](http://www.globalsecurity.org/military/library/report/2003/uscentaf_oif_report_30apr2003.pdf) (accessed November 22, 2012).

15. United Kingdom, Ministry of Defence (MOD), “Battlespace Management,” in *Army Field Manual – Combined Arms Operations*, Vol. 1 (London: Ministry of Defence, 2007), 1-1.

16. Colin S. Gray, “Irregular Warfare: One Nature, Many Characters,” *Strategic Studies Quarterly* 1, no. 2 (Winter 2007): 52.

with electronic means by an agency having the authority and responsibility therein.”<sup>17</sup> At the operational level, this can be achieved using airborne warning and control system (AWACS) aircraft and ground-based radars. Procedural control is defined as “a method of airspace control which relies on a combination of previously agreed and promulgated orders and procedures.”<sup>18</sup> The airspace control authority, through the ACP, sets forth ACMs, which define the procedural control measures.

### *Coordination level*

The coordination level is defined as “an advisory measure established to increase the aircrew awareness of conflicts between slow and fast moving air traffic at low level.”<sup>19</sup> Above the coordination level is where most fixed-winged assets can be found, and the method of control is predominantly positive control. Below the coordination level is where many of the army airspace users reside. The method of control in this area is predominantly procedural.<sup>20</sup> For example, in Afghanistan and Iraq, the coordination level is 3,500 feet [1,067 metres] above ground level.<sup>21</sup>

The air force traditionally had the expertise in airspace management, but in general, it was only concerned with aircraft flying above 10,000 feet [3,048 metres]. The army decided it needed to develop its own skills in airspace coordination because its aircraft typically flew at much lower altitudes and they usually interacted with troops engaged in combat. In fact, the introduction of army UAVs has brought the discussion of the coordination level into focus. In response to a United States Air Force (USAF) position that all high- and medium-level UAVs should be under Air Force control for coordination reasons, US Army Aviation Director Brigadier-General Mundt stated, “The Army would give up some of its capability and platforms, depending on UAV use, above 3,500 feet [1,067 metres]. But no line in the sky determines a particular service competency.”<sup>22</sup>

Doctrine is careful not to call the area below the coordination level *army airspace* because the airspace environment is supposed to be a fluid flexible environment used to effectively employ air assets. The argument above suggests that although the airspace may be seamless, the army’s influence and desire to be the master of the airspace below the coordination level is significant.

The airspace coordination system is made up of several parts. A basic understanding of the process, what defines the air battlespace, the control measures and their relation to the coordination level are all important to aid in the understanding of the larger issue of airspace coordination.

### **Review of airspace doctrine**

Upon reviewing the current doctrine on airspace coordination, it was found that only three countries have evolved their doctrine in any significant manner. The United States, the United Kingdom and, to a lesser extent, Canada have all issued updated documents on the subject. These changes have also been reflected in varying degrees in the organizations that the three countries are members of, namely NATO and American, British, Canadian, Australian and New Zealand Armies’ Program (ABCA). It should be noted that all three countries have been major contributors to the wars in Afghanistan and Iraq and their lessons learned are starting to be reflected in their respective

17. NATO, AJP-3.3.5 (A), 3-2.

18. Ibid.

19. Ibid., A-2.

20. United States of America, Joint Staff, JP 3-52, *Joint Doctrine for Airspace Control in the Combat Zone* (Washington: Joint Staff, 2004), III-4.

21. Captain Scott Lang, “2 RCR BG ASCC February Report” (Kandahar, 2007).

22. Michael Fabey, “AF Leaders Push for Better UAV Coordination,” *Aviation Week* (2007), [https://aviationnow.com/aw/generic/story\\_generic.jsp?channel=aerospacedaily&cid=news/uav032707.xml&headline=AF%20Leaders%20Push%20For%20Better%20UAV%20Coordination](https://aviationnow.com/aw/generic/story_generic.jsp?channel=aerospacedaily&cid=news/uav032707.xml&headline=AF%20Leaders%20Push%20For%20Better%20UAV%20Coordination) (accessed February 6, 2010, site discontinued).

doctrines. Within each country, however, there is a wide divergence on how each of their force components have updated their doctrine. In many cases, there has been an evolution in the doctrine to accommodate the significant changes of asymmetric operations. However, there remains a delta between what is published in the new manuals and what is currently occurring in the Afghanistan and Iraq theatres of operations. There is an abundance of professional papers and lessons-learned articles on the subject coming out of the respective theatres of operations. A quick review of the work completed by each of the countries will be discussed as well as the organizations listed. The review will not look into detail of some of the changes, as this will be addressed in the analysis in Section 5. Instead, the review will look at how pervasive the changes have been in each country.

#### *North Atlantic Treaty Organization*

NATO's capstone document on airspace coordination is Allied Joint Publication 3.3.5(A), *Doctrine for Joint Airspace Control*. This publication, updated in 2006, supersedes ATP-40 (C), the previous tactical publication that was considered the bible of airspace coordination. This publication has gone a long way to capture the realities of airspace coordination in asymmetric operations. Some of the old terminology and airspace measures remain with no revision on what to do in an asymmetric battlefield. One such example is the identification friend or foe (IFF) switching line. This measure states:

IFF Switch OFF and IFF Switch ON Lines are to be established and will be published in the ACO. All aircraft en-route to targets beyond the IFF Switch ON Line should stop squawk as they cross the IFF Switch OFF Line. Aircraft conducting operations between the IFF Switch On/Switch OFF Lines, or those returning to friendly territory after crossing the Switch ON Line, should squawk at all times.<sup>23</sup>

This measure is still required in case conventional warfare is still fought. The policy, however, does not account for IFF in the case where defined enemy territory does not exist. Is IFF to remain on at all times? Are pilots only to turn off their IFF transponder just before attacking? There are several sections in AJP-3.3.5 (A) that come directly from the old doctrine—ATP-40 (C)—with no update to address the complexity of the asymmetric battlefield.

Other sections have been added to directly address the asymmetric battlefield. There is an entire new chapter addressing the integration of civilian air traffic services into the airspace control system. Although the chapter is only two pages in length, it is a good start to introduce the issue. For the first time in any publication, there is mention, albeit as a passing example, that planned artillery and mortar fire should have an airspace control means request made to reserve the airspace. There is no addition under the airspace control means chapter on what type of airspace should be requested for artillery or mortar fire. It should be noted that all fires currently executed in both Afghanistan and Iraq require airspace clearance before an engagement is authorized; even in troops in contact scenarios, an airspace warning is delivered.

Other publications (such as AJP-3.3.2, *Air Interdiction and Close Air Support*, issued in 2004), although incrementally better than previous versions, have not been updated to the level of currency as AJP-3.3.5.

#### *American, British, Canadian, Australian and New Zealand Armies' Program*

ABCA has produced two key documents that address airspace coordination. The *Coalition Airspace Control Manual*, published in 2001 and the *Coalition Operation Handbook*, Edition 4,

23. NATO, AJP-3.3.5 (A), A-3.

produced in 2008. The manual was produced prior to the lessons learned from Iraq and Afghanistan; however, there are large sections in the manual dedicated to military operations other than war (MOOTW). This was the term coined back in the 90s for peace support operations to include peacekeeping, peacemaking, peace enforcement and peace building.<sup>24</sup> Although not as up to date as the NATO AJP-3.3.5, this manual provides a better framework in some areas. For example, the section on IFF adds the following:

An IFF regime will be required that is responsive to the various users' needs, particularly AD [air defence] and de-conflicts IFF/SIF [selective identification feature] parameters with civil ATC [air traffic control]. Platform IFF/SIF capabilities must be checked to ensure the ACP encompasses individual needs. Consideration should be given to establishing more than one procedure in theatre, separated by area, if this would allow more capable units greater freedom.<sup>25</sup>

Clearly, this expanded explanation on the implementation of an IFF procedure is more responsive to an asymmetric battlefield.

The *Coalition Operation Handbook* is written to cover all aspects of operations in very generic terms. The specific section in the handbook that deals with airspace coordination has been updated and now reflects the doctrine and procedures outlined in NATO's AJP-3.3.5.

#### *Canada*

The coordination of the army airspace is conducted by the ASCCs in Canada. These organizations are manned by the air defence artillery trade. In Canada, this trade is very small and specialized. Due to the small nature of the trade, the issues of airspace coordination are not well understood in the Canadian Forces. The only doctrine manual that covers airspace coordination is B-GL-372-001/FP-001, *Air Defence Artillery Doctrine*, which was published in 1999. One chapter of 12 pages covers airspace coordination. In fact, the chapter cites NATO's ATP-40 (B), a publication that was superseded by ATP-40 (C) that in turn was superseded by AJP-3.3.5.

The Canadian capstone document—B-GJ-005-300/FP-000, *Canadian Forces Operations*—was updated in late 2005. It has one chapter dedicated to airspace coordination. The chapter reflects nearly word for word the first three chapters of NATO's AJP-3.3.5. These chapters cover the broad introduction of the airspace control system, broad concepts of airspace coordination and the general operation of the airspace control system. What Canadian doctrine is lacking is a document covering the details of how to execute the airspace control system and the integration with the civilian airspace with the airspace control plan.

#### *The United Kingdom*

United Kingdom (UK) doctrine on airspace coordination is centred on three documents, all published in 2007–2008. Joint Doctrine Publication 3-70, *Battlespace Management* is a strategic-level document that discusses airspace coordination as a part of the overall battlespace. This document focuses on the entire battlespace, all components and all environments. The second document—Joint Force Operating Procedure 2-06, *Joint Battlespace Management*—is an operational-level document that discusses airspace coordination as a key part of the different components battlespace. This document discusses host-nation integration into the battlespace and specifically addresses the operational issues of integrating the airspace of the different components through the implementation of an airspace control plan.

24. Hugh Segal, *Geopolitical Integrity* (Montreal: Institute for Research on Public Policy, 2005), 275.

25. ABCA and ASCC, *Quadripartite Advisory Publication – Coalition Airspace Control Manual*, 32.

The third document—Army Field Manual, Volume 1, *Combined Arms Operations Battlespace Management*—is a tactical-level document that details the specific coordination of army airspace. This document has included many of the new procedures and concepts that have been trialed or are in place in theatres like Afghanistan and Iraq. The British have been very efficient at updating their doctrine and other publications from lessons learned on their operations. Concepts such as the kill box for coordinating artillery and fixed-wing aircraft are detailed in these manuals. Innovative concepts such as the addition of a third control method “dynamic procedural” are worthy of attention.<sup>26</sup>

The British have drafted a complete set of documents encompassing all elements of battlespace management. These documents cover the larger integration of the whole battlespace and not just the airspace. The publications are topical, and they have introduced many of the concepts being tried in their current theatres of operation. However, by moving so quickly to include new policies and procedures developed in Afghanistan and Iraq, some parts of their publications are potentially flawed, as operators have found that some of the tactics and techniques that were put in place were unsound and have since been discarded.

#### *United States*

The US has embarked on a revision of all of their doctrine and TTP manuals. “To renew its capability at counterinsurgency, the military is assessing 21<sup>st</sup> century insurgency, particularly in Iraq and Afghanistan, and revising its strategy, operational concepts, organization, and doctrine.”<sup>27</sup> Six main publications discuss airspace coordination in the US. The key document—JP 3-52, *Joint Doctrine for Airspace Control in the Combat Zone*, published in 2004—is a tactical-/operational-level document outlining the detailed mechanics of airspace coordination. The publication is slightly dated, as it does not include any of the information contained in the NATO AJP-3.3.5. The document is not forward thinking like the UK’s tactical publication, as it remains relatively focused on cold war conventional doctrine and tactics. There has been some discussion on the integration of UAVs, as well there is very general direction on integrating the airspace in operations other than war. There has been little integration of lessons learned from either Afghanistan or Iraq.

JP 3-0, *Joint Operations*, published in 2008, gives an updated view of airspace coordination from the joint operational perspective. Although not all encompassing as the UK’s publication, this document does cover the operational-level considerations for airspace coordination and is generally up to date for the time it was published. The second joint document from the United States is JP 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support*, published in 2003. This publication specifically discusses the use of close air support (CAS) and its integration into the airspace. This tactical-level document explains in detail the coordination of CAS with other arms of the army. It remains focused on conventional warfare, with little mention of new procedures or the asymmetric battlefield. Although still useful, as the specific coordination of an attack will remain relatively similar when coordinated by a forward air controller (FAC), this document provides little on how to integrate CAS on the asymmetric battlefield.

The fourth document is the Marine Corps, MCDP 1-0, *Marine Corps Operations*, this is a tactical-level publication issued in 2000. Although this document is somewhat dated in its airspace coordination chapter, it has the most complete directives on how to conduct airspace coordination in littoral operations. The section on naval gunfire coordination requires significant updates to bring

26. UK, MOD, “Battlespace Management,” 2-7.

27. Dr Steven Metz and LTC Raymond Millen, *Insurgency and Counterinsurgency in the 21st Century: Reconceptualizing Threat and Response* (Carlisle: Strategic Studies Institute, 2004), 2, <http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=586> (accessed November 22, 2012).



it in line with current policies on fires coordination in the airspace. The final two documents on airspace coordination come from USAF. AFDD 2-1.3, *Counterland Operations* was published in 2006, and AFDD 2-1.7, *Airspace Control in the Combat Zone* was issued in 2005. AFDD 2-1.7 is simply an updated air force-centric version of JP 3-52, *Joint Doctrine for Airspace Control in the Combat Zone*. AFDD 2-1.3, although an operational-level air force document specifically for air interdiction and CAS operations, provides an updated version of airspace coordination to include concepts for contingency operations. Lessons learned and tactics and techniques from Afghanistan and Iraq have been incorporated.

It should come as no surprise that the three countries that have evolved their doctrine in any significant manner are all currently involved in asymmetric theatres of operation. There is a wide divergence on how each has updated their doctrine. In many cases, there has been an evolution in the doctrine to accommodate the significant changes presented by the asymmetric battlefield. However, as stated, there remains a delta between what is published in the new manuals and what is currently occurring in the Afghanistan and Iraq theatres of operations. Therefore, evolution of airspace doctrine needs to continue.

### Airspace doctrine during conventional operations

Historically, conventional warfare could be defined as a 180-degree, bi-directional fight within a linear battlefield; a forward line of own troops; and with a defined rear, close and deep battlefield areas. Aircraft and weapon systems “generally flew or fired from the rear to the front with little lateral movement or firing required.”<sup>28</sup> All airframes were flown by trained pilots. UAVs were rare (generally high level) and were operated by specifically trained pilots. These pilots were trained in airspace coordination issues and the potential impact their actions could have on other airspace users. Outside of the army, very few organizations used army airspace, simplifying coordination by allowing the airspace user to communicate with those directly on the ground. The coordinating altitude in general separated the army airspace users from those of the air force. In essence, they were separated by altitude, and there was rarely a reason to enter the airspace of another component. Fixed-wing aircraft were rarely required to fly below the coordination level, while rotary-wing aircraft generally rarely flew above. Very short-range and short-range air defence systems used visual engagement rules or air defended areas, that when coupled with static airspace coordinating measures and IFF, mitigated the risk of fratricide. Enemy use of the airspace was generally higher altitude fast movers or deliberate aviation incursions. Theatre-level air defence systems would detect and identify enemy threats at extended ranges. Once identified, this would negate coordination issues with low altitude airspace users, as they would be tracked and engaged. Generally, from the onset of military actions, only military aircraft flew in the battlespace. Civilian aircraft would simply avoid or be restricted from operating in the combat area. Artillery and mortars generally fired in the same direction as the flow of air traffic, providing for lateral separation with aircraft. Simply put, the flow of air traffic was towards the FEBA.

The airspace structure had evolved over many years during the cold war conventional battlefield. High-level airspace above the coordination altitude was coordinated by the air force. Radars and dependable communications allowed the air force to retain positive control over the airspace. Below the coordination level, the airspace was much harder to coordinate. Radar pictures were dependent on ground clutter, and communication was less robust. Where possible, this airspace was under positive control, but generally, it was under procedural control. Helicopters (slow movers as described by the

28. United States of America, Department of the Army, TRADOC 525-7-3, *The US Army Concept Capability Plan for Airspace Command and Control for the Future Modular Force 2015–2024* (Fort Monroe, Virginia: Director Army Capabilities, 2009), 15.



air force) were the predominant user of this airspace, and visual flight rules dominated the airspace coordination protocols. In the rear area of the battlefield, routes and corridors were established in the airspace for administrative movement of aircraft. As aircraft flew towards the front lines of the battlefield, aircraft tended to travel in the direction of the front line and the enemy. Lateral movement across the front of the battlefield generally did not happen. When there were complex operations with multiple airspace users in a small area, specific coordination measures were put into effect. Once aircraft passed into enemy territory, there were limited airspace coordination measures and restrictions of aircraft movement. The rationale was the pilot needed to fly where required to hit their target and avoid enemy fire. Only in rare circumstances were aircraft allowed to release munitions over friendly area. When this was done, it was planned in detail and under the positive control of an air controller. There was no risk to troops training in the rear nor was there risk of fratricide. Civilian traffic was generally restricted from operating in war zones. On the friendly side of the battlefield, the airspace was well structured. Positive control and detailed planning were exercised when aircraft fired in close proximity to friendly troops near the front lines and aircraft were generally free to fly and fire over enemy territory. Missions on the enemy side were less structured, and there were minimum restrictions on weapon release in enemy territory once targeting was determined. Simply put, coordination was relatively easy on the conventional battlefield.

### Summary

Airspace control doctrine has developed incrementally since the inception of aircraft during the First World War. The evolution of aircraft and artillery during that period only necessitated incremental changes in airspace doctrine. The nature of warfare with enemy lines and friendly lines drove the airspace system to be well structured, civilian-like in the rear and single direction focused as they approached the front lines. The doctrine was thoroughly analysed and detailed to suit that method of warfare. However, the nature of warfare has changed. Enemy and friendly territory has been replaced by a mixed enemy/friendly quasi-civilian environment. UAVs have proliferated across the battlefield, and trusted methods for pilots—such as see and avoid—have become less dependable. Airspace coordination has changed and become more complicated. It needs to be reassessed in the context of an asymmetric battlefield.

## 3. Methodology

### Introduction

The transition to an asymmetric battlefield with no defined enemy or friendly territory has had significant impact on the C3 of the airspace. Incidents such as Tarnak Farms highlighted early that the airspace control environment had significantly changed and that a new way forward needed to be developed. Doctrine as well as tactics, techniques and procedures have been slow to evolve. The reality is that with deployments in Iraq and Afghanistan, Western forces are learning and developing the way forward in real life. The battlefield has become the environment where new policies are being trialed and lessons learned, out of necessity, are being developed.

In order to facilitate discussion and analysis on the subject of command, control and coordination of the army airspace, this paper will focus on those elements that have emerged as the primary users of the army airspace. Traditionally, these army airspace users were fixed-winged aircraft, rotary-winged aircraft, field artillery and the users of the electromagnetic spectrum. Since the cold war, there has also emerged a group of users that, although they may have used the airspace in the past, were not considered major users of the airspace. These new primary users of the airspace include

UAVs, civilian aircraft and explosive ordnance disposal (EOD) teams. Finally, recent experience has shown that friendly bases and ranges as well as civilian airspace have an impact on the contemporary operational environment and must be considered to fully appreciate and understand their influence on the command, control and coordination of the army airspace after the cold war. In essence, the army airspace has gone from four major users of the airspace in conventional operations to nine primary users of the airspace in the asymmetric battlefield.

### Research methodology

Each of these nine users will be analysed individually. Specific analysis will be conducted on a coordination issue for each of the users, which is representative of the major problems emerging within the field of airspace coordination for the user. The methodology of this paper will be a comparative analysis of the old and new doctrine for each of the identified nine users. Shortfalls for both old and new doctrine will be discussed, and lessons learned or emerging practical theories will be presented and analysed to determine if they address current doctrinal shortfalls. Finally, recommendations on future work or the future direction of the doctrine will be proposed.

### How the methodology will be applied

By employing a comparative doctrinal framework for the analysis of the old doctrine in relation to the asymmetric battlefield, shortfalls, such as the airspace coordination of artillery fire, can be identified. Analysing the identified shortfalls against new doctrine and TTP will give insight if the new doctrine has effectively addressed the problems posed to airspace coordination within the asymmetric battlespace. Iraq and Afghanistan have provided an outstanding opportunity to test the new doctrine and TTP. Studying the lessons learned and emerging theories from these theatres of operations will allow for an objective analysis of the status of the new doctrine and TTP.

### Summary

The following section will explore some of the unique problems the asymmetric battlefield has caused in recent years for each of the identified nine airspace users. The aim of the section is to help identify the problem domain. The problems posed by the asymmetric battlefield are complex and not always evident. Using examples taken from real-life experiences on exercise or operations, some of the new problems posed by the asymmetric battlespace will be described in practical terms. By describing some of the complexities of the airspace, it will help to provide insight into the complexities that will be analysed in this paper.

## 4. Defining the problem: Practical problems from operations

### Introduction

This section is designed to give the reader an appreciation of some of the common, unforeseen difficulties asymmetric operations can cause for the coordination of the army airspace. In order to better comprehend the complexity and interrelationship of the different users of the army airspace, a practical discussion is needed with specific examples in order to help recognize some of the unique issues posed by the command, control and coordination of the various assets. As outlined earlier in this paper, the discussion will focus on each of the nine major airspace users.

These examples will help clarify in practical terms some of the many issues and problems with the command, control and coordination of the army airspace post cold war. These examples, taken

from current missions, will help to identify and highlight shortfalls of the old doctrine. Although no solutions will be offered, the goal of this section is to illustrate the problem domain in terms that are easily understood. It will then lead into the discussion in follow-on sections that will dissect current doctrine, analyse emerging doctrine and examine changes adopted in the field. These examples have been taken from operational reports, lessons-learned articles, interviews and personal experience while deployed in the Kabul Multinational Brigade Airspace Coordination Centre. Many have been sanitized for operational security reasons.

### Detailed description of the problems

#### *Fixed-wing aircraft*

Many believe fixed-winged assets only affect the army airspace when they physically enter the low-level airspace. Many forget, however, that aircraft even at high levels can have an effect on the ground forces and the low-level airspace. Even at altitudes above the coordination altitude, the coordination of fixed-winged aircraft must be considered.

During the Loya Jirga of 2003, where the Afghans were deciding on the future constitution of their country, there was an incident that highlighted the requirement for coordination of fixed-winged aircraft.<sup>29</sup> Although the aircraft did not penetrate the army airspace, their actions had a direct effect on the operations of the ground forces. In asymmetric operations, it is possible and likely to have several missions and forces working in the same battlespace. In this example, Operation ENDURING FREEDOM – AFGHANISTAN (OEF-A) was still executing the war on terror in southern Afghanistan in the Kandahar region. At the same time, the International Security Assistance Force (ISAF) under NATO was conducting peace enforcement operations in the city of Kabul. ISAF was in the midst of a large security operation to protect the Afghan Loya Jirga.<sup>30</sup> The security consisted of an inner and outer ground cordon as well as a no-fly zone over the site of the Loya Jirga. NATO was responsible for the security of the meeting and President Karzai. OEF-A was responsible for executing the war on terror in the rest of Afghanistan.

The city of Kabul was a volatile city, and the NATO forces were frequently attacked by remotely launched rockets and improvised explosive devices (IEDs) during this period. NATO forces were on high alert during the conduct of the Loya Jirga. On the first evening of the Loya Jirga the ground forces thought the city had come under attack from several rockets as streaks of light were seen in the skies above Kabul. Special forces were put on high alert to move President Karzai to safety, and forces were waiting for reports of impacts across the city. The situation was tense and the ground troops were preparing to mobilize. However, it was identified by the airspace coordinators that it was aircraft flares and not rockets over the city. Evidently, the Commander of OEF-A ordered all transiting OEF-A aircraft to deploy flares over the city as a show of force by USAF. Once this was discovered, the ISAF ground troop stood down. Although this show of force display became very successful during later parts of the mission in Afghanistan, the first time it was implemented it had a significant negative impact on friendly ground troops.<sup>31</sup>

Since the cold war, terms like the three-block war have been used to describe a situation where a military force “may be required to conduct full scale military action, peacekeeping operations

29. NATO, “Constitutional Loya Jirga begins in Afghanistan,” NATO, <http://www.nato.int/docu/update/2003/12-december/c1217a.htm> (accessed November 22, 2012).

30. Ibid.

31. Joseph A. Katz, “Afghanistan: The Role of ‘Show-of-Presence’ Aircraft in the First Democratic Elections,” *FA Journal* (Jan/Feb, 2005): 1, <http://proquest.umi.com/pqdweb?did=1301197581&Fmt=7&clientId=1711&RQT=309&VName=PQD> (accessed November 22, 2012).

and humanitarian aid within the space of three contiguous city blocks.”<sup>32</sup> These types of differing operations all within the same geographical area can cause significant coordination issues not only between the three blocks but in the third dimension as well. This example highlights the reality that the coordination of fixed-wing aircraft is more complex than just ensuring aircraft are under positive control when they operate below the coordinating altitude.

#### *Rotary-wing aircraft*

Helicopters have always worked in the army airspace. In many militaries, helicopter assets belong to the army so it would be expected that their integration would be well coordinated with other army assets. Historically, helicopter movement was in the rear; it was administrative in nature and did not conflict with combat operations. As helicopters moved toward the combat zone, they were more closely coordinated. On the asymmetric battlefield, all aviation traffic must be closely coordinated. The minute helicopters leave their base they are potentially in enemy territory and a combat zone. If helicopters use the same routes all the time and are predictable, they are susceptible to enemy fire. This is why helicopter pilots prefer to have a great deal of latitude in their flight planning both in altitude and laterally.

In 2007, there were several instances where helicopters crossed different areas of operations (AOs) without coordination. The Canadians had established and maintained voice communications with the majority of air assets operating in their AO. The intelligence, surveillance and target acquisition coordination centre (ISTAR CC) had communications with all the UAVs. The fire support coordination centre (FSCC) had communications with the artillery, and the tactical air control party (TACP) had communications with all the fixed-winged air assets. The ASCC had direct communications with all the other coordination centres. The aviation assets remained the one airspace user without reliable communications. There was an aviation officer working in the headquarters, but their sole purpose was to coordinate aviation airlift for the battle group. Occasionally the headquarters (HQ) would have real-time contact with aviation assets through a chat window over the Internet, but this was not reliable. This lack of communications with the aviation assets impeded their efficient coordination. However, a lack of communication with mobile, low-flying assets is still a reality, even with today's technology.

During one incident in particular, a MEDEVAC helicopter was dispatched to the south of the Canadian AO. It was escorted by two Blackhawk helicopters. As per standard procedures, the pilots checked in prior to departure with the ASCC to clear a route to the site. The mission was cleared, and the helicopters departed on schedule. Around the same time, further north in the Canadian AO, Canadian soldiers came under attack from insurgents. UAV support (SPERWER) was immediately redirected to cover the area and provide real-time situational awareness to the troops under fire. The attack was relatively minor, and the troops were in the midst of destroying the enemy. The UAV pilot, who was in the main camp, was concentrating on the video feed he was receiving from the UAV. The commander in the headquarters was also receiving the real-time feed from the UAV. Suddenly, the UAV screen was filled with rotor blades as one of the Blackhawks made an unannounced and unexpected foray into the airspace to see if they could be of assistance. People immediately began to panic, as they thought a mid-air collision between the UAV and Blackhawk was imminent. Luckily, there was at least a few hundred feet [less than 100 metres] of separation between the two aircraft; however, people were stunned to see the helicopter so close to the UAV. If it were not for the fact that the UAV was above its usual flight altitude due to weather, a mid-air collision might well have happened.<sup>33</sup>

32. “Three Block War,” Wikipedia, [http://en.wikipedia.org/wiki/Three\\_Block\\_War](http://en.wikipedia.org/wiki/Three_Block_War) (accessed November 22, 2012).

33. Captain Scott Lang, The Blackhawk Helicopter Airspace Incident, 6 April 2010, copy in author's possession.

In asymmetric operations, every flight must be treated as if it could have potential life-and-death impact on operations. This example highlights that there is no such thing as simply diverting a flight without coordination. The requirements for coordination and pilot awareness are critical in this complex environment.

### *Unmanned aerial vehicles*

UAVs have been a huge combat multiplier for friendly forces in recent years. They give our forces a technical advantage over our enemies. They give us a level of situational awareness that is unprecedented. A company commander can launch a mini UAV in an instant to see over the next hill or over a wall to see what is in the next compound. At the tactical level, UAVs can provide observation in areas that are unsafe for ground troops, and one tactical UAV can cover the area that would have taken a brigade worth of assets in the old days. As these assets proliferate, ground troops have become dependent on, and want, the instant information these UAVs can give them.<sup>34</sup> This necessitates the launching of numerous unplanned or emergency UAV missions. These types of missions cause significant challenges when trying to coordinate their integration into a busy airspace and represent one of the greatest challenges facing airspace coordination.

The proliferation of UAVs in recent years, specifically within tactical-level units and subunits, has caused a dramatic increase in the risk to air operations. In Afghanistan, “an Airbus 300 airliner with 100 personnel on board came within 170 feet [52 metres] of a German EMT Luna tactical UAV,”<sup>35</sup> while in Iraq “reports have indicated that helicopters have been struck by UAVs.”<sup>36</sup> Though UAVs are unmanned, their coordination is one of the easiest in theatre because of the use of liaison officers and direct voice communications with the pilots. Many feel, incorrectly, that UAVs are a huge burden on airspace coordination.

UAVs provide our forces significant advantage. The real-time nature of the information they provide pushes commanders at all levels to demand immediate and unplanned missions. These missions present significant challenges to airspace coordination as the system is dependent on detailed planning and procedural control measures, particularly in the army airspace. These examples highlight that the proliferation of UAVs are significantly straining the airspace coordination system as it tries to evolve to accommodate this new technology and employment tactics. The integration of UAVs, particularly at the low level, represents one of the greatest safety concerns facing the use of the airspace.<sup>37</sup>

### *Field artillery*

One of the difficulties for artillery in asymmetric operations is to decide which direction the guns should face for their centre of arc. Historically, the enemy was in one general direction. The guns would face toward the enemy, and with a small correction for azimuth and elevation, the gun could be fired quickly. Repositioning the gun to face another direction can be time consuming and delay the firing of the guns. Generally, the guns have been positioned daily, based on intelligence reports on the enemy’s most likely positions. However, in asymmetric operations this may only be a best guess. The issue of the direction of the guns is also a key consideration for helicopters. To ensure

34. ABCA and ASCC, *Quadripartite Advisory Publication – Coalition Airspace Control Manual*, 6.

35. Peter La Franchi, “Animation: Near Misses Between UAVs and Airliners Prompt NATO Low-Level Rules Review,” Flight Global, <http://www.flightglobal.com/articles/2006/03/14/205379/animation-near-misses-between-uavs-and-airliners-prompt-nato-low-level-rules.html> (accessed November 22, 2012).

36. Sandra I. Erwin, “Controlling Iraq’s Crowded Airspace No Easy Task,” *National Defense* 90, no. 625 (Dec 2005): 20, <http://proquest.umi.com/pqdweb?did=969142231&Fmt=7&clientId=1711&RQT=309&VName=PQD> (accessed November 22, 2012).

37. Captain L. A. Shrum, “Lessons Not Yet Learned—Tactical Airspace Operations in Afghanistan,” *The Bulletin* 11, no. 8 (2005): 6.



the safety of the helicopter, airspace coordination would have the helicopter routed to the rear of the gun position, avoiding the flight path of the rounds. The nature of asymmetric operations may cause the guns to significantly change their direction of fire.

A practical example of this occurred one evening in Kabul. One of the military units was doing administrative flights from their camp to the main airfield. Their flight path took them past the east side of the Canadian camp. They were aware that there were two Canadian howitzers recently deployed on the camp; however, they believed they were deployed facing northwest. The guns had been brought to the camp to conduct counter-battery operations in response to earlier rocket attacks. At the same time that these flights were flying near the camp, a call for fire came in for the guns to support troops in contact. The contact was southeast of the camp. The troops had called for an immediate illumination mission. Unfortunately, as the guns were about to fire they heard the sound of helicopters in front of their position. Due to the dark, they could not positively identify the location of the helicopters, and there was no means to contact the helicopters from the gun position. The guns were not allowed to fire if they could not positively identify the location of a potential aircraft forward of their firing position. The gun fire was delayed for a few minutes, and fortunately for the mission, it was not critical. However, the delay of guns firing in support of operations could have had a critical impact on the lives of our soldiers.

This incident highlights the fact that the airspace must remain flexible for emergency operations. The ability to reroute flight paths or calculate firing data to ensure flight paths are avoided is critical. It also highlights the difficulties of airspace coordination in and around gun positions.

#### *Explosive ordnance disposal*

EOD, historically, was not something that airspace coordinators considered an airspace user, “but when a plum of phosphorus reaches to 1,000 ft, it becomes a real issue to low fliers.”<sup>38</sup> EOD either happened on friendly ranges in the rear or in enemy territory. When the engineers would crater a road in friendly territory, it would be considered a deliberate operation, and a review of old doctrine makes no mention of ever reserving airspace specifically for EOD operations. In asymmetric operations, engineers are continually working on demining tasks or destroying enemy weapons caches. Much of this work is done in place due to the risk of booby traps.

The coordination of EOD, particularly when they are destroying IEDs or weapons caches, is rarely planned. They are last-minute missions that require the airspace to be flexible and reactive to their needs. Unfortunately, it is not always possible for the engineers to move their target to a safe site or EOD range. An example of the type of issue that can occur in asymmetric operations occurred in early October 2003. The Canadian battle group had been conducting operations in a mountainous region southwest of Kabul. The battle group uncovered a very large weapons cache in a cave complex. The cache was so large the EOD teams were called in to destroy it on site. The only problem was the site was directly underneath standard use army aircraft flight route (SAAFR). The Americans were conducting a large operation that day to the south of Kabul, and the SAAFR was in use. The Americans were allocated the airspace for the SAAFR from surface to 300 feet [91 metres], and they were unwilling to permit the EOD to blow the enemy weapons cache. The Americans did not have real-time situational awareness and did not know the exact location of their helicopters in the SAAFR. There was a danger to the Canadian troops, as they were susceptible to an enemy attack as they had just found and were about to destroy a major enemy weapons cache. After 30 minutes of trying to get approval for the use of the airspace and the EOD team seeing no American helicopters

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38. Major Michael Notaro, “Airspace Coordination in Afghanistan,” *The Bulletin* 10, no. 6 (2004): 7.



in the SAAFR, the Canadian ASCC ordered the EOD to destroy the weapons cache. They were ordered to put out air observation posts to ensure no helicopters were near the EOD site, and the Americans were simply given a warning the EOD was going to destroy the cache at a specific time. The EOD explosion occurred without incident.

This example highlights the fact that the airspace coordination measures must be flexible and able to accommodate unplanned events. It also highlights that, in spite of a detailed procedural system in place, common-sense and simple solutions, such as posting air observation posts, can provide the best solution.

### *Civilian aircraft*

When airspace becomes too dangerous for civilian aviation, the ICAO will close the airspace to civilian traffic. Such was the case for Afghanistan in 2001. However, once the heavy fighting ended and the transitional government of President Karzai was installed, the airspace was reopened. It was a practical and commercial decision, over-flight fees are an important and lucrative revenue stream for the government.<sup>39</sup> The existence of civilian airspace over the ISAF mission complicated the airspace.

Civilian airliners transiting Afghanistan travel at differing flight levels. The flight levels around Kabul are from FL140 to FL 290, approximately 14,000 to 29,000 feet [4,267 to 8,839 metres] above sea level. It should be noted that the city of Kabul is at roughly 6,000 feet [1,822 metres] above sea level.<sup>40</sup> This means that transiting civilian airlines could be travelling between 8,000 and 23,000 feet [2,438 to 7,010 metres] above ground level.

Due to the fact that the artillery may be firing into areas that potentially have civilians in them, gunners must ensure the fall of shot of their rounds is completely safe. One way to minimize the risk is to fire rounds at a high angle. When this is done, the impact of the round, and its ricochet (the footprint), tends to be much smaller than if rounds are fired at lower angles. At lower angles, the ricochet tends to be larger and oblong. This desire to ensure safety on the ground means that rounds are fired much higher in the air. The maximum ordinance of the M777, the artillery pieces the Canadians use, can reach altitudes between 35,000 and 65,000 feet [10,668 to 19,812 metres] above ground level.<sup>41</sup> This means the rounds easily reach and surpass the altitude that civilian aircraft are travelling.

Although not always obvious, ground operations can have an impact on not only the low-level airspace but also higher-level airspace. The theory of a little bullet in the big sky, implying minimal risk, is insufficient when dealing with civilian aircraft. This incident exemplifies the issues that can arise when civilian airspace is inserted into a zone where military operations are occurring.

### *Civilian airspace*

For military operations, particularly asymmetric battlefields like those in Afghanistan, the airfield is the vital airport of disembarkation (APOD) and acts as an ever-expanding base of operations. The airfield is a key centre of gravity for coalition forces; while at the same time, these airfields remain important transport nodes for the host nation. Thus, closing the airfield down for strictly military use is not always a viable option. For an airfield to be able to operate and accept civilian airliners,

39. International Civil Aviation Organization News Release, "ICAO and Afghanistan Sign Agreement for Rebuilding of Kabul Airport," (Montreal, 30 May 2002), [http://legacy.icao.int/icao/en/nr/2002/pio200207\\_e.pdf](http://legacy.icao.int/icao/en/nr/2002/pio200207_e.pdf) (accessed November 22, 2012).

40. "Afghanistan Facts and Figures," World Atlas, <http://www.worldatlas.com/webimage/countrys/asia/af.htm#facts> (accessed November 22, 2012).

41. Canada, Department of National Defence, C-71-777-000/56-001, *Abridged M777 Firing Tables* (Kingston: DND Canada, 2008), 63.

it must follow ICAO's rules. These rules and regulations lay out common standards for civilian flight. For example, if UAVs were operating within the Class D airspace of the Kabul Afghanistan International Airport (KAIA), a notice to airmen (NOTAM) was required.<sup>42</sup>

When ISAF wanted to fly their LUNA UAVs in the vicinity of the airfield, they needed to plan the mission 48 hours in advance. They needed to submit an airspace control measure request on the military side and a NOTAM on the civilian side. Although operational security on the time and location of the UAV flight could be assured on the military side, it was not the case on the civilian side. All NOTAMs need to be filed 48 hours in advance to the ICAO regional office in Singapore. Once approved, the NOTAM, with the exact location and time for the UAV flight, would be posted on the World Wide Web for all to see. The enemy could look on the ICAO website to determine when and where the UAV would fly. Unplanned missions were not allowed near the airfield since a NOTAM could not be issued on short notice.

The rules and regulations limited the use and effectiveness of ISAF's UAVs when operating near the airfield, an airfield whose airspace covered 80 per cent of ISAF's area of operations. Unplanned missions were not approved by the ATCs, and all approved mission were posted on the World Wide Web for all to see. The integration of civilian airspace with military airspace can pose some unique problems for a military force on the modern battlefield.

### *Electromagnetic spectrum*

When discussing the electromagnetic spectrum, it is usually assumed that the Signals trade is responsible for managing frequencies. This is true for the most part, but in asymmetric operations with no enemy territory defined, friendly forces will always be conducting jamming missions in and among friendly forces. If left uncoordinated, this could have serious impacts on friendly operations. A practical example of this occurred in Afghanistan.

Communication had been lost two nights in a row between the Canadian camp, Camp Julien, in the southwest of Kabul and the Kabul Multinational Brigade (KMNb) Headquarters in downtown Kabul. The Signals community assumed it was due to electromagnetic interference potentially caused by construction in the city or environmental conditions. The airspace coordination centre believed it might have been caused by American aircraft working in the area. The ASCC was aware that an American Prowler EA-6B, an electronic warfare aircraft, had been engaged in operations over Kabul for the previous two evenings. When contacted, the EA-6B squadron commander confirmed that they had been engaged in operations over Kabul and that they were indeed working on the same frequencies the Canadians were using for their radio communications. The Americans agreed to remove the Canadian frequencies from the range of frequencies they were working with.

Although the Signals community had requested and been given the frequencies the Canadian radio net was using, these frequencies were not transmitted to USAF. It was identified that this type of information would need to be inserted into the ACO. This example again highlights that when operations are intermingled between friendly and enemy elements a greater degree of coordination is required. It also highlights that airspace coordination encompasses a variety of users, including users of the EMS.

42. International Civil Aviation Organization (ICAO), ECCAIRS 4.2.6, *Data Definition Standard* (Montreal: International Civil Aviation Organization, 2006), <http://www.icao.int/anb/aig/Taxonomy/R4LDAtributesvaluesbyattributeid.pdf> (accessed April 2, 2010, site discontinued). ICAO defines Class D airspace where operations may be conducted under instrument flight rules, visual flight rules or special visual flight rules. Flights are subject to air traffic control clearance. Aircraft flying using IFR and SVFR are kept separated from one another and are given traffic information on VFR flights. Flights flying using VFR are given traffic information on all other flights. It is for smaller airports with a control tower. A NOTAM is filed with an aviation authority to alert pilots of any hazards en route or at a specific location.

*Friendly ranges and bases*

The friendly-fire incident at the Tarnak Farms range is an example of the difficulties that arise when friendly ranges or bases are part of the battlespace in which operations are occurring. Historically, friendly bases and ranges were located behind the FLOT. There was no need to specifically identify them, as friendly aircraft were not allowed to drop ordnance in friendly territory unless expressly ordered.

In the asymmetric battlefield, air forces are conducting operations in and around friendly installations. In the case of Tarnak Farms, the pilots believed they were under attack from ground troops, as they misidentified ground fire at night as hostile. The pilots, believing the fire was hostile, turned in and attacked the target in self-defence.<sup>43</sup> The board of inquiry identified several problems relating to airspace coordination in the asymmetric environment, including the failure to properly identify ranges in the ACO and the lack of visibility the airspace coordination system had on ground operations.<sup>44</sup>

Realistically, however, the issue of ranges and bases poses a significant problem to pilots and airspace coordinators. To populate a map with multiple friendly installations may bureaucratically sound simple; however, it is a far more difficult problem for the pilot. A pilot travelling at mach speed over large distances would pass many of these installations in a matter of seconds. When travelling at approximately a kilometre every four seconds, the pilot would require either a very large map or a significant improvement in technology for the heads-up-display to provide real-time data. As well, to simply restrict aircraft from engaging under any circumstances may overly restrict a significant amount of firepower at the commander's disposal. Therefore, procedural controls alone for fast movers like fixed-wing aircraft are only a small part of the solution. For example, in 2007, a TACP, a team of air force tactical air command and control specialists, was added to the battle group HQ. The TACP had direct voice communications with the aircraft working within the AO. Aircraft would check-in with the TACP upon entering the AO; the TACP would then brief the pilots on the standing ACMs in the area before handing the pilot over to the FAC, the controller at the tactical end.<sup>45</sup>

This example illustrates that the requirement for the integration of friendly installations into the airspace causes several problems for pilots and airspace coordinators. Seemingly, simplistic doctrinal solutions may not be entirely realistic.

**Why is this such a difficult problem?**

As shown, the airspace in asymmetric operations offers unique challenges that did not need to be considered during cold-war era operations. The asymmetric operating environment has no friendly or enemy boundaries; the area of operations is a fluid mix of both. The flow of air users is not linear, and other airspace users—such as artillery—can fire in any direction on short notice. Strategic and operational assets, weapons and sensors can be pushed to the lowest tactical level, adding layers of complexity to the airspace; furthermore, UAV use has proliferated, adding a new dimension to coordination. Military operations are in many cases overlaid on existing civilian airspace structure, and the assumption of a battlespace void of civilian traffic is no longer valid. The airspace has significantly changed, and the subtleties of these changes have not yet been fully understood by the military community.

43. Canada, DND, *Tarnak Farm Board of Inquiry*, Air Events.

44. Ibid.

45. Lang, *Blackhawk Helicopter Airspace Incident*.

## Summary

The aim of this section was to give the reader an idea of some of the issues, in practical terms, that have been experienced in the field on operations. The examples were purposely selected to demonstrate the breadth and depth of the problems for airspace coordination in asymmetric operations. In each case, proper TTP, in accordance with policy at the time, were applied; however, shortfalls in the TTP and doctrine become abundantly clear by the outcome of each example. These examples set the stage for a detailed discussion and analysis in Section 5 of airspace coordination doctrine. A basic understanding of the types of problems faced by airspace coordinators will facilitate in the understanding of the issues that have arisen as airspace doctrine has evolved. A practical understanding of some of the issues will help to explain why personnel on operations are further evolving the doctrine and TTP.

## 5. Airspace problem analysis

*The objective of ASC is to maximize the effectiveness of military operations by promoting the ability of air, land, maritime and special operations forces to operate in an efficient, integrated and flexible manner with minimum mutual interference and without undue restraint and risk to friendly forces and non-combatant airspace users.<sup>46</sup>*

### Introduction

The previous section has provided a comprehensive analysis of what airspace coordination used to be like on the conventional battlefield. It has also explained how the asymmetric battlefield has challenged current ideologies and affected the airspace. Through the specific examples previously discussed, a sense of some of the issues still facing the command, control and coordination of the battlespace have also been made explicit. After reviewing the Canadian doctrine on airspace, it was determined that it is significantly out of date and that the portions that have been updated come directly from NATO or US publications. For this reason, Canadian doctrine was not factored into the analysis, as it was determined that it would provide no added value. This section will focus on an analysis of old and new doctrine for specific issues facing each of the nine major airspace users. Conventional doctrine will be reviewed, and the new doctrine will be discussed in comparison. The new doctrine will then be critically assessed. If there is a deviance from new doctrine to what is being practiced in the field, these new methods will be studied to determine their validity. Conclusions will then be drawn to determine if the new doctrine has effectively addressed the problems posed by airspace coordination within the asymmetric battlespace.

### Analysis

#### *Fixed-wing aircraft*

Low-level airspace coordination with fixed-winged aircraft should be an easy thing. As long as they stay above the coordination level, there is no chance of conflict. When aircraft do fly below the coordination level, they are usually being terminally guided by a FAC, and again, there should be no issue for coordination, as they are being positively guided by the FAC. The majority of coordination issues with the fixed-winged community are when they fire their rockets or drop their bombs.

Rules of engagement and coordination measures alone cannot be relied upon as sufficient measures to properly coordinate the effects of aircraft weapons' delivery. Ground forces measure distance in metres and kilometres. A fighter aircraft, flying at 250 metres per second, measures

46. NATO, AJP-3.3.5 (A), 1-1-1-2.

distance in hundreds of kilometres not metres. This difference causes many of the coordination problems between the fixed-winged aircraft and the ground forces.

The airspace measures used to coordinate fixed-wing aircraft have not changed significantly. What has changed is the coordination that is required for aircraft to drop and fire their rockets and bombs. Simply, in a conventional war, once the aircraft passed into enemy territory, they could drop their bombs knowing there was little chance they would strike or have an impact on friendly ground troops. As warfare evolved, air forces became more selective about which targets they hit in enemy territory, and they used more precise munitions to reduce collateral damage. Again, there was little impact on friendly forces, as the targets were often deep in enemy territory and friendly forces were simply not near the targets. Targeting became more formalized, but coordination with ground forces remained the same. When aircraft dropped bombs in close proximity to troops in contact, then the missions were coordinated and under the positive control of a FAC.

This all changed in asymmetric operations. With friendly forces, facilities and civilians intermixed with enemy forces, the dropping of munitions became much more complicated. The airspace control measures for coordinating aircraft remain virtually unchanged. What has changed is that unless specifically tasked with higher-level targets that have been approved by targeting boards, aircraft must now be under the positive control of a FAC, who is trained to guide the aircraft onto the intended target. As well, strict requirements must be met to authorize the release of weapons, according to the rules of engagement and to minimize collateral damage.

The common grid reference system (CGRS), traditionally used as a high-level coordination method for fast movers, has now been used to evolve some airspace coordination measures relating to fixed-winged aircraft, particularly in the area of coordinating fires. It is for this reason that this section will look critically at this system.

#### *Common grid reference system*

During Operation IRAQI FREEDOM (OIF) and Operation ENDURING FREEDOM (OEF), operators successfully used a gridded area reference system.<sup>47</sup> CGRS is a system of grid squares that uses an arbitrary origin point in the lower left-hand corner of the matrix. Each cell is identified with an increasing number on the y-axis (latitude) and a letter on the x-axis (longitude) at 30-minute intervals. Each square is broken down into a 10-minute keypad and then each keypad is further broken down into 5-minute quadrants.

Once the grid matrix is established, a coordinator can identify a cell, keypad or quadrant to implement an airspace coordination measure. This method is specifically designed for fast-moving, fixed-winged aircraft that travel large distances and may need a general area of airspace coordinated in a relatively short time. CGRS “is primarily an operational-level administrative measure used to coordinate geographical areas rapidly for battlespace de-confliction and synchronization ...”<sup>48</sup>

As described above, a 5-minute x 5-minute box represents a 25-kilometre x 25-kilometre box on the ground. A box this size is perfectly suited to fixed-wing aircraft travelling several hundred kilometres per hour. In terms of the ground commander, this area is large and not easily avoided or circumvented. To place airspace limitations in even the smallest cell could represent an entire area of operations for a battle group.

47. Francis A. DiLego and others, *Joint Airspace Management and Deconfliction (JASMAD)* (Rome: Air Force Research Laboratory, 2009), <http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GefTRDoc.pdf&AD=ADA493585> (accessed November 22, 2012).

48. United States of America, Department of the Army, FM 3-60.1, *TST Multi-Service Tactics, Techniques, and Procedures for Targeting Time-Sensitive Targets* (Washington: Secretary of the Army, 2004), G-3.



Work has been done by soldiers in the field to try to adapt this system to the command, control and coordination of army airspace, and it has been trialed in Afghanistan and Iraq. It has been used to coordinate close air support missions as well as joint fires with artillery. The utility of this control measure in joint fires with artillery will be fully analysed in the artillery portion of this section.

The airspace coordination of fixed-winged aircraft in the army airspace has been complicated by the increased number of users of the airspace and the corresponding limitations on large areas of airspace that can be dedicated to fixed-winged assets. The commander can allocate this airspace if fixed-winged aircraft become their airspace priority. In essence, there has been no change. However, the limitation, in most cases, of munitions being dropped under the positive control of a FAC has caused some issues due to the lack of qualified FACs on the battlefield. Ground forces have found it difficult, on occasion, to have a FAC on the ground when the aircraft was available and the firepower was required.<sup>49</sup> The current airspace coordination measures are still valid for the integration of fixed-winged aircraft into the army airspace. Greater limitations have been put on aircraft releasing munitions; however, these limitations were always in place when friendly troops were in close proximity. The assessment of the CGRS system will follow in the artillery section.

#### *Rotary-wing*

Aviation is an integral part of many armies in the world. For that very reason, they are some of the best-coordinated users of the army airspace. The daily interaction with the ground environment has enabled the helicopter community to establish well-defined procedures for airspace coordination. However, aviators have had to make a significant adjustment to not only the asymmetric battlespace but also the proliferation of UAVs in the airspace. This subsection will specifically look at how the main airspace control means for the helicopter, the SAAFR, has been affected.

A SAAFR is a “route established below the coordination level to facilitate movement of army aviation assets in the forward area in direct support of ground operations.”<sup>50</sup> This definition for a SAAFR has not changed in some time, despite revisions to airspace doctrine. As noted in Section 4, these routes would define a corridor of airspace in the forward area that enables aviation assets to conduct combat service support missions or to move them to the forward edge of the battlefield. If the helicopter crossed into enemy territory, they were free to fly wherever they needed to ensure their survival and to achieve their mission. SAAFRs were normally temporary in nature, following a series of predefined airspace control points, or communication check points, and the ingress and egress routes were often different.<sup>51</sup>

Army aviation doctrine manuals are all dated in the 1990s and have not been updated. Current airspace coordination documents contain the same unchanged definitions for airspace control measures, relating to helicopters, as are written in the older documents. In essence, the airspace coordination tactics, techniques and procedures have remained the same despite the fact that the environment in which army aviation operates has significantly changed. Once helicopters leave the security of their base, they are potentially at risk to enemy fire, which is significantly different from the conventional battlefield. The flexibility they had when they were at risk in enemy territory no longer exists. Pilots must remain in their SAAFR on the asymmetric battlefield.

49. United States of America, Special Operations Command, “Joint Terminal Attack Controller (JTAC) Shortage,” United States Special Operations Command, [http://www.nssc.bices.org/GetFile/?File\\_ID=94](http://www.nssc.bices.org/GetFile/?File_ID=94) (accessed April 5, 2010, site discontinued).

50. NATO, AJP-3.3.5 (A), A-14.

51. United States of America, Department of the Army, FM 100-103, *Army Airspace Command and Control in a Combat Zone*, 2-14.



Most of the problems experienced by aviation assets have been in how other airspace users interact with them. In particular, UAVs have posed a problem. Many of these issues relate to the other airspace users not remaining in their designated airspace.

There has already been one reported midair collision between a Raven SUAV [small unmanned aerial vehicle] and an OH-58D [Kiowa helicopter] and several reported near misses. Because Raven SUAV and Army helicopters frequently operate in the same airspace and at the same altitudes (0–500 feet [0–152 metres] above ground level), potential collisions between Raven SUAV and helicopters are serious concerns.<sup>52</sup>

The doctrine for coordinating army aviation seems to have stood the test of time. A review of the Internet and other reference did not produce any commentary on shortfalls with aviation doctrine. Anecdotal evidence suggests that airspace coordinators have increased the width of the SAAFRs to allow helicopters more latitude when flying, but this is not contained in any doctrine or tactics manuals. Since manuals do not dictate the size of a SAAFR, this seems to be in line with giving pilots increased flexibility while flying in a potentially hostile environment. Doctrine relating to rotary-winged aircraft seems to be sufficient. The key outstanding issue with aviation is their ability to communicate with ground elements.

#### *Unmanned aerial vehicles*

The greatest change to the airspace environment has been the introduction and proliferation of UAVs. From their early stages as remotely piloted vehicles (RPVs) that flew preprogrammed flights, UAVs have evolved into miniature aircraft that are piloted and controlled in real time and deliver both weapon and sensor effects to the battlefield. At the tactical level, these UAVs can be launched by hand to see over an obstruction, or they can be launched from designated launch sites to loiter in the airspace looking for enemy activity. They are used to coordinate artillery fire and to track individual enemy combatants. They have entered into every aspect of warfare, as they have the capability to find, fix, strike or, in recent years, conduct all three missions simultaneously, giving allied forces a technology advantage over the enemy.<sup>53</sup>

A review of the older airspace doctrine revealed small sections on how to coordinate the RPV. These early UAVs had limited capability and generally flew preprogrammed flight routes. Correspondingly, the doctrine was also limited in nature. ATP-40 (C) mentions in passing that UAV or drone flights will require an airspace control means request (ACMREQ) to request airspace for the flight.<sup>54</sup> There is no other mention of UAVs, drones or RPVs in the document. The US doctrine discusses the coordination of RPV flight under a section called special airspace users. The doctrine calls for launch and recover restricted operations zones (ROZ) as well as special corridors for transiting RPVs. It suggests positive control can be established “to a limited degree”<sup>55</sup> because the UAV is controlled by a ground control station. The doctrine and policy also state that air forces may wish to accept risk when transiting an RVP ROZ by “using the principle of see-and-avoid.”<sup>56</sup> Both of these concepts have been dismissed by modern-day airspace controllers. UAVs are too small to see, and the ground controller can only see the target they are focused on, not the airspace users around

52. John C. Wagner, “The Raven SUAV: Working with Army Aviation,” *Infantry Magazine* (May-June 2005): 2, [http://findarticles.com/p/articles/mi\\_m0IAV/is\\_3\\_94/ai\\_n27864867/?tag=content;col1](http://findarticles.com/p/articles/mi_m0IAV/is_3_94/ai_n27864867/?tag=content;col1) (accessed February 22, 2010, site discontinued).

53. Captain S. Yadali, “Unmanned Aerial Vehicles - Benefits to the Warfighter” (Command and Staff College, Marine Corps University, 2006), 16, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA504319&Location=U2&doc=GetTRDoc.pdf> (accessed November 22, 2012).

54. NATO, ATP-40 (C), 5-4.

55. US, Department of the Army, FM 100-103, 2-24.

56. Ibid.

the UAV. The development of these procedures and doctrine occurred when the use of RPV/UAVs was rare. The proliferation of UAVs, however, has caused current doctrine to expand significantly.

Prior to reviewing the current doctrine on UAVs, a quick explanation of the different types of UAVs will be helpful, as different categories of UAVs are coordinated in significantly different manners. The three classes of UAVs are mini/micro, tactical level and strategic level.<sup>57</sup> The key concept to understand is that the higher the level the UAV, the larger the UAV is, the more capable it becomes and the more it can carry. Larger UAVs can carry global positioning system (GPS) and collision avoidance transponders as well as munitions.

The other key concept to understand is that UAVs that fly below the coordination level, generally 3,500 feet [1,067 metres], as with all flyers in the area, are expected to fly using see-and-avoid procedures. Current optics packages on these smaller UAVs look downward to acquire targets; they are not looking for other aircraft. These UAVs are too small to carry larger optical suites. In addition, if UAVs fly in areas requiring visual flight rules, pilots of manned aircraft would be expected to detect them as well. Many mini and micro UAVs are too small for pilots to see. Even if detected, it is difficult for a pilot to judge the distance to the UAV.<sup>58</sup> The problem of seeing and avoiding other aircraft is a difficult challenge with UAVs in the low-level airspace.

UAVs must have a see-and-avoid capability in order to operate safely in the low-level airspace. This capability will require the addition of sensors that can effectively detect aircraft.<sup>59</sup> Collision avoidance is the primary airspace coordination and safety concern for UAVs. Unfortunately, technology has not kept up with the proliferation of these smaller UAVs. Current avoidance solutions are too large and too heavy for the smaller classes of UAVs.<sup>60</sup> As discussed, larger UAVs have identification systems that are designed to augment their radar returns. These systems allow the tactical air control system to acquire the UAV and populate data link networks with the UAV position. The operation of larger UAVs is handled in much the same way as aircraft. The missions are reflected in the ATO, and the UAVs have transponders to track their locations in real time.

The integration of the mini/micro level up to tactical level is much different. Airspace coordinators have a limited ability to control UAV operations at the mini/micro level because the hand-launched mini UAVs are often launched to provide local reconnaissance at a moment's notice. These smaller UAVs do not have the payload capability to carry transponders for identification and are far too small to be identified by radars. However, these mini/micro UAVs are operated by ground controllers that require line of sight to fly their UAV. They could easily implement a see-and-avoid policy, even if the helicopter could not do the same. However, the see-and-avoid system is predicated on both pilots taking action. Some have suggested the airspace system should treat these small UAVs in the same manner as birds, and a collision would be considered in the same light as a bird strike, potentially damaging to the aircraft but a part of life.<sup>61</sup> As the use of UAVs continues to proliferate, their impact on airspace coordination will increase exponentially. For example, tactics such as UAV "swarms" in a surveillance, intelligence or reconnaissance role will significantly increase the potential for air-to-air collisions due to the concentration of tactical UAVs in a small volume of airspace.<sup>62</sup>

57. Maria De Fátima Bento, "Unmanned Aerial Vehicles: An Overview," *Inside Global Navigation Satellite Community* (January/February 2008): 55, <http://www.insidegnss.com/auto/janfeb08-wp.pdf> (accessed November 22, 2012).

58. Mathew T. DeGarmo, *Issues Concerning Integration of Unmanned Aerial Vehicles in Civilian Airspace* (Virginia: Mitre Corp, Center for Advanced Aviation Systems Development, 2004), [http://www.mitre.org/work/tech\\_papers/tech\\_papers\\_04/04\\_1232/04\\_1232.pdf](http://www.mitre.org/work/tech_papers/tech_papers_04/04_1232/04_1232.pdf) (accessed November 22, 2010).

59. Ibid.

60. Ibid.

61. Roland E. Weibel and R. John Hansman, "Safety Considerations of Operation of Different Classes of UAV in the NAS" (Cambridge: MIT Press, 2004), 11.

62. Erwin, 20.

To further complicate the airspace, the advent of stand-off and loitering munitions adds yet another new complexity to low-level coordination. Weapons, such as the joint air-to-surface stand-off missile (JASSM) and the Low-Cost Autonomous Attack System (LOCAAS), are difficult to incorporate into the airspace structure. Current airspace coordination measures are inadequate to deal with these types of weapons that loiter for long times looking for a target. The limitations in coordinating the use of stand-off and loitering munitions represent a significant risk of an air-to-air collision.

Current manuals have formally integrated UAVs into the doctrine, tactics and procedures for airspace coordination. UAVs must now be included into all aspects of airspace planning as well as all the key airspace documents, such as the ACOs and ATOs.

The established principles of airspace management used in manned flight operations will normally apply to UAV operations. However, UAVs may be difficult to visually acquire and do not always provide a clear radar or electronic signature, presenting a potential hazard to other aircraft. Therefore, UAV operations require some special considerations in terms of airspace control and usage. Specific volumes of airspace need to be included in the ACO. Additionally, the ACO should provide times of activation of airspace for UAV operations (where a standing ACO is used, UAV operations are addressed in the ATO/SPINS [special instructions]).<sup>63</sup>

All manuals now include a specific airspace control means for UAV operations. The newly created UAV area is “airspace created specifically for unmanned aerial vehicle operations.”<sup>64</sup> The doctrine from the UK goes into detail on the planning and factors to consider for UAV operations in relation to each of the environments and major airspace users, and this doctrine notes the specific interaction and coordination requirements with sea assets, electromagnetic users and air forces while defining the impact UAV operations could have on higher-level operations.<sup>65</sup> Procedures have been updated to have UAVs follow airspace control points in the same manner as army aviation for flight planning.

UAV coordination has been one of the most written about subjects. Pilots are concerned about the inability of UAVs to “see-and-avoid”; army personnel continually express concern over the UAVs being responsive to their needs.<sup>66</sup> The inability for smaller UAVs to transmit their exact location to other aircraft remains an issue. A review of many of the writings and lessons learned from current operational theatres suggests that many of the issues surrounding UAV airspace coordination are the result of the operators of UAVs, aircraft pilots or air traffic coordinators not following the established procedural control measures. One of the most highly publicized near misses was when the civilian airliner nearly missed a UAV in Afghanistan. An investigation determined that “due to the failure of the air traffic control tower to follow standard procedures, the two aircraft nearly occupied the same airspace at the same time.”<sup>67</sup> Recent airspace coordination issues in Iraq have seen UAV planners try to make a UAV search area more than 50 per cent of the country’s area.<sup>68</sup> The rationale was to account for possible contingencies or mission changes. This is just a poor application of airspace control means and violates the objective of airspace coordination: one user should not overly restrict other airspace users.

63. US, Joint Staff, JP 3-52, III-6.

64. NATO, AJP-3.3.5 (A), A-14.

65. UK, MOD, “ Battlespace Management,” 4-E-1.

66. Kris Osborn and Michael Hoffman, “Finally, Ground Rules for Air Ops - US Army, USAF Near UAV Pact,” *Defense News*, sec. 1, September 15, 2008.

67. La Franchi.

68. United States of America, Department of the Army, FM 3-04.15, *Army Aerial Vehicle System Operation* (Washington: Secretary of the Army, 2005), D-13.

Advancements in technology are restricting the further integration of UAVs into the battlespace. In the low-level airspace, there is a greater reliance on procedural control over positive control. Land features continually cause communications problems, and there will never be enough radars to see the entire low-level airspace. Positive control, to the disappointment of pilots, will not be easily achieved in the army airspace. However, the procedural measures currently outlined in the doctrine combined with direct communications to the pilots seem to provide a basis for effective airspace coordination. In many cases, the communications network with the UAV pilot allows for an increased level of positive control. Work is still required in the area of loitering UAVs. Questions need to be addressed, such as the feasibility of blocking out large areas of airspace to allow these systems to operate. Finally, as mini and micro hand-launched UAVs proliferate, policy will need to be developed on how to more effectively integrate them into the battlespace; treating collisions like they are bird strikes is not a viable option.

### *Field artillery*

Three important areas must be considered when analysing the impact of field artillery on the airspace. The explosion of the round, either impact or airburst, is the area where the greatest attention is paid; however, the trajectory of the rounds through the airspace and the gun position are equally important. The old theory of “big space, little bullet” is nothing more than coordination by hope and is no longer viable when coordination affects civilian users of the airspace. This subsection will specifically look at how doctrine has addressed the coordination of indirect fire from the gun position, including the trajectory of the round to the impact area.

The coordination of field artillery during the cold war centred on the threat posed to low-flying aircraft in the direct vicinity of gun batteries.<sup>69</sup> In this era, gun batteries were positioned with their centre of arc facing the enemy. In effect, most gun batteries on the battlefield were generally pointing in the same direction. As long as aircraft flew behind the gun batteries, they were safe. Coordination also focused on deep attacks, but not from the perspective of deconflicting the airspace with friendly airspace users. The policy of the period was more concerned with the fact that if artillery prosecuted deep targets without coordination, it could cause enemy air defence units to reposition without the knowledge of our friendly air forces or intelligence organizations.<sup>70</sup> There is no mention in any old doctrine about coordinating the flight path of artillery rounds or airspace coordination at the target site. The artillery focus during that time was to ensure safety of ground forces forward. They used a series of fire support control measures to ensure limits of fire and safety of ground troops. For complex missions where artillery, fixed-winged aircraft and helicopters were being used (such as an opposed air insertion), special planning teams would come together to coordinate the convergence of the three assets with ground force movement. These teams are known as joint air attack teams.<sup>71</sup> These planning teams convened only for complex joint operations that required detailed coordination.

Airspace coordination for artillery under the old doctrine was relatively simple. Do not allow aircraft to fly immediately in front of battery positions and only coordinate the impact of complex missions. Due to the linear reality of the battlefield, the flight path of the rounds was rarely considered unless it was a joint and coordinated attack. The terminal trajectory of the rounds and point of impact were generally only coordinated from the perspective of ensuring there were no ground troops in the vicinity. This was only considered by the forward observation officer (FOO) during the calculation of

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69. US, Department of the Army, FM 100-103, 1-6.

70. Ibid.

71. United States of America, Department of the Army, FM 6-20-40, *Tactics, Techniques, and Procedures for Fire Support for Brigade Operations (Heavy)* (Fort Sill, Oklahoma: Field Artillery School, 1990), A-6-1.

the firing data, not as a coordination issue. Little consideration was given to the surrounding airspace of the impact area; after all, it all occurred in enemy territory. This level of coordination is no longer acceptable in asymmetric operations.

The modern battlefield tends to combine linear and non-linear. The reality is there is no longer friendly and enemy territory. This has caused airspace coordinators to consider the flight path of rounds and the airspace surrounding the impact area of the rounds. To address the issue of airspace at the impact area and the trend towards non-linear operations, the military developed the kill box concept. In much the same way the fire support coordination line (FSCL) is a linear fire support coordination measure (FSCM) that defines the limits of coordination and control required, the kill box is a permissive FSCM that defines these limits both for linear and non-linear operations to ensure the safety of the airspace surrounding the impact area.<sup>72</sup> According to joint doctrine, the kill box combines elements of FSCMs and airspace control measures to facilitate expeditious air-to-surface operations in support of the joint force commander's objectives while also allowing surface-to-surface targeting by ground forces.<sup>73</sup>

The kill box has been standardized using the CGRS box system discussed earlier. A "blue" kill box "permits air-to-surface fire effects in the kill box without further coordination with the establishing headquarters."<sup>74</sup> In this scenario, the aircraft operating in the blue kill box is permitted to fly at any altitude below 24,000 feet [7,315 metres]. Both the aircraft and ordnance must physically remain inside the boundaries of the box. Coordination with the ground commander would ensure that no enemy forces inside the kill box would be attacked using artillery or other surface-to-surface fires. Similarly, no air or ground assets are permitted to penetrate the vertical or lateral boundaries of the kill box without prior coordination with the airspace coordinators. Deconfliction is achieved and maintained throughout the lateral and vertical dimensions of the kill box between fixed-winged air assets and artillery. However, it does not preclude surface-to-surface fires that exceed the vertical limit of the kill box. Surface-to-surface fires could be launched as long as the trajectory passed over or outside the kill box.

A "purple" kill box "permits the integration of surface-to-surface fires with air-to-surface fires into the ... box without further coordination."<sup>75</sup> In this scenario, enemy forces are targeted by both air and artillery assets in the same geographical area. The difference between the blue kill box and the purple kill box is the establishment of an intermediate altitude. In this scenario, the maximum ceiling is identical to the previous one; however, the intermediate altitude is used to separate aircraft from the ground munitions. The aircraft remains above the established intermediate altitude. This allows the artillery rounds to pass through the side of the kill box below the intermediate altitude ensuring deconfliction. No rounds, artillery or any other munitions (such as ship-launched cruise missiles or air launched stand-off weapons) are permitted to penetrate the kill box between the intermediate and maximum altitudes established within the confines of the box. These boundaries and limits for the kill box ensure the positive safety of airborne assets, eliminating the potential for fratricide, while expediting the prosecution of targets in a specific geographic area.

72. Karl E. Wingenbach, "KILL BOX: The Newest FSCM," *FA Journal* 10, no. 4 (Jul/Aug, 2005): 13, <http://proquest.umi.com/pqdweb?d=913854081&Fmt=7&clientId=1711&RQT=309&VName=PQD> (accessed November 22, 2012).

73. United States of America, Secretary of the Air Force, AFDD 2-1.3, *Counterland Operations* (Washington: Secretary of the Air Force, 2006), 74.

74. Ibid.

75. Ibid.



The battlefield is evolving, and procedures must be in place that allow for the expedient and safe prosecution of enemy targets. Doctrine has begun to evolve in order to address the changes brought by the asymmetric battlespace, which is becoming more prevalent in today's conflicts.

A combination of kill box and traditional FSCMs is possible, such as when a single large advance is made from a classic linear battlefield (such as operations during OIF). Here the standard FSCL could be used for the slower moving ground forces, and a localized JFLCC kill box system could be created in front of, or behind, a rapid advance. This allows for more efficient air attack on non-engaged enemy land forces, the greatest freedom of land and aerial maneuver, and enhanced combat effectiveness—especially during non-linear operations.<sup>76</sup>

Conceptually, the kill box has been lauded as a step forward in coordination of fires. However, there are major critics outside of the artillery and fixed-winged aircraft communities. The main concern seems to be the size of the kill box in relation to the ground. The CGRS is designed for high performance aircraft travelling at great distances. It allowed for easy deconfliction in the higher-level airspace. FM 3-60.1, *Multi-Service Tactics, Techniques and Procedures for Targeting Time-Sensitive Targets*, Appendix G, “Common Geographic Reference System,” notes that the, “CGRS is primarily an operational-level administrative measure used to coordinate geographical areas rapidly for battlespace de-confliction and synchronization.” The adaptation of the CGRS to a fires support coordination measure and an airspace control measure in the low-level airspace has caused a great deal of concern. The concept is proven; however, the size of the box is not. The kill box should be delinked from the area reference system (CGRS).

The two clearly can be related but are not synonymous. OEF and OIF proved the usefulness of the area reference system beyond facilitating rapid air-to-ground attack of targets.<sup>77</sup>

The CGRS system is an ideal big-hand, small-map coordination system/protocol for fixed-winged aircraft; however, it is not a tactical-level coordination tool. The kill box can be a useful coordination measure at the operational level; however, to reserve a 5-minute x 5-minute box on the ground would equate to roughly a 25-square-kilometre area. To a fixed-winged pilot, this is a relatively small area, easily bypassed. To a ground commander, this area represents a very large area, making it virtually infeasible in the context of land operations. “We had helicopters that were forced to fly around these boxes. The distances were too great and we almost had helicopters making hard landings because they were running out of fuel.”<sup>78</sup> This has caused army operators to develop new but similar techniques to solve the issue.

Recent professional writings have seen the development of firing and terminal-effects restricted operating zones. American experience has shown that in asymmetric environments, like Iraq and Afghanistan, artillery batteries remain static for long periods.<sup>79</sup> This stability in the gun positions has led to deconfliction of the firing platform by using a ROZ. The coordinating altitude for the theatre and the average range and highest charge expected to be fired from the firing platform are then determined. This data is used, along with the firing tables for the weapon, to determine the distance from the gun at which a projectile fired at low angle will climb above coordinating altitude on its trajectory toward the target. An additional safety buffer is added to this distance to determine the

76. Ibid., 77.

77. Wingenbach, 15.

78. Lang, Blackhawk Helicopter Airspace Incident.

79. Daniel A. Pinnell, Victor S. Hamilton, and Michael T. Oeschger, “Deconflicting Army Aircraft and Indirect Fires: Brigade-Level A<sup>2</sup>C<sup>2</sup>,” *FA Journal* 9, no. 2 (Mar–Jun, 2004): 47, <http://proquest.umi.com/pqdweb?did=913854361&Fmt=7&clientId=1711&RQT=309&VName=PQD> (accessed November 22, 2012).



radius of the circular ROZ around the firing unit.<sup>80</sup> This ROZ below the coordination level is closed to all aviation and UAV operations. The CGRS box remains the same above the coordination level. With the ROZ permanently erected over the firing position, the airspace coordinator simply makes a calculation at the target site to determine the size of the ROZ at the target end. This calculation at the target end is rarely made because a large proportion of, if not all, indirect fires in asymmetric operations are observed by a FOO. When the FOO is present, they would make a simple visual observation or radio confirmation to determine there are no other airspace users in the area. The fact that the fire support coordination centre and the airspace coordination centre are generally collocated allows for relatively quick and simple building of a trajectory ROZ and confirmation of the airspace.

The High Mobility Artillery Rocket Systems (HIMARS) and the multiple-launch rocket system (MLRS) have also moved away from the large kill box. “Goalposts”—relatively small ROZs—are created and established both over the target area and around the weapon’s platform. Then a 2-kilometre-wide rectangle is built to connect the two. This allows operations to continue unabated under the trajectory of the projectile in the space between the goalposts.<sup>81</sup> The unacceptably large size of the kill box has driven coordinators in the field to adapt the procedure to something that is more manageable in the low-level airspace.

The adoption of the CGRS system as the basis for a kill box has been written into doctrine; however, practitioners in the field have modified this procedure to reduce the size of the airspace below the coordination level. This evolution in the doctrine allows for greater flexibility of all airspace users and reduces the mutual interference between airspace users, which is in line with the objectives of effective airspace coordination.

Canadian scientists at Defence Research and Development Canada (DRDC) have done some analysis that supports a more limited structure of airspace control measures, as outlined by Pinnell and in line with what soldiers are doing in the field.<sup>82</sup> Further analysis and research should be conducted in the area to determine the optimal size of airspace that needs to be reserved to conduct joint fires, and the adoption of the CGRS in the army airspace needs to be reviewed.

### *Explosive ordnance disposal*

Western armies are increasingly conducting operations in countries that are heavily mined. Demining the countries becomes one of the tasks during operations for military and other non-governmental agencies. Complex battlefields now have demining and large EOD operations going on at the same time as fighting. EOD operations and their potential use of army airspace require coordination. “Most do not think of the EOD organizations as airspace users, but when a plume of phosphorus reaches to 1000 feet [305 metres], it becomes a real issue to low fliers.”<sup>83</sup> This subsection will investigate how EOD has been integrated into the airspace.

Simply put, there is no reference to airspace coordination with EOD, demining or any other engineer activity in any doctrine manual old or new. There is no mention in either airspace or engineering doctrine. Airspace coordination of EOD activities has not been a consideration in doctrine or procedures. However, the example in Section 4 would seem to illustrate a requirement for deconfliction.

80. Ibid., 48.

81. Lang, Blackhawk Helicopter Airspace Incident.

82. Sylvia Lam and Shiva Poursina, “As-is Architecture Document for Joint Fire Support Capability TDP” (Defence Research and Development Canada Ottawa, 2006), [http://www.cfd-cdf.forces.gc.ca/websites/Resources/cfec/Joint%20Fires/Documents/JFS\\_AS-IS\\_OP\\_ARCH\\_V\\_005b.pdf](http://www.cfd-cdf.forces.gc.ca/websites/Resources/cfec/Joint%20Fires/Documents/JFS_AS-IS_OP_ARCH_V_005b.pdf) (accessed April 5, 2010, site discontinued).

83. Notaro, 7.

Both lessons learned and literature emanating from operational theatres around the world mention the requirement for airspace deconfliction when undertaking EOD and demining operations. The requirement to deconflict EOD operations with the airspace in Bosnia-Herzegovina, Iraq and Afghanistan has been identified.

In as early as 2000, the airspace controllers for the stabilization force (SFOR) in Bosnia-Herzegovina noted the requirement to issue a notice to airmen, the civilian equivalent of an airspace control order. "The NOTAMs from Maj. Lopis's office are usually about air space restrictions, and must be issued when certain activities take place. This includes demining, ... and range activation."<sup>84</sup>

In Afghanistan, a policy was developed to institute a temporary ROZ over the demining site.

The general policy was that all these organizations were to recover the ordnance to one of two sanctioned EOD ranges. If they could not move the round then the ESCC [engineer support coordination centre] would request a temporary ROZ on their behalf.<sup>85</sup>

The American airspace coordinators in Iraq ensured that they provided "staff and aircrews situational awareness of known flight hazards, such as explosive ordnance disposal ...".<sup>86</sup>

The most specific direction to date was issued by the United Nations Mine Action Office in their document entitled *National Technical Standards and Guidelines Sudan Part 1 Demining*. This document contains an entire chapter of detailed direction for coordination between EOD operations and the airspace.

When the use of an explosion in an emergency situation is necessary, such as for the destruction of UXO [unexploded ordnance] in a dangerous location or emergency situation, the details required for NOTAM are to be passed on to the UNRMAO [United Nations Regional Mine Action Office]. An Emergency NOTAM will be dealt with on a case-by-case basis. These should be the exception rather than the rule. In all such cases the means of initiation is to be electrical and the time of detonation is to be carefully controlled to ensure that the airspace is clear of aircraft.

Normal safety precautions are to be taken whenever the explosive destruction of any item of ordnance is carried out. These safety precautions are to include visual and aural inspection of the airspace above and around the demolition area to encompass the implemented safety distance.<sup>87</sup>

There will be demining or EOD operations occurring in today's asymmetric battlefield. These large explosions must be coordinated to ensure the safety of airspace users. These EOD missions often take place within the very area of operations that combat operations continue within; this means UAV and aviation activity will remain high in these areas. The soldiers on the ground in both NATO and United Nations (UN) missions have noted this requirement. Doctrine must be written

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84. 1Lt Javier Donesteve, "Air Space Control: SFOR Creates a Reference Web Site," Stabilisation Force, <http://www.nato.int/sfor/indexinf/104/s104p04a/t0101104a.htm> (accessed November 22, 2012).

85. Notaro, 7.

86. James M. Waring, Carl L. Giles, and John A. Robinson, "The 19<sup>th</sup> BCD in Counterinsurgency Operations," *FA Journal* 10, no. 4 (Jul/Aug, 2005): 16, <http://proquest.umi.com/pqdweb?did=913854241&Fmt=7&clientId=1711&RQT=309&VName=PQD> (accessed November 22, 2012).

87. United Nations Mine Action Office, *National Technical Standards and Guidelines Sudan Part 1 Demining* (Technical Guide, Sudan, 2008), Chapter 6, [http://www.mineactionstandards.org/nmas/files/sudan/Sudan\\_NTSG%20SINGLE%20DOCUMENT.pdf](http://www.mineactionstandards.org/nmas/files/sudan/Sudan_NTSG%20SINGLE%20DOCUMENT.pdf) (accessed April 4, 2010, site discontinued).

and enforced in this area to define how hazards from demining will be captured and what airspace control means will be used to reserve the airspace for these types of operations.

### *Civilian aircraft*

Another significant change to the airspace in modern times is that operations during a military conflict will need to be conducted in airspace used simultaneously by civilian aircraft. Current tactics, techniques and procedures only provide rudimentary guidance for integrating ICAO airspace. Coordination with civilian aircraft is essential to ensure their safety as they continue to operate in war zones. As countries such as Canada continue with concepts such as the whole-of-government approach to conflicts, humanitarian assistance as well as work by non-governmental agencies will continue. This subsection will review how new doctrine has tried to integrate civilian aircraft into the operational theatre.

A review of old doctrine resulted in little or no mention of interoperability with civilian aircraft. The expectation under the old doctrine was that there would be little to no civilian aircraft activity in the airspace. In ATP-40 (C), the only reference to civilian aircraft is mentioned with respect to military operations other than war.

Especially during a crisis or in MOOTW, the requirement to operate civilian aircraft in the airspace control area or parts thereof must be considered and maximum safety consideration consistent with peacetime operations allowed without disrupting operational effectiveness.<sup>88</sup>

New doctrine manuals expand on the concept of civilian aircraft working in a combat zone. All acknowledge that the introduction of civilian aircraft complicate the operation and demand that “airspace control planning becomes much more intensive, often requiring the establishment of detailed airspace control procedures.”<sup>89</sup> There is also explicit acknowledgement that civilians will be working in the military airspace and that the airspace control system needs to integrate these aircraft into the system.

Civilian agencies will operate in many theatres, even when the risks are significant. Such agencies include OGD [other governmental departments], UN, NGOs [non-governmental agencies], HN [host nation] and private military companies. Agencies working wholly within a formation’s AOR [area of responsibility] should, if possible, be integrated into the battlespace to minimise their risk.<sup>90</sup>

NATO doctrine requires that military forces may need to protect the right of civilian passage, taking the integration of civilian aircraft beyond mere coordination.<sup>91</sup> All of the current doctrine notes that the integration of civilian aircraft should never jeopardize the operational security of the mission and that civilian operators should be given all of the unclassified information from the airspace control orders and the air tasking orders. There is a difference between the doctrine of the UK and NATO when it comes to whether civilian or military aircraft have primacy. NATO doctrine states that civilian aircraft must be given the “maximum safety consideration consistent with peacetime operations allowed without disrupting operational effectiveness.”<sup>92</sup> The UK’s doctrine notes that “military operations will often be constrained by civilian airspace control or by unexpected civilian

88. NATO, ATP-40 (C), 3-1.

89. US, Joint Staff, JP 3-52, xi.

90. UK, MOD, “Battlespace Management,” 4-7.

91. NATO, AJP-3.3.5 (A), 4-4.

92. Ibid., 3-5.

activity in the Joint Operations Area or Airspace Control Area.<sup>93</sup> This is a significant difference in approach to airspace coordination. The key factor affecting airspace coordination during asymmetric operations is deconflicting military and civilian traffic without overly restricting either one.

Civilian and military aircrews use different documents when flying. Civilians use Aeronautical Information Publications (AIP) defined by the International Civil Aviation Organization and issued by countries for their own airspace. They contain information essential for air navigation, containing details of regulations, procedures and other information pertinent to flying aircraft in the particular country. The ATO is the source document that tasks aircraft for designated missions, and specific directions on flying procedures are contained in the ACO. These documents are planned, produced and distributed by the military chain of command. Both of these documents are classified and controlled publications and for operational security cannot be released to civilians. This means there are two completely different sources of information for aircraft flying in the same country. Airspace planners must ensure that any changes in one document will not conflict with the other. As well, a balance must be achieved on what information can be released to civilians without jeopardizing operational security of the military mission. For example, in Afghanistan, military airlift aircraft fly along routes that are different than those used by civilian airliners. When the civilian and military routes cross, the aircraft are procedurally deconflicted. The civilian pilots fly as directed in the AIP, and the military routes would be classified. Therefore, any change to either the military route or the civilian route would need to be updated in both documents.<sup>94</sup> There would be a duplication of work and an increased potential for error.

To date there have been few articles or lessons learned emanating from the current operational theatres that would suggest that there have been any significant problems with the integration of civilian aircraft into the operational airspace. The likelihood of increased civilian traffic in an area of conflict will only increase in the future. Civilian pilots are trained in civilian airspace coordination requirements and, thus far, have proven capable of integrating into the military airspace. The potential for error exists, and the streamlining of the civilian and military documents needs to be resolved. As well, the conflict in doctrine between nations needs to be addressed at the coalition level to determine if and when civilian or military aircraft have primacy of operations. A difficult question when the airspace belongs to the host nation.

#### *Civilian airspace*

The impact of civilian aircraft is not the only civilian consideration for military airspace coordinators. Another significant change to the airspace in modern times is that operations during a military conflict will be conducted in close proximity to, or in and around, civilian airspace and civilian populations. Current tactics, techniques and procedures only provide rudimentary guidance for military operations in the ICAO airspace. Particularly in the case of failed states, governments are eager to transition these states back to civilian control as soon as possible. This transition introduces civilian airspace into the operational theatre. Section 4 outlined an example in Afghanistan when the transitional government was eager to resume civilian transcontinental flight routes over their country. This subsection will review how new doctrine has tried to integrate civilian airspace into the operational theatre.

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93. UK, MOD, "Battlespace Management," 1-1.

94. Major Michael A. Grogan, "Airspace Control Authority in Stability Operations: The Role of the United States Air Force in Rebuilding Afghanistan's National Airspace System" (Air Command and Staff College, Air University), 17, <http://www.dtic.mil/cgi-bin/GetTRDoc?Location=U2&doc=GefTRDoc.pdf&AD=ADA476300> (accessed November 22, 2012).

A review of old doctrine resulted in little or no mention of interoperability with civilian airspace. In FM 100-103, the only reference to civilian airspace is with respect to assistance to foreign defence or peacekeeping.

Airspace control in this environment primarily focuses on providing air traffic services, coordinating military airspace requirements with host nation civil airspace, and integrating and coordinating air operations with fires and the ground activities. Air traffic services may be expanded to provide greater positive control of airspace users.<sup>95</sup>

Current doctrine clearly states that the direction as set out by the host nation will be respected.

Bilateral and international agreements often establish obligations affecting the use of airspace and the conduct of ATC activities by operational and civilian organizations. Any requested changes to or waivers of obligations imposed by these agreements or by HN law, as well as problems that result from restrictions to military operations, should be forwarded to the JFC [joint force commander] and may be referred through diplomatic channels for resolution.<sup>96</sup>

Afghanistan provides an excellent example of this. Prior to its invasion almost US\$23 million a year was being paid to the central government in over-flight fees.<sup>97</sup> At the commencement of hostilities, the airspace over Afghanistan was closed to commercial airlines.<sup>98</sup> Once closed, flights were routed around Afghanistan, resulting in longer flight times and significant additional costs in both fuel and time for flights between Southeast Asia and Europe. Immediately after the fall of the Taliban, commercial airlines wanted to resume over flights of Afghanistan, and the newly installed government of Afghanistan was eager to collect the over-flight fees. The problem facing military forces was how to convert operational airspace into a civilian airspace structure capable of safely integrating military operations with civil aviation.

Once commercial airliners were allowed to fly over Afghanistan, the problem facing the military was balancing the ongoing military requirement for airspace with those of the international civil aviation community. For example, the artillery was required at times to fire high-angle missions. The maximum altitude the rounds were reaching directly conflicted with lower altitudes the airliners were using for civilian over flights. Either artillery missions needed to be limited or over flights restricted, which would have an impact on the revenue that the central government could generate. In the end, a ceiling was placed on the military airspace and no artillery rounds were allowed to penetrate this altitude unless under positive control and in exceptional circumstances.<sup>99</sup>

Actions in operations suggest the integrity of civilian airspace is a key aspect of coordination, and this is in line with current doctrine. The duplication of work and the increased potential for error between civilian and military documents should be addressed if both systems are to be run concurrently.

95. US, Department of the Army, FM 100-103, C-1.

96. US, Joint Staff, JP 3-52, IV-3.

97. "Case Studies in Sanctions and Terrorism: Case 99.1 US and UN v Afghanistan (Taliban)," Peterson Institute for International Economics, <http://www.petersoninstitute.org/research/topics/sanctions/afghanistan.cfm> (accessed November 22, 2012).

98. Marian Edmunds, "No Fly Zone: Avoiding Afghan Airspace," Frequent Flyer, <http://frequentflyer.oag.com/backissues/12082001/f120701-3.asp> (accessed December 27, 2009, site discontinued).

99. Regional Command South, Airspace Coordination Centre, *Standing Operating Procedures Airspace Coordination Cell* (Kandahar: ISAF RC (S), 2007), A-16.

*Electromagnetic spectrum*

Growth in the use of the EMS has increased over the past years. From the use of satellites for UAV control and data transfer, to vehicle-mounted radio-frequency jammers, the use of the EMS has become congested. This increase in use raises the potential for a growing number of conflicts. Some of these conflicts can have potentially devastating effects.

[During the First Gulf War] it was discovered that certain combinations of airborne jammer frequencies could trigger an involuntary launch of Patriot anti-aircraft missiles, as well as some less catastrophic, but equally unexpected events.<sup>100</sup>

The deconfliction of the EMS has traditionally fallen to the Signals trade to solve. This subsection will focus on the role that airspace coordination can play in assisting in the deconfliction.

A review of old doctrine reveals that airspace coordination treated coordination with the EMS as a special case and a limited requirement. Special electronic mission aircraft (SEMA) and heliborne electronic warfare flights were given ROZs in order to conduct their missions. Both types of missions were generally ordered from the corps level and required detailed preplanning and inclusion into the ATO.<sup>101</sup> US EMS doctrine from 1991 specifically states that the “Army representatives in the [airspace cell] help the corps spectrum manager resolve airspace electromagnetic spectrum problems.”<sup>102</sup>

With the increase in use of the EMS, it would be expected the deconfliction of the EMS would be discussed in greater detail. Surprisingly in the NATO AJP-3.3.5, there is very little mention of coordination of the EMS. The section on SEMA and heliborne flights has been removed. The only mention of EMS coordination in the airspace is an airspace control means. It is called an electronic combat ACM. It is defined as “[a]irspace established specifically for aircraft engaging in electronic combat.”<sup>103</sup> Any other mention of EMS refers to the ability of the enemy to degrade allied capabilities through the use of electronic warfare. This lack of doctrine and procedures for airspace deconfliction of the EMS may be due to the fact that many nations rest that responsibility with the J6 or Signals branch.<sup>104</sup> However, even in the new US EMS joint doctrine that replaced the doctrine from 1991, any reference to coordination with airspace coordinators has been removed. Instead, there is only generic mention of coordination.

Systems such as UASs [unmanned aircraft systems] and common user “jammers” all use RF [radio frequency] spectrum for operation. It is their widespread use and unique operating characteristics that require special planning and coordination to ensure that frequency fratricide is mitigated.<sup>105</sup>

The exception is the doctrine from the UK. Throughout their doctrine at the strategic, operational and tactical levels, there is reference to, and a requirement for, EMS coordination and deconfliction

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100. “Electronic Fratricide over Iraq,” Strategypage.com, <http://www.strategypage.com/htmw/htnavai/20080322.aspx> (accessed November 22, 2012).

101. US, Department of the Army, FM 100-103, 2-24.

102. United States of America, Department of the Army, FM 24-2, *Army Electromagnetic Spectrum Management Operations* (Washington: Secretary of the Army, 1991), Section 4-12.

103. NATO, AJP-3.3.5 (A), A-12.

104. United States of America, Joint Staff, *Joint Operations in the Electromagnetic Battlespace* (Washington: Joint Chiefs of Staff, 2008), D-L-1.

105. United States of America, Department of the Army, FMI 6-02.70 (FM24-2), *Army Electromagnetic Spectrum Management Operations* (Washington: Secretary of the Army, 2006) 5-3.



with other airspace users. They have implemented electronic warfare coordination centres (EWCC), which are to integrate and coordinate in the headquarters with the other coordination centres, particularly the ASCC.

Equally, details of any action which may have a potential, possibly unintended, physical or electronic effect in airspace controlled by another agency must be passed on in order to be coordinated or deconflicted.<sup>106</sup>

Electronic warfare must be coordinated with [artillery] fires ... radars, Air Defence and surveillance and UAVs, and there must be the avoidance of electronic fratricide.<sup>107</sup>

As the EMS becomes more complex, it must integrate further into the airspace. The failure of the new doctrine to further integrate the coordination requirement is troublesome. Forces in operational theatres are experiencing a greater number of EMS conflicts within the airspace. As noted in the example discussed in Section 4, it is only through interpersonal relationships and the awareness of the organizations involved that the issues are being solved; however, there remain many more issues where solutions are not easily found. A commanding officer of a UAV squadron in Afghanistan has noted publicly

that the service's Silver Fox drone was "very susceptible" to electromagnetic interference. "In particular with our convoys, with our electronic countermeasure systems going off, they really degrade our range," he said. "And then we have a problem recovering [the UAV]."<sup>108</sup>

The issue of EMS coordination with the airspace requires the coordination between the Signals branch and the rest of the army. The management of the EMS rests with the Signals branch, but the coordination and deconfliction of the myriad of assets using the EMS is a joint function. The UK's doctrine provides a model that should be explored by the rest of NATO.

#### *Friendly ranges and bases*

When soldiers are on a live-fire range they are focused on their drills and are thinking about what their comrade to the left and right are doing. They are not worried about friendly fire from above.

Once communications were established between the range and the 3 PPCLI Command Post, the TF [Task Force] Rakkasan Tactical Operations Centre, and the KAF [Kandahar Airfield] Tower Sentry at approximately 16:01Z, permission was granted for the ranges to start live fire. ...

The exercise proceeded without interruption until 20:35Z, when the KAF Control Tower imposed a "Check Fire" through the Control Tower Sentry due to an inbound transport aircraft. The "Check Fire" was cancelled at 20:51Z, after the transport aircraft had landed, and firing resumed. ...

Between 21:10Z and 21:20Z, a flight of two American helicopters approaching Kandahar Airfield from the east observed weapons at the Tarnak Farm Range, approximately six miles from their flight path. ...

106. UK, MOD, " Battlespace Management," 4-5.

107. Ibid., 4-K-1

108. Nathan Hodge, "US Struggles with 'Electronic Fratricide' in Afghanistan," Wired.com, <http://www.wired.com/dangerroom/2009/11/us-struggles-with-electronic-fratricide-in-afghanistan/> (accessed November 22, 2012).

At approximately 21:21Z, at the same time the transiting F-16s were observing and reporting the ground fire to the AWACS, some members of “A” Company reported hearing jets fly overhead. 3 Section continued to fire, not knowing what was transpiring in the skies above them. ...

The bomb impacted at 21:26:01Z, just as Sergeant Leger was climbing up the west wall of the wadi behind Corporal Dyer and Private Smith ...<sup>109</sup>

The board of inquiry (BOI) from this incident made several recommendations concerning airspace coordination. The reality was they were making recommendations to fix a problem for a circumstance that the doctrine and procedures to that point had never addressed. This subsection will look at how asymmetric operations have made the airspace coordination for friendly bases and ranges an issue and how the airspace control system has been adapted to address this issue.

On the conventional battlefield, there was enemy and friendly territory. Friendly aircraft did not drop ordnance in friendly territory unless under strict positive control. Friendly ranges were in the rear with specifically named military operations area (MOA) airspace reserved over them in accordance with civilian guidelines.<sup>110</sup> This was done to keep civilian traffic out. Airspace for key military installations was protected by ground-based air defence and had a base defence zone (BDZ) placed over them to coordinate aircraft with the air defence. Any key infrastructure forward may have had a no-fire area placed around them, but this was an FSCM to stop weapons and aircraft from firing into them. These were limited, and for the most part, the airspace in the forward area was not limited by restrictive airspace. There was never reason to restrict airspace on the enemy side. As warfare evolved, there was a growing concern to protect sites of significant cultural, political or religious meaning. Detailed targeting procedures were developed to ensure proper target selection and prosecution. The airspace structure never envisioned friendly and enemy forces intermingled with civilians over the entire battlespace.

The new doctrine was slow to evolve. The recommendations from the Tarnak Farms BOI point out that the ranges were not listed in the ACO.

All future Airspace Coordination Orders (ACO) should contain a detailed list, including but not limited to timings, weapons to be used, altitude restrictions and coordinating agencies, of all the live firing exercises scheduled to take place, on any given day, on any of the existing small arms ranges currently in use by Coalition Forces in the Afghan theatre.<sup>111</sup>

As late as 2003, US forces in Afghanistan did not know the location of friendly ranges or bases in the ISAF AO, and none of these were reflected in the ACO.<sup>112</sup>

In fact, the doctrine books do not mention how friendly locations and airspace are to be integrated into the airspace. Special-use airspace (SUA) is mentioned as an airspace control measure to cover these particular instances. The SUA was adopted from civilian airspace terminology and was “a peacetime term contained in Federal Aviation Agency Handbook 7610.4, and was used to define airspace for a specific purpose. It may also designate airspace in which no flight activity is authorized.”<sup>113</sup> The SUA has been adopted as the method to identify friendly airspace; however, it

109. Canada, DND, *Tarnak Farm Board of Inquiry*, Findings.

110. ICAO, ECCAIRS 4.2.6.

111. Canada, DND, *Tarnak Farm Board of Inquiry*, Recommendations.

112. Notaro, 4.

113. US, Joint Staff, JP 3-52, C-B-22.

is a catch-all ACM, which covers the following types of areas: alert area (ALETA), airspace control area (ACA), forward arming and refuelling point (FARP), forward operating base (FOB), MOA, no-fire area (NFA), no-fly area (NOFLY) and surface-to-surface missile system (SSMS).<sup>114</sup> This is the standard method for identifying friendly airspace in asymmetric operations. Brigadier-General Devlin noted in his mid-tour update that the SUA “no fire areas have been emplaced over all major ISAF installations.”<sup>115</sup>

From the onset, there was concern from the fixed-wing community and airspace coordinators that placing so many SUAs on the map would only clutter an already busy airspace and overly restrict air forces.<sup>116</sup> Unfortunately, there remains no other way to identify and restrict friendly airspace so that another Tarnak Farms incident does not occur. ISAF had eight friendly bases, one ammo compound, one US SUA and five ranges all within a 30-kilometre by 20-kilometre region. A fighter pilot could traverse that area in less than two minutes. The challenge this presents was how could this information be graphically displayed for a pilot traveling at mach speeds so that it would make sense and just not be a clutter on their map? The BOI identified this very issue.

If not already in existence, a control and standardization method needs to be developed to ensure that all aircrew fly with accurate airspace coordination information. More specifically, the information that aircrew will have with them while flying, as well as the format in which the information is presented (maps, diagrams, briefing cards) needs to be clearly defined.<sup>117</sup>

Too much small detail would clutter the airspace and significantly affect their ability to conduct missions in such airspace. Each SUA represented on a map may have a different altitude or different restrictions for the aircraft’s ability to enter or fire into.

Airspace of this nature would be unworkable for a fighter pilot who may have travelled hundreds of kilometres over areas virtually littered with these small areas. “It’s very hard for a pilot to know what [they] can and can’t do when there are literally thousands of these [SUA] no-fire areas.”<sup>118</sup>

The proliferation of SUAs on the asymmetric battlefield continues to clutter the airspace. Many are put in place merely as no-fire areas to restrict aircraft from firing into them. One solution may be to populate the battlefield with FACs who are trained to control fighter aircraft in CAS missions. If this were possible, a force could restrict all aircraft fire to be under the positive control of a FAC. However, the ability of a force to have a FAC at every location on the battlefield where aircraft firepower is required would be near impossible to achieve.

There are other potential options. In areas where there is a large amount of airspace control means or air traffic that required specific coordination, a commander, at divisional level or higher, could request and establish an airspace control measure known as a high-density airspace control zone (HIDACZ). A HIDACZ reserves airspace and controls which airspace users have access, allowing the commander to restrict other users from the airspace. The HIDACZ would have a specific command, control and coordination organization that would be responsible for all activities in the specified area. This control measure would be used sparingly and only when there was a high

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114. Ibid., C-B-4.

115. Devlin, 6.

116. Notaro, 4.

117. Canada, DND, *Tarnak Farm Board of Inquiry*, Recommendations.

118. Joe Pappalardo, “Afghanistan Taught US ‘Hard Lessons’ in Close Air Support,” *National Defense* (1 August 2005), <http://www.thefreelibrary.com/Afghanistan+taught+U.S.+%22hard+lessons%22+in+Close+Air+support.-a0135117735> (accessed November 22, 2012).

level of activity in a defined area.<sup>119</sup> The increased responsibility to control and coordinate the defined airspace would, however, strain the airspace coordination system.

The ability to identify and protect ground troops and installations is critical, particularly on an asymmetric battlefield where friendly and enemy elements may be intermixed. Currently this is achieved by placing SUAs of varying size, altitudes and restrictions over friendly assets. This has the potential to clutter the airspace and limit the effectiveness of fighter aircraft. Further study in the area is required to ensure the doctrine, procedure and airspace control means available to the operators allow for the most efficient and safe integration of the airspace.

### Major findings

The analysis in this section has demonstrated there are significant areas of airspace doctrine, tactics, techniques and procedures that need to be further developed. It identified contradictions as well as areas of discussion that are completely lacking in direction. In some areas, such as rotary-winged aircraft operations, doctrine for the army airspace is sufficient to meet the new challenges posed by the asymmetric battlefield. However, overall doctrine has failed to maintain pace with the dynamic, complex, operating-environment changes. In the case of the CGRS, it seems that new procedures were introduced by the air force and field artillery before a full appreciation of their impacts on other airspace users could be realized. The lack of concrete and clear doctrine and the varying level of training of airspace coordinators internationally have led to many cases of trial-by-error adoption of methodologies with no discernable course of action comparison. It is clear airspace doctrine and procedures need to continue to evolve. In particular, five specific areas have been identified above as requiring such evolutionary work.

#### *Areas of contradiction*

The contradiction between UK doctrine and US/NATO doctrine to determine if and when civilian or military aircraft have primacy of operations requires clarification. Although the military answer might be that military operations should be the priority, restriction of humanitarian flights or limitations on host-nation use of their airspace may not be politically tenable.

#### *Areas requiring further development of doctrine and procedures*

A review of the doctrine and concepts of how fixed-winged aircraft will interact with ground troops must be conducted. If in an asymmetric battlefield, it is concluded that all fire effects delivered by fixed-winged aircraft must be under conditions of positive control, then the role of the forward air controller needs to be reviewed.

Doctrine and procedures for UAVs need to be expanded. Technological advancements may take a while before they can provide a solution for the see-and-avoid problem currently being experienced in coordination below the coordination level. Procedural control measures can be refined to provide a better-structured, more-manageable airspace environment for UAVs and aviation. Further guidance is required on how to effectively and safely operate an airspace control system when both military and civilian airspace and aircraft are involved. The current operation of parallel systems of airspace control is cumbersome and susceptible to errors. A doctrinal concept of a hybrid system needs to be further developed. Finally, the concept of SUA requires further development to address the issue of multiple friendly locations requiring controlled airspace, resulting in a cluttered airspace that may be overly restrictive to other airspace users.

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119. US, Department of the Army, FM 100-103, 2-8.

*New doctrine requiring review*

The introduction of the fire box as a means to deconflict fires for artillery or fixed-winged aircraft was premature. The procedures overly burden the airspace below the coordination level and cause unacceptable limitations on airspace use to other users and in the case of army aviation, the potential to run out of fuel is a significant safety concern. A method of procedural and positive control must be developed to coordinate the delivery of both weapon and sensor effects in a congested, localized tactical area.

*New areas for inclusion in airspace coordination doctrine and procedures*

EOD and demining operations need to be included into doctrine and other publications. New work must determine how specific types of UAVs will be integrated in to the airspace. Loitering UAVs and other munitions are an emerging class of UAVs that have no defined procedure or method for integration into the airspace. As well, the small, hand-launched mini and micro UAVs require inclusion in doctrine. Presently, there is no concept on how these will be integrated into the airspace. The EMS is, currently, only represented in the UK's doctrine. It should be expanded into NATO and other countries' doctrine. Airspace coordination can play a key role in assisting the Signals branch in coordinating the EMS. EMS should also be included in the doctrine of other Western countries and alliances.

*Areas doctrine and procedures should be sustained*

Procedures for army aviation and fixed-winged aircraft remain suitable for the current asymmetric battlefield. They should be continuously reviewed as new procedures are introduced for new airspace users to ensure aviation and fixed-wing operations are not overly restricted.

**Summary**

This section has determined there are five areas where doctrine and procedures need to evolve or be amended. As with any after-action review or lessons learned system, it is important to determine: what is working, what is not working, what requires improvement as well as what is being done well and simply needs to be sustained. In the case where new concepts or assets are being introduced, it is also important to determine if current doctrine and procedures provide sufficient guidance for the safe and efficient inclusion of the asset or if new procedures need to be developed.

**6. Analysis and findings****Introduction**

Army airspace command, control and coordination seeks to integrate a dynamic variety of airspace users into a flexible and fluid structure with minimal mutual interference between the various users or their intended effects. It achieves this while applying the commander's priorities to the airspace and ensuring the lowest possible level of risk to friendly troops. It is a diverse field covering almost every branch and element of the modern-day military force. This task has been complicated further by the ascension of asymmetrical operations in a post-cold-war reality and the proliferation of a new airspace user: the UAV. The analysis in Section 5 has detailed five areas where doctrine and procedures need to be revised to take account of these new circumstances.

This section will review the evidence and provide some additional analysis as to why the doctrine has evolved in this manner. It will further review which findings may be suitable for recommendation to the NATO Joint Doctrine Board and which findings will require further study in the future.

## Review of the evidence

### *Areas of contradiction*

As previously noted, this paper has identified only one major area of conflict in new doctrine. The integration of civilian aircraft and airspace in an operational area needs to have a common standard applied to determine when civilian or military aircraft have primacy of operations. The contradiction between UK doctrine and US/NATO doctrine is subtle, and realistically, there will have to be a balance between the safety of civilians and the primacy of the military operation. Doctrine needs to account for the fact that the modern battlefield, particularly in stability operations, is situated in host nations who are the ones who ultimately give the military force the authorization to operate in their airspace. To ignore the civilian requirement for the use of their airspace is not feasible, given the demonstrated commercial and social impacts, yet at times, the military force must take priority due to the nature of the threat. What the doctrine needs to address is how the balance between when civilian or military aircraft have primacy of operations will be managed and how the transition between the two systems will be achieved.

### *Areas requiring further development of doctrine and procedures*

Doctrine must address what control requirements are required for fixed-winged aircraft to operate within an asymmetric environment where enemy, friendly troops and civilians are all intermixed. On the asymmetric battlefield, virtually every mission will be in close proximity to friendly troops or civilians. This has necessitated the requirement for positive control for all missions and the expansion of FAC training to qualify sufficient numbers of ground troops to control these aircraft. It has also led to the incorporation of a TACP in the HQ structure at divisional level. As well, the asymmetric battlefield has specific rules of engagement requirements that lead to a focused targeting procedure for the delivery of weapons effects, particularly important for fixed-winged aircraft. Airspace coordination measures can assist in solving this problem by identifying the areas for loitering and operation as well as measures that restrict the release of munitions unless under positive control. The airspace structure needs to be flexible enough to be able to allocate the large amounts of airspace to conduct these types of missions on short notice. Targets in enemy territory did not require this level of coordination, and missions that were near friendly troops were conducted under positive control. However, these tended to be on the front lines where troops were in contact with enemy forces. The requirement for serious airspace coordination was identified after the unfortunate fratricide events in Afghanistan. Within an asymmetric environment, fratricides, as periodically seen in the news, can have a significant impact on public perception of a mission's success.

As discussed, there is an existing airspace management methodology for fixed-wing aircraft in the CGRS, and this has had mixed success in terms of integration with low-level and ground assets. Future airspace doctrine must provide a comprehensive methodology which supports the complete integration of fixed-wing aircraft with low-level assets in an asymmetrical environment.

The introduction and proliferation of UAVs of all types has resulted in a significant increase in airspace control measures in the army airspace. To date, procedures and doctrine have only tried to find a solution to allowing UAVs and rotary-wing aircraft to coexist in the same airspace. Since current airspace control means are assumed by most commanders to be sufficient to coordinate the current level of activity, there has been no substantial work done on finding a solution to the fast approaching issue of UAVs consuming larger amounts of airspace and negatively affecting aviation operations. The military must critically look at the expansion of UAVs in the army airspace and, in particular, at UAVs that operate at the same altitude as rotary-winged aircraft. Altitude separation is one manner to deconflict UAVs from rotary-wing aircraft. Military forces should consider reviewing



the requirement of having UAVs that work at all altitudes. Solutions such as tactical-level UAVs being restricted to certain altitudes above the operating altitude of rotary-winged aviation could be a solution. Current advancements in collision avoidance technology have been slow to develop. Research should be conducted to verify the feasibility of optic suites that are more suitable for tactical UAVs flying at an altitude above rotary-winged aircraft. Procedural control measures can be strengthened to provide a better-structured, more-manageable airspace environment for UAVs and aviation; however, the proliferation of UAVs operating in the same airspace altitude as rotary-winged aircraft will eventually become untenable without the ability to directly communicate position data to aviation assets, through an avoidance system or direct voice communication.

The current method of integrating civilian and military airspace is to produce the different airspace documents required for both military operations (ACOs, ATOs) and civilian operations (AIP, NOTAMs). Operators, faced with a lack of doctrine, are simply trying to run both systems in parallel. Missions that require operational security are removed from the civilian airspace document, and procedural methods are inserted in the civilian documents to ensure deconfliction. This causes a large duplication of work and necessitates a significant level of double-checking to ensure that every time a military mission requiring operational security changes, the changes are reflected in the procedural control measures that were inserted into the civilian document. This is a cumbersome process fraught with potential for human error. A doctrinal concept of a hybrid system needs to be further developed.

Finally, the protection of ground installations and facilities is critical. Further study in this area is required to ensure the doctrine, procedures and airspace control means available to the operators allow for the protection of these assets while ensuring the most efficient and safe use of the airspace. The increasing numbers of friendly installations are cluttering up the airspace. Faced with a lack of new doctrine to handle this new reality, airspace controllers are simply adding more and more special usage areas to the airspace control map. Multiple, small special-usage areas with differing restrictions become meaningless to a fixed-winged pilot travelling long distances at high speeds. Current airspace control means, such as HIDACZ, are designed for airspace with multiple aircraft that require a greater level of coordination and are not appropriate for this type of problem. Investigation into new airspace control measures that would identify areas with significant numbers of friendly installation requiring positive control of fires may be an option.

#### *New doctrine requiring review*

The adoption of the CGRS system as the basis for a kill box in doctrine and tactics publications requires review. It is overly restrictive in the army airspace below the coordination level, and the fact that operators in the field have devised their own reasonable and workable solution should give rise to a review. Further analysis and research should be conducted into this problem to determine the optimal size of airspace that needs to be reserved to conduct joint fires. The introduction of the fire box as a means to deconflict fires for artillery or fixed-winged aircraft was premature. The doctrine review noted the procedure started in air force doctrine, migrated to the field artillery doctrine and was subsequently introduced into the airspace doctrine. This control measure is clearly to the benefit of the fixed-winged and artillery users of the airspace. However, the kill box overly burdens the airspace below the coordination level and causes unacceptable limitations on airspace to other users. The area requested below the coordination level is simply too large. Further study of the issue and consideration of the procedures currently adopted on operations are required.

*New areas for inclusion in airspace coordination doctrine and procedures*

EOD and demining operations need to be included into doctrine and other publications. This paper has identified a complete lack of doctrine in this area. Operators have also identified this as an area of concern and have instituted the use of restricted operations zones. This method of deconfliction merits inclusion into current tactics, techniques and procedure manuals. Doctrine publications at all levels also need to identify the inclusion of EOD and demining as users of the airspace that require consideration.

New analysis must be conducted to determine how specific classes of UAVs will be integrated into the army airspace. UAVs that loiter, looking for a target, and other munitions are an emerging class of UAVs that have no defined airspace control methods to enable their integration into the airspace. These types of UAVs present a difficult problem to coordinators. A UAV of this class would simply fly about the battlefield looking for a specific target or electronic signal. When it finds its target, it attacks it. These UAVs could potentially be autonomous systems preprogrammed with their target specifications. The challenge to coordinate these types of UAVs could be significant.

The smaller class of UAVs—the small, hand-launched mini and micro UAVs—requires inclusion in doctrine. This class of UAVs presents another unique problem to airspace coordinators. Currently there is no concept on how these will be integrated into the airspace. The simple answer may be to leave the deconfliction up to the mini/micro UAV operator and simply advise other users of the airspace that these types of operations may be conducted in specific areas. However, a solution like that would most likely be resisted by the aviation community, as it leaves their safety in the hands of another.

Finally, doctrine with respect to the EMS is lacking. Serious consideration of the UK's model for integrating EMS and airspace coordination should be given. Airspace coordination can play a key role in assisting the Signals branch with the management of the EMS.

*Areas doctrine and procedures should be sustained*

The procedures for army aviation and fixed-winged aircraft remain workable for the current asymmetric battlefield. They should be continuously reviewed in relation to new procedures for new airspace users as they are introduced to ensure that aviation and fixed-wing operations are not overly restricted.

**Summary of research objectives**

This paper set out to analyse current army airspace command and control doctrine, and lack of it, across NATO. It analysed and identified gaps and inconsistencies between the doctrines from the selected allied countries and proposed potential solutions. It was determined that coordination measures for EOD are lacking in allied doctrine and that countries should consider adopting the measures being utilized by coordinators engaging in current operations. Temporary restricted operations zones should be considered as a potential airspace control means.

With respect to the EMS integration into the airspace, this paper determined that the UK's coordination of the EMS into the airspace is far more developed than the rest of NATO. The procedures proposed by the British are in accordance with the principles of airspace coordination and should be considered for adoption by other countries and alliances.

The review of current professional writings and lessons-learned articles proved interesting. Operators are being innovative in finding solutions to problems when faced by shortfalls in doctrine and procedures. Of particular note was the reconfiguration of the CGRS below the coordination level when used for joint fires or artillery fires.

This paper provides several concrete findings that relate directly to the stated objectives of this paper. The first goal was to develop recommendations and proposals that would be suitable for recommendation to the NATO Joint Doctrine Board. The findings are:

- a. A TACP should be incorporated into the HQ structure of NATO forces at divisional level.
- b. NATO should adopt the EMS airspace coordination procedures and policies as described in UK publications.
- c. NATO should adopt the hybrid system of a ROZ below the coordination level and a CGRS cell above the coordination level for all fires deconfliction.
- d. It is recommended that NATO work to further develop the procedures for civilian and military airspace coordination, eliminating the potential conflict with British doctrine.
- e. NATO should set standards for UAVs, determining what altitude band they should be allowed to operate in, allowing for separation with aviation assets.

The second goal of this paper was to propose joint doctrine challenges for further study for the third dimensional battlespace in the asymmetric modern battlespace. These proposals are:

- a. ACMs need to be determined for loitering UAVs and munitions.
- b. Further study is required to determine the best means of protecting dense areas of friendly facilities. Studies should determine if a cluster of varying SUAs should be used or another newly defined ACM should be adopted.
- c. If it is determined that fixed-winged aircraft can only deliver fires under positive control, a review of how best to employ the FAC should be conducted.

### **Strengths and weaknesses of the analytical approach**

In an ever rapidly changing environment such as the airspace, an approach that analyses doctrine and procedure publications, past and present, can provide a sound basis of the status of the policies and doctrine. It helps to identify what areas of the doctrine and procedures have evolved and which ones have remained static. Combine this analysis with a comparison of lessons learned articles and other professional writings and it becomes clear why some areas have evolved and what areas require further development.

One of the challenges of this approach is that lessons learned and contemporary writings are subject to the risk of writer bias. The proposals for the CGRS generated by the air force and adopted by the field artillery seem to benefit their cause in the airspace. For example, it was noted that there were very few articles written by the air defence trade, the branch of the army that is responsible for army airspace coordination. By contrast, there was an abundance of articles from air force and field artillery officers. As well, if doctrine was not updated or was simply a copy of another country's document, such as Canada has done, then it is difficult to assess if the current trend and direction

of doctrine is global in nature or just the viewpoint of a single nation. This paper tried to mitigate these weaknesses by selecting articles from a cross section of the different components of the selected allied countries.

## Conclusion

Based on the research and findings of this paper, it can be concluded that it has met its aim and stated goals. It was able to determine that the airspace control doctrine is evolving but there are significant areas that need to be reviewed. The analysis also determined that, for the most part, there is a common approach and terminology for airspace coordination. The one area where this differs is between the UK and NATO when determining the primacy of the civilian and military airspace systems. Finally and most importantly, the findings point to the conclusion that there remain significant areas for future study and further analysis.

## 7. Conclusion

### Introduction

While no two military campaigns are the same, it is normal to plan for the future based upon lessons learned from past experiences. Doctrine, and the ability for airspace coordinators to learn from past experiences, is limited to what happens on operations. Unfortunately, in Canada, airspace coordination is a function that is often only notionally played during exercises and training, and because of a lack of training opportunities, there have been challenges in the advancement of this doctrine. For an airspace coordinator to be successful, one needs to constantly study how each airspace user employs its aircraft and equipment and how each component views the battlespace. This cannot simply be a study of doctrine or tactics, techniques and procedures; it must look critically at how they actually think and execute their missions. To be successful, airspace coordinators must have the ability to articulate the requirements to properly manage the airspace and understand the concepts of the full-spectrum battlefield. Airspace is an integral part of every aspect of the joint force commander's plan, and soldiers on the battlefield need a piece of that airspace to operate and effectively use their weapons. Therefore, airspace coordinators need to understand the commander's intent and ensure the airspace is properly structured to support the plan.

### Summary of findings

Analysis from this paper determined the following:

- a. A TACP should be incorporated into the HQ structure of NATO forces at divisional level.
- b. NATO should adopt the EMS airspace coordination procedures and policies as described in UK publications.
- c. NATO should adopt the hybrid system of a ROZ below the coordination level and a CGRS cell above the coordination level for all fires deconfliction.
- d. It is recommended that NATO work to further develop the procedures for civilian and military airspace coordination, eliminating the potential conflict with British doctrine.
- e. NATO should set standards for UAVs, determining what altitude band they should be allowed to operate in, allowing for separation with aviation assets.

- f. ACMs need to be determined for loitering UAVs and munitions.
- g. Further study is required to determine the best means of protecting dense areas of friendly facilities. Studies should determine if a cluster of varying SUAs should be used or another newly defined ACM should be adopted.
- h. If it is determined that fixed-winged aircraft can only deliver fires under positive control, a review of how best to employ the FAC should be conducted.

### Future work

This paper has clearly outlined five areas requiring further discussion, clarification and agreement. Of these five areas, some, such as the coordination of fires, are in the collective consciousness as it relates directly to day-to-day tactical operations in theatre and thus have generated the most advancement and refinement of doctrine. However, consensus is required on the best methodologies and control measures required to ensure fast, effective fire support that does not negatively affect other assets.

Future doctrine discourse should also be focused in two key areas: integrating UAVs and the EMS into the airspace. UAVs constitute the area of largest growth in the use of the army airspace. Their efficiency and success in two large theatres of operations have pushed them to the forefront of sought after military technologies. The addition of mini and micro UAVs as well as loitering UAVs and munitions present some of the greatest future challenges to the airspace. Future work should primarily be focused in this area.

The integration of the EMS users in the airspace is also a growing concern. Examples of EMS interference and fratricide are increasing as the use of UAVs and IED countermeasures continues to increase on the battlefield. Airspace coordination can play a significant role in aiding the military's Signals branch by deconflicting the different EMS airspace users.

Finally, from a Canadian perspective, Canada must update its publications to reflect the advancements in airspace coordination. Canada has had an airspace coordination centre in Afghanistan for over seven years. Unfortunately, the majority of successes and refinement of doctrine have remained in theatre, and genuine discourse has not happened in Canada. These lessons learned need to be better captured, to allow the updating of Canadian publications and to allow for the comprehensive training of the next generation of airspace coordinators. Due diligence must be exercised to ensure that the refinement of airspace doctrine incorporates Afghan and Iraqi lessons learned but that it does not become over biased; the doctrine must be developed with a mindset to support any possible theatre.

### Conclusion

The army airspace—the tactical to the strategic level—is evolving out of necessity. Military operations in the asymmetric environment are pushing airspace coordinators to devise unique and workable solutions to the practical problems they face within the dynamic airspace environment. This paper set out to analyse army airspace command and control doctrine and, in doing so, it has identified areas of conflict in doctrine, areas where doctrine is completely lacking, areas where doctrine needs to continue to evolve, areas where new doctrine needs to be revisited and areas where doctrine remains workable. Airspace command, control and coordination has proven to be an area of significant importance to the Canadian and allied forces engaged in asymmetric operations, such as those

being encountered in Afghanistan and Iraq. Incidents such as Tarnak Farms demonstrate the catastrophic consequences if airspace coordination fails to respond to the new demands of the modern battlespace. This paper confirms that the asymmetric battlefield has dramatically changed the way airspace coordination must be conducted. It also proposes concrete steps to achieve substantial improvements in this critical area of joint and combined combat operations. Finally, and most importantly, this paper demonstrates that there remain significant areas for future research and analysis, as technological advances continue to redefine the complexity of airspace management in peace and war.

## Abbreviations

<b>ABCA</b>	American, British, Canadian, Australian and New Zealand Armies' Program
<b>ACM</b>	airspace control measure
<b>ACO</b>	airspace control order
<b>ACP</b>	airspace control plan
<b>AD</b>	air defence
<b>AIP</b>	Aeronautical Information Publications
<b>AO</b>	area of operations
<b>ASC</b>	airspace control
<b>ASCC</b>	airspace coordination centre
<b>ATC</b>	air traffic controller
<b>ATO</b>	air tasking order
<b>AWACS</b>	airborne warning and control system
<b>BOI</b>	board of inquiry
<b>C3</b>	command, control and coordination
<b>CAS</b>	close air support
<b>CGRS</b>	common grid reference system
<b>EMS</b>	electromagnetic spectrum
<b>EOD</b>	explosive ordnance disposal
<b>FAC</b>	forward air controller
<b>FEBA</b>	forward edge of the battle area
<b>FLOT</b>	forward line of own troops
<b>FOO</b>	forward observation officer
<b>FSCL</b>	fire support coordination line
<b>FSCM</b>	fire support coordination measures
<b>HIDACZ</b>	high-density airspace control zone
<b>HN</b>	host nation



<b>HQ</b>	headquarters
<b>ICAO</b>	International Civil Aviation Organization
<b>IED</b>	improvised explosive device
<b>IFF</b>	identification friend or foe
<b>ISAF</b>	International Security Assistance Force
<b>JFLCC</b>	joint force land component commander
<b>JOA</b>	joint operations area
<b>KAF</b>	Kandahar Airfield
<b>MOA</b>	military operations area
<b>MOOTW</b>	military operations other than war
<b>NATO</b>	North Atlantic Treaty Organization
<b>NOTAM</b>	notice to airmen
<b>OEF</b>	Operation ENDURING FREEDOM
<b>OEF-A</b>	Operation ENDURING FREEDOM - Afghanistan
<b>OIF</b>	Operation IRAQUI FREEDOM
<b>ROZ</b>	restricted operating zone
<b>RPV</b>	remotely piloted vehicle
<b>SAAFR</b>	standard use army aircraft flight route
<b>SEMA</b>	special electronic mission aircraft
<b>SIF</b>	selective identification feature
<b>SUA</b>	special-use airspace
<b>SUAV</b>	small unmanned aerial vehicle
<b>TACP</b>	tactical air control party
<b>TTP</b>	tactics, techniques and procedures
<b>UAV</b>	unmanned aerial vehicle
<b>UK</b>	United Kingdom
<b>UN</b>	United Nations
<b>US</b>	United States
<b>USAF</b>	United States Air Force

## Chapter 10 – The Future of Command and Control in the Canadian Forces

Lieutenant-Colonel Denis O'Reilly

### Abstract

Command and control (C2) has been an essential tool in allowing military commanders to wage war. Past conflicts have demonstrated the decisiveness of C2 as a weapon in and of itself. Napoleon's creation of corps and divisions with their supporting staff revolutionized C2 in a way that continues today. The many revolutions in military affairs (RMAs) that changed the nature of warfare to what it is today did not happen overnight. In many cases, these RMAs were deliberate paths chosen to transform the nature of an organization to something entirely different and more effective. The information age is challenging the Canadian Forces (CF) to just such an RMA. The CF's solution to this RMA is a multi-headed beast that can only be slain by an organization with a zeitgeist of innovation to change.

The solution that is calling the CF necessitates a change from a traditional, hierarchical C2 structure to a more networked, flatter, agile organization. Changing from one organization to another will be difficult and affect CF culture, doctrine, equipment, training, and how Canadian society understands warfare overall. The only certainty in the future is change; therefore, the best way to prepare for it is to keep an open mind and adopt solutions to C2 that will give the CF the best chance of handling the challenges that lie ahead.

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## 1. Introduction

*[O]nly humans command. All other concepts, technologies, doctrines, standard operating procedures, training, systems development, and so on, must support this pivotal axiom. We believe that C2 must be defined and discussed from a uniquely human perspective—one that is consistent with the prevailing operational experience, yet provides novel and productive avenues for improving overall effectiveness and efficiency.<sup>1</sup>*

Ross Pigeau and Carol McCann, two Canadian defence researchers, assert that militaries exist primarily to resolve human conflict. C2 is fundamental to these military operations which, despite any advances in technology, continue to be human endeavours. The “man in the loop” in charge of these military “levers of power” on behalf of government, must exercise C2 as a key tool to mission success. Historically, C2 has been one of those elements that have fallen under scrutiny as being decisive in both victories and defeats, regardless of the nation or tradition of warfare that they practice. The CF is no exception to this rule.

Major-General M. Jeffery expresses his concern over the future of C2 in the CF, centring on the growing complexity of operations and the demands that this places on the commander and the supporting C2 structure. More specifically, he argues that we are facing an organizational crisis and a call to pragmatically review the assumptions, practices, and organization of C2 within the CF.<sup>2</sup> This paper will take up that challenge and analyse the steadily growing body of knowledge regarding the future of C2 at large, followed by a more focused look at the CF today. The central thesis herein is that future C2 structures in the CF will need to move away from a hierarchical structure to a flatter, more agile one.

Command, control, and command and control are terms that can be defined in many different ways. Indeed, the words that are used and the way they are defined automatically “limits the available solution space and [may point] us in the wrong direction when discussing the issue.”<sup>3</sup> For the sake of clarity, and in keeping with the research that is being done within the context of the CF, the definitions of command and control used throughout this paper shall be:

- a. **Command:** “the creative expression of human will necessary to accomplish the mission.”
- b. **Control:** “those structures and processes devised by command to enable it and to manage risk.”<sup>4</sup>

These definitions are very different from many of the more traditional ones that focus command on the authority granted to an individual and control as a method by which authority is exercised, with the technological focus on the tools available to achieve it.

The Pigeau-McCann definition works well for future C2 considerations because it does not pander to the panacea of network-centric warfare (NCW) theorists that often gloss over the human-factors side of C2. David Alberts goes further to distinguish between *command and control*—synonymous with the way traditional military organizations achieve C2—and a more open-ended C2 definition which focuses on effects to be achieved, very similar to the Pigeau-McCann model.

1. Carol McCann and Ross Pigeau, *The Human in Command: Exploring the Modern Military Experience* (New York: Kuwer Academic / Plenum Publishers, 2000), 181.

2. Major-General M. K. Jeffery, “Foreword,” in *The Human in Command* (see note 1).

3. David S. Alberts and Richard E. Hayes, “Understanding Command and Control,” Department of Defense (DoD) Command and Control Research Program (2006): viii, [http://www.dodccrp.org/files/Alberts\\_UC2.pdf](http://www.dodccrp.org/files/Alberts_UC2.pdf) (accessed November 21, 2012).

4. Ross Pigeau and Carol McCann, “Re-conceptualizing Command and Control,” *Canadian Military Journal* (Spring 2002): 56.

*Command and control*, Alberts asserts, has become “a significant impediment to progress.”<sup>5</sup> Therefore, the reader is encouraged to break from the traditional *command and control*, or C2 definitions and constructs, and consider a more generic, open-ended command and control (not italicized) that will allow paradigmatic thought patterns to be broken.

The focus of this paper is on C2 at the operational level. The operational level is defined as “the level at which campaigns and major operations are planned, conducted and sustained to accomplish strategic objectives within theatres or areas of operations.”<sup>6</sup> There is neither the space nor scope to consider more complex C2 problems such as coalition operations.<sup>7</sup> The problems of coalition C2 are at the strategic level, many of which are outside the control of the operational-level commander from any participating nation. Coalitions—made up of heterogeneous military, civilian, international, and private entities—often do not even meet the basic premise of unity of command, nor do they fit neatly into the strategic, operational or tactical level.<sup>8</sup> For the purpose of this paper, coalitions will be considered a political hybrid with unique circumstances unto themselves and will be excluded from this discussion. The method of analysis herein is chronological. Alvin and Heidi Toffler argue that the history of the world can be divided into three waves. The agricultural era is the first wave and is represented by the hoe. The industrial era is the second wave and is represented by the assembly line. The third wave is the post-industrial era or information age and is represented by the computer. One can analyse the RMAs that have occurred in each of these waves, as a means of informing the discussion. The first wave was long ago and was instrumental in effecting change through to the second wave. For the purpose of this paper, the first wave of the agricultural era will not be considered.

Section 2 will look at past conflicts as a prologue to contemporary C2 theory. The second wave (industrial era) will be the focus of the historical analysis for two reasons. Firstly, it is necessary to discuss the second wave in general, and military conflict specifically, to understand the legacy of hierarchy that is so central to this wave and the discussion in subsequent sections. Secondly, it will be useful to analyse past conflicts where military culture and, by extension, doctrine of C2 or the application of it on the battlefield have contributed to both success and failure. Section 2 will analyse events starting with the Franco-Prussian wars in 1806 and end with the development of blitzkrieg in World War II (WW II). Covering a period of two centuries, it is not within the scope of this paper to analyse all of the events that have had a profound impact on contemporary theory. A broader analysis of this issue would have also included those periods prior to 1806, [Helmuth von Moltke] “Moltke the Elder” (circa 1870), and the development of Russian operational art as a minimum.

Section 3 discusses contemporary theory. Toffler asserts that we are moving from the second to the third wave today; that various elements of society have moved into the third wave (post-industrial), while other elements are still in the second wave. This transition period will be discussed as an RMA. More specifically, Section 3 will look at NCW, one of the more popular emerging concepts that have an impact on future C2 of the CF. Many of the theorists discussed in this section stem from different backgrounds, be it organizational theory, cognitive behaviour, sociology, or defence studies. Interestingly, these theorists are all contributing to the growing body of knowledge surrounding C2 from their own respective disciplines. The key point to be taken from this is that C2 is a multidisciplinary, multifaceted, complex, and inherently human problem. By examining their

5. David S. Alberts, “The Future of C2,” *The International C2 Journal* 1, no. 1, [http://www.dodccrp.org/files/IC2J\\_v1n1\\_01\\_Alberts.pdf](http://www.dodccrp.org/files/IC2J_v1n1_01_Alberts.pdf) (accessed November 21, 2012).

6. Canada, Department of National Defence (DND), B-GJ-005/FP-000, *Canadian Forces Operations* (August 15, 2005), 1-5.

7. Paul T. Mitchell's book *Network Centric Warfare and Coalition Operations: The New Military Operating System* (New York: Routledge, 2009) addresses this specific issue.

8. Alberts, “The Future of C2,” 5.

research and findings, a wealth of principles and warnings for the future will emerge that will assist in building recommendations for the future C2 organizations of the CF.

Some of these principles will point towards a growing call to drop hierarchy as a solution to a problem that is disappearing. Others will reinforce, through empirical data, that new forms of organization, including flatter architectures or “edge” organizations, can move information and provide better decision making than hierarchies. The common theme throughout is that the ongoing RMA provides new opportunities to improve, innovate, and adapt in ways that we can yet imagine. Examining the possibilities will, as a minimum, challenge any traditional military thinkers that a hierarchical approach to C2 always will be the best solution for the future of the CF.

Section 4 will look specifically at C2 in the CF today and where it needs to be in the future. The method used will apply a three-dimensional C2 model from Section 3 to ascertain the optimum C2 structure for the future of CF operations. The analysis will reveal a complex and uncertain future security environment, which will point towards C2 structures that are flatter and more agile. This will represent the culminating point of the section, which will conclude by looking at CF transformation and implications on C2, where its policies are leading, and then look at the cultural and leadership issues that will help or hinder the CF in achieving the necessary transformation.

The method chosen for this paper is meant to be simple. First, look at the past which informed the development of contemporary theory and identify relevant lessons learned. Second, analyse contemporary theory and define a model for matching the optimum C2 solution to a given problem. Third, analyse the future and apply the model to discover the optimum solution. Finally, discuss where the CF is today, and recommend what might help on the road to achieving the optimum solution.

## 2. The past as prologue

Williamson Murray asks how analysts of revolutions in military affairs make sense of the past. He answers this question by portraying the past as non-linear, meaning that it cannot provide direct cause and effect, but only more questions or possibilities. In paraphrasing Carl von Clausewitz, Murray points out that history can “sharpen our judgment about the nature of war and about the sort of organizational behaviour that can encourage effective innovation.”<sup>9</sup> The focus of this section will be to identify those “behaviours” from past conflicts that have contributed to success or failure and are, therefore, contributing to shaping contemporary C2 theory.

The behaviour, largely, will be that of the commanders and the framework within which they work, reinforcing Pigeau-McCann’s assertion that command is a human endeavour of “creative expression.” As this section will discuss, this expression has its greatest impact in the decisions that commanders make (or fail to make) given the circumstances and information available at the time. It is important to note that by analysing past conflicts, we are also discovering those behaviours or agents of change that best prepare commanders for their own uncertain futures, much as we must do ourselves in preparing for tomorrow. If we accept that the only certainty is change, then an analysis of those lessons from the past can only assist us in preparing for the future. However, command is affected by too many factors to be able to use military history as evidence of any immutable principles.<sup>10</sup> Regardless, there will be common themes emerging that will inform the discussion in subsequent sections.

9. Williamson Murray, “May 1940: Contingency and Fragility of the German RMA,” in *The Dynamics of Military Revolution* (New York: Cambridge University Press, 2001), 157.

10. Martin Van Creveld, *Command in War* (Cambridge: Harvard University Press, 1985), 261.



The practice of C2 throughout history has varied for different reasons, whether through necessity, culture, or brilliant innovation. Canadian officers as part of the Canadian Expeditionary Force of World War I (WW I) applied old principles and developed new ones that we can see in the C2 of the CF in Afghanistan today. However, choosing a method of C2 because that is the way it has always been done (implying cultural or historic ties) is not sound logic. There were often good reasons for doing things a certain way in the past. If those reasons no longer exist, then the associated practices fall into question. This is often why service cultures and traditions can become the main obstacles to establishing credible cause and effect relationships when looking at various approaches to C2. This is likely because effective innovation does not stem from traditional practices. Rather than using history to justify existing traditions, it should be used as a retrospective concept development and experimentation laboratory that can identify principles and provide insight into the applicability of certain theories.

In discussing Toffler's second wave—the industrial era—one cannot escape the prevalence of hierarchy and bureaucracy as an enduring theme. Hierarchy had an important role in the move from agricultural to industrial societies. In the 1800s, a society that relied on less-educated farmers and immigrants moving into cities and working in factories required “clear lines of authority and responsibility, and copious rules, regulations, policies, and procedures [that were] well suited to regularizing the behaviour of these workers.”<sup>11</sup> In other words, society was changing its doctrine of organization and interaction in response to the emerging technological advances of the industrial age. Similarly, the industrial era changed the way war was waged.<sup>12</sup> It was the French Revolution and the subsequent Napoleonic era that would see the whole people (rather than conscripts) “now enlisted in the war effort via the *levée en masse*,”<sup>13</sup> or total war.

Total war meant that society as a whole was engaged in the war effort; a change from the traditional smaller professional armies which served the monarchies. This, in turn, produced larger armies than ever before. The challenge became how to exert control over forces that were increasing in size. The French solution, Robert M. Citino asserts, was the development of command echelons “above the level of the regiment, divisions for the revolutionary armies and corps for the Napoleonic.”<sup>14</sup> An examination of this important era (Napoleonic) in military C2 will reveal the “behaviours” that contributed to success or failure on operations. These new behaviours began to take shape in Western Europe within a new level of war that served to translate national strategic aims into tactical objectives. As history would later prove, it would be the Prussian Field Marshall Helmuth von Moltke who would formalize this operational art into doctrine.<sup>15</sup>

### Franco-Prussian wars of 1806 and 1813

The first 19<sup>th</sup> century Franco-Prussian wars provide excellent historical evidence to demonstrate changes in organization, doctrine, and culture that can affect C2. It is also important to note that, except for the Chappe telegraph, this period of change did not include any technological advances.<sup>16</sup> The first area examined will be the Napoleonic staff as well as the divisions and corps he fielded against Prussia. The second half of this examination will look at Prussia in the interwar period (1806–1813)

11. David K. Banner and T. Elaine Gagné, *Designing Effective Organizations: Traditional & Transformational Views*, 10, <http://books.google.ca/books?id=RVjyaVvEGHoC&printsec=frontcover> (accessed November 21, 2012).

12. Martin Van Creveld, *The Culture of War* (New York: Ballantine Books, 2008), 147.

13. Robert M. Citino, *The German Way of War: From the Thirty Years' War to the Third Reich* (University Press of Kansas, 2005), 105.

14. *Ibid.*, 107.

15. Michael D. Krause and R. Cody Phillips, *Historical Perspectives of the Operational Art*, <http://www.history.army.mil/books/OpArt/> (accessed November 21, 2012).

16. Van Creveld, *Command in War*, 62.

and the changes brought about that manifested themselves in allied victory over Napoleon in 1813. The questions to be answered are: what role did doctrine, culture, and organization play during these battles and were they a decisive factor in either victory or defeat?

In 1806, Prussia's problems lay largely with many of their older commanders who were indifferent to, or unaware of, French military developments of the previous two decades, despite some calls for reform from younger officers.<sup>17</sup> This culture of resistance to change meant that the Prussian army did not share in the innovations that Napoleon's new corps and their requisite staff brought to the battlefield. In contrast to the Prussian Army, the French Revolution had opened up a new military culture where troops fought as free men and their officer corps brought the "career open to talent" in place of the old aristocracy just a decade earlier.<sup>18</sup> One of these young lieutenants was Napoleon himself. What Prussia would discover the hard way was that the French could deploy and control eight independent all-arms corps, each with its own staff in a common structure<sup>19</sup> (hence the term Napoleonic staff). In theory, these changes offered operational advantages. Divisions could operate across a larger area due to their independence and enhanced security. This distribution over a larger frontage also meant that "an opposing unitary army could be easily enveloped"<sup>20</sup> among other things.<sup>21</sup> Thus while the Prussians were still moving at best 10–12 miles (16–19 kilometres) per day, the *Grande Armée* could move larger forces 20 miles (32 kilometres).<sup>22</sup>

It would be easy to attribute French victory in 1806 simply to the creation of divisions and corps; however, there are many other factors on both sides that contributed to the Prussian defeat. Firstly, the character of the commanders themselves had a definite impact. It has even been suggested that this new operational level of war under anyone other than Napoleon would have failed and the revolution was a product of "one of those rare explosions of human energy which, like supernovae, sometimes light up the course of history."<sup>23</sup> Looking back to the definition of C2, the personal attributes of the commander here appear to be as decisive as the system used to establish control. With *le feu sacré*, Napoleon not only led the military revolution, he bred a form of nationalism that was as important to raising, motivating, and committing forces as any organizational or technological advances.<sup>24</sup>

The framework within which Napoleon and Frederick William waged war is as important as their personalities. Napoleon served all of the functions of ruler, down through the strategic and operational military levels. Therefore, when Napoleon made a decision at the political level with operational military implications, there was little need to establish consensus across multiple levels of command. This also holds true for the situational awareness Napoleon enjoyed through the many hats he wore. A report of enemy troop movements or dispositions of own forces to Napoleon would satisfy the operational, strategic, and political levels at the same time. He accomplished this through a strong, centralized control that was established for the purpose of war.<sup>25</sup> In contrast, Frederick William ruled a kingdom of political hangers-on and advisers that resulted in "a lack of policy

17. Citino, *The German Way*, 110.

18. MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolution: 1300–2050* (New York: Cambridge University Press, 2001), 65–66. Knox reports that in the fervour of the revolution, France executed 17 generals in 1793 and 67 in 1794. By the summer of 1794, almost half of the officer corps had not served under the old regime.

19. Van Creveld, *Command in War*, 60.

20. Claus Telp, *The Evolution of Operational Art, 1740–1813: From Frederick the Great to Napoleon* (New York: Frank Cass, 2005), 42.

21. Claus Telp goes further to say that Napoleon's corps and divisions also had the advantage of higher speed of movement, greater combinations of "less predictable" manoeuvre, more secure lines of communication, and greater reconnaissance.

22. Citino, *The German Way*, 110.

23. Van Creveld, *Command in War*, 62.

24. Knox and Murray, *The Dynamics of Military Revolution*, 68.

25. Telp, 63. Further information regarding the workings of Napoleon's "whole of government" approach to war can be found at <http://www.history.army.mil/books/OpArt/france1.htm> (accessed November 21, 2012).

coordination particularly between diplomacy and military planning, and a lacklustre mobilization.”<sup>26</sup> Thus, even though Prussia had declared war on France and had the initiative, it was Napoleon that was able to act first.<sup>27</sup>

The short period after Prussian defeat in 1806 that led to the battles of 1813 can be described as transformational for the Prussian Army. Reformers such as Gerhard von Scharnhorst and Clausewitz, among others, developed two main solutions to the problem they faced in Napoleon. These two solutions were to develop “thinking combatants that only universal military service could provide, and a thinking officer corps and staff system honed by *Bildung*—systematic professional study and the cultivation of decision-making skill.”<sup>28</sup> The long-term result of this approach was the creation of a staff that could serve as a “central nervous system for strategic planning and operational control that would harness the collective wisdom of the best minds the army could recruit.”<sup>29</sup> Here we see evidence of a culture of learning established in the Prussian Army that could better serve C2 and, alongside any technological or organizational changes, at least attempt to match the level of professionalism in the military culture that had been demonstrated by Napoleon.

Napoleon was defeated in 1813 by a coalition of allies including Prussia. The results of this battle, again, cannot be attributed solely to the presence or absence of some organization or C2 structure. It had as much to do with Napoleon’s overconfidence and a French military system with a tendency to outgrow its own C2 capabilities.<sup>30</sup> The defeat in 1813 was the first example of “a problem that would increasingly bedevil military operations in the nineteenth century.”<sup>31</sup> The previously manageable armies of 75,000 had now grown to a half million. It seems Napoleon had allowed overconfidence (or ill health) to affect the span of command<sup>32</sup> he was willing to accept, placing himself in a situation where “no single commander, no matter how gifted, could possibly process all the possibilities and potential combinations of that many men and that many corps.”<sup>33</sup>

To summarize this section, we need to answer what role doctrine, culture, and organization played during the 1803–1813 era of Franco-Prussian wars, especially as it pertained to C2. The culture that emerged from industrialism and the revolution produced larger armies which, under the innovation of the French and later the Prussians, gave birth to the operational level of war and operational art. The innovations (corps, divisions, and staff) of this era in themselves, however, were insufficient to guarantee victory. Evidence from both the Prussian and French sides has demonstrated that command competence, organization, societal motivations, and military culture are all interrelated and impact the effectiveness of a C2 system. Therefore, no one factor on its own is decisive. What is decisive, however, is the understanding of culture and the matching of commander to a control system against a given foe that provides a distinct advantage. It was seen to work for Napoleon in 1806 (intentional or otherwise) and worked against him after 1813.

Napoleon should be remembered as a leader who was able to change organizational and procedural doctrine (if doctrine existed then) in order to overcome the limits of existing technology.<sup>34</sup>

26. Telp, 63.

27. Citino, *The German Way*, 113.

28. Knox and Murray, *The Dynamics of Military Revolution*, 70.

29. Ibid., 72.

30. Dennis E. Showalter, “The Prusso-German RMA, 1840–1871,” in *Dynamics of Military Revolution*, 94.

31. Citino, *The German Way*, 135.

32. Jake Thackray defines span of command as “the number of subordinate organisations given to one commander to command directly.” From “The Commander-Centric Approach to Modernising Command Structures,” in *The Big Issue: Command and Control in the Information Age*, ed. David Potts (UK, Strategic and Combat Studies Institute, 2002), 118.

33. Citino, *The German Way*, 135.

34. Van Creveld, *Command in War*, 191.

Despite the growing mass of his forces, he did not possess any new invention capable of passing information or achieving situational awareness at the operational level that his recent predecessors did not have. He had to rely on the same method of signals, messages passed by rider and horse, or word of mouth. Napoleon's example lends evidence to the theory that organizational and doctrinal changes are an effective means of responding to technological improvements, or in the case of Napoleon, technological limits.

The Prussians and then German Army would continue to develop their culture of war over the next century and a half, which would take up more space to further analyse than is available here. However, Martin Van Creveld succinctly describes this period for the German Army as follows:

Partly sustained by their culture, the army, later the armed forces as a whole, were able to develop a singular combination of cohesion, strict discipline, high initiative, and the command system known as mission-type orders (*Auftragstaktik*). These qualities in turn helped the forces win a series of signal victories in the Wars of Unification of 1864–71. Later they put on an outstanding, if ultimately unsuccessful, military performance in both world wars.<sup>35</sup>

The German way of war, initially developed in the 19<sup>th</sup> century, would continue to shape operational art and C2 theory throughout the 20<sup>th</sup> century. It is this era that is of particular importance to Canadian military history, as it represents the start of its participation in operational-level warfare.<sup>36</sup>

### The hundred days of World War I

Arguably, the birth of Canadian Forces C2 occurred during WWI, which “combined the legacies of the French and Industrial Revolutions and set the pattern for twentieth-century war.”<sup>37</sup> This “pattern” involves a hierarchical structure and culture of command that continues to influence C2 on the battlefield. Canada first fought as a nation during WWI.<sup>38</sup> Sadly, analysis of any Canadian way of war at the operational level cannot occur within the context of both world wars because Canadian officers “functioned only at the tactical level, under British commanders who may or may not have exercised operational art.”<sup>39</sup> However, there is value in analysing the military cultures and doctrines of both the British and the German militaries during these wars, in order to identify common themes that contributed to C2 theory.

Like the century before it, the 20<sup>th</sup> century also saw an increase in the size of armies as a consequence of increase in population and industrial capacity.<sup>40</sup> The new technology, in the form of telephone (and later wireless radio), could barely keep pace with size of the forces. This meant that manoeuvring “these unwieldy infantry-dominated masses presented serious problems to staff officers weaned on lessons from the operations of Napoleon and Moltke.”<sup>41</sup> In other words, the military doctrine at the start of the war had not fully responded to the benefits of emerging technology; therefore, the necessary changes in C2 doctrine had not yet occurred. Examples of doctrine lag also appeared in 1806, when the Prussian king ordered the formation of divisions to make their army

35. Van Creveld, *The Culture of War*, 363.

36. The author acknowledges earlier conflicts within Canada (North West Rebellion, Fenian Raids) and the Boer War as part of Canada's military history; however, they will not be considered conflicts at the operational level like World War I.

37. Knox and Murray, *The Dynamics of Military Revolution*, 6.

38. Pierre Berton, *Vimy* (Toronto: McClelland and Stewart, 1986), 294.

39. William McAndrew, “Operational Art and the Canadian Army's Way of War,” in *The Operational Art: Developments in the Theories of War*, ed. B. J. C. McKercher and Michael A. Hennessy (London: Praeger, 1996): 87.

40. Citino, *The German Way*, 192. The opening days of WWI involved five French field armies against eight from Germany.

41. *Ibid.*, 192.

like Napoleon's, but this directive was received while his army was already on the march.<sup>42</sup> The period from 1870 to 1914 would see a similar phenomenon of competitive emulation<sup>43</sup> where:

After 1870 every European army adopted the Prussian formula. They introduced conscription, expanded their railways and telegraphs, procured magazine rifles, machine guns and quick-firing artillery ... Forgetting that the Napoleonic "revolution in military affairs" had lost its punch once every other army in Europe adopted it, these generals went to war in 1914 labouring under the "short war illusion"; they were somehow convinced that their planning, armaments and tactics would defeat the enemy, even though the enemy possessed virtually the same technologies and doctrines that they did.<sup>44</sup>

Thus, Geoffrey Wawro succinctly points out behaviour of doctrine stagnation after a period of competitive emulation. The net result was an assumption of doctrinal adequacy, without considering whether existing organization and doctrine still provided relative strength against emerging threats within the context of developing technology. As we will see, it was a contributing factor to the trench warfare deadlock that ensued at the start of WWI.

There is sufficient evidence on the British Expeditionary Force (BEF) side to suggest that culture did not allow for a flexible or innovative approach to doctrine in the early years of the war. Haig once bragged that he had fired more than 100 brigadiers.<sup>45</sup> As Peter Simkins points out, "the strong possibility that one might be relieved of command if one carried protests too far bred caution and frequently outweighed common sense."<sup>46</sup> As Major-General Fuller states, there was also the misuse of technology.

As the general became more and more bound to his office, and, consequently, divorced from his men, he relied for contact not upon the personal factor, but upon the mechanical telegraph and telephone. They could establish contact, but they could accomplish this only by dragging subordinate commanders out of the firing line, or more often persuading them not to go into it, so that they might be at the beck and call of their superiors. In the World War nothing was more dreadful to witness than a chain of men starting with a battalion commander and ending with an army commander sitting in telephone boxes, improvised or actual, talking, talking, talking, in place of leading, leading, leading.<sup>47</sup>

The results of these behaviours within the BEF created a culture within which Haig and his general staff restricted operations in a way that maintained control by wire. Van Creveld posits that it was this approach that led to failure during the battle of the Somme, despite the fact that this battle was "one of the most thoroughly organized in history."<sup>48</sup> He further asserts that what the British High Command feared most was the sort of confusion that would make command from above difficult. Thus, troop advances were coordinated with the limited reach of the artillery, at which point they had to halt and await reorganization, regardless of the disposition of the enemy facing them.

42. Citino, *The German Way*, 111.

43. Colin S. Gray, *Strategy for Chaos: Revolutions in Military Affairs and the Evidence of History* (London: Frank Cass, 2002), 174.

44. Geoffrey Wawro, *Warfare and Society in Europe, 1792–1914* (London: Routledge, 2000), 225.

45. Timothy Travers, *The Killing Ground: The British Army, the Western Front & Emergence of Modern Warfare 1900–1918* (London: Allen & Unwin, 1987), 13.

46. Peter Simkins, "Building Blocks: Aspects of Command and Control at Brigade Level in the BEF's Offensive Operations, 1916–1918," in *Command and Control on the Western Front: The British Army's Experience 1914–18*, ed. Gary Sheffield and Dan Todman (Staplehurst, UK: Spellmount, 2007), 159.

47. Major-General J. F. C. Fuller, "Generalship: Its Disease and Their Cure: A Study of the Personal Factor in Command," <http://www-cgsc.army.mil/carl/resources/csi/Fuller/Fuller.asp#Generalship%20in%20the%20World%20War> (accessed April 16, 2009, site discontinued).

48. Van Creveld, *Command in War*, 158.



“Confusion, in a word, was to be banished from the battlefield; that this could only be done at the cost of constricting tactics to the point that the battle would be lost before it started nobody seems to have considered.”<sup>49</sup> As well, early attempts at mission command were often ineffective “because of a combination of insufficiently trained subordinate commanders, the British army’s lack of a culture of mission command, and the inclination of higher commanders to interfere in operations.”<sup>50</sup> Thus, a military culture of highly rigid control (or lack of trust) did not allow changes to organization and doctrine that would capitalize on technological advances (e.g., artillery, tanks, and wireless radio).

While the Hundred Days Offensive is the main period of analysis, Peter Simkins does point out an earlier example that demonstrates the beginnings of a more flexible command climate within the BEF. It occurred during the defence of Amiens on 24–25 April 1918, where Australia’s 13<sup>th</sup> and 15<sup>th</sup> Brigades took the initiative to plan, time, and conduct a defensive counter-attack; a bottom-up approach that met the approval of division, corps, and higher (including Haig and Rawlinson). Ironically, the German offensives during the spring of 1918 drew attention to the fact that the BEF did have subordinate commanders capable of making sound decisions on the spot within a more flexible command structure, albeit unintended.<sup>51</sup> Events like these were points along a continuum of growing trust between superiors and subordinates, evidence of the importance of professional competence as an important element in decentralizing C2.

Changes in the command philosophy of the BEF continued to decentralize during the more dynamic period of the hundred days in 1918. This period represented a departure from the set-piece battle approach to trench warfare, including the beginnings of changes to C2 that had hitherto seen little development since the United States (US) civil war.<sup>52</sup> Prior to the hundred days, the lowest level of command where battles were planned and executed was at the division level.<sup>53</sup> Brigadiers (brigade commanders) and their headquarters’ staff carried out coordination, support, and reporting functions and had little effect during the ensuing battle other than to choose the time at which to commit their reserves. However, in the later stages of WWI, the grip on decision making at the division level began devolving to lower levels, resulting in greater success.

The Hundred Days Offensive of August to November 1918 represented a shift towards more semi-open warfare. During this period, units gained more ground in one day than they had previously in months. This stretched existing lines of communication beyond the possible, therefore it was those corps and divisions that devolved decision making and exercised interarm coordination that seemed to have the best chances of exploiting tactical gains where they occurred. For example, in the attack at Amiens (8 August 1918), the corps set up wireless information cells and provided coordination of air and artillery support. Robert Citino describes the culmination of this combined attack succinctly:

[A]fter four long years of brutal trench warfare, a combined attack by Allied troops ... did what had previously been thought impossible: it broke through the German defensive positions on the western front. Allied assault troops, supported by the slow-moving tanks and flimsy aircraft of the period, tore a great hole through the German lines in front of Amiens and drove through into the open country, those elusive “green fields beyond” that had tantalized military planners on both sides of the conflict for so long.<sup>54</sup>

49. Ibid, 161.

50. Gary Sheffield, “An Army Commander on the Somme: Hubert Gough” in *Command and Control on the Western Front* (see note 46), 83.

51. Simkins, 162.

52. To be fair, many of the same lessons had been learned and applied prior to the Allies on the German side during the Michael Offensive in March 1918, but that will not be discussed here. See William R. Griffiths and Thomas E. Griess’s book, *The Great War* (Staplehurst, UK; Spellmount, 2007) 132–144.

53. Sheffield and Todman, *Command and Control on the Western Front*, 145.

54. Robert M. Citino, *The Path to Blitzkrieg: Doctrine and Training in the German Army, 1920–1939* (Boulder, CO: Lynne Rienner Publishers, 1999), 2.



In contrast to the methods described earlier (move, stop, and consolidate), Amiens demonstrated interarm cooperation that saw “[t]anks and infantry assaulted under the cover of a fast-moving predicted barrage and a hurricane counterbattery bombardment ... loitering spotter planes protected by fighters directed friendly artillery fire ... .”<sup>55</sup> By the end of the war, many of the BEF higher commanders were becoming more comfortable with leaving “basic tactical decisions to the man ‘on the spot.’”<sup>56</sup> The devolution of decision making, while solving one problem, created another. The ability for the lower-level commander to exercise this increased decision-making responsibility was only as good as that commander’s professional and tactical acumen. Therefore, a second principle came to light through our experiences of WWI: devolved decision making increased professional development requirements at lower levels.

The end of WWI can be described as a watershed that introduced many new innovations to modern warfare. While many of them were tactical and/or technological in nature—artillery, tanks, rail networks, aircraft, wireless radios—it was how (or whether at all) the military culture responded and harnessed these technologies that made the difference. The increased decentralization paid off when two Australian brigades were allowed to execute a bottom-up solution for a counter-attack. The use of headquarters staff to coordinate the supporting functions of artillery and aircraft also paid dividends in realising more fully the potential that these improved technologies brought to the battle. Overall, it may have taken Haig and his staff several years to learn it, but the BEF during the “hundred days” did eventually move another step closer to what we call “mission command”: that approach which requires higher commanders to set objectives, but give subordinates the freedom to decide how to achieve them. Sadly, while the successes of the “hundred days” are fairly well documented now, they were never well institutionalized during the post-war demobilization, at least among the Allies. However, the Germans, possibly because of an already well-established doctrine of *auftragstaktik*, paid more attention. It was the German Army that would take the lessons seriously and further nurture and develop advances in doctrine that would subsequently bring about the birth of blitzkrieg in WWII.

## Blitzkrieg in World War II

The interwar years for Germany can be characterized best as retrospective and transformational. Generals Werner von Fritsch and Ludwig Beck re-wrote *Truppenführung*, which led the Army’s efforts to evolve in a “coherent, careful, evolutionary fashion.”<sup>57</sup> For the Germans, the lessons of 1918 had proven that *auftragstaktik* could open up what the Germans accepted was an inherently chaotic battlefield.<sup>58</sup> This resulted in a doctrinal approach which “rested on a genuine understanding of the nature of warfare as a domain of constant transformation that was not subject to accurate prediction.”<sup>59</sup> Germany’s reaction to the Treaty of Versailles under Adolf Hitler stirred a nationalistic fervour and renewal of militarism. One must remember that Germany was limited by the Treaty of Versailles, which restricted any open developments until at least 1935, when Hitler defiantly opened the door to rearmament.<sup>60</sup> A believer in short wars, Hitler set out to rebuild a German army that was aggressive (like its Prussian tradition), fully mobile, and tested in battle (the Spanish Civil War).<sup>61</sup> As we will see, a culture of innovation emerged that transformed the German military into a force that would quickly defeat France and later push the allies back to Dunkirk.<sup>62</sup>

55. John English, “The Operational Art: Developments in the Theories of War,” in *The Operational Art* (see note 39), 12.

56. Simkins, 162.

57. Murray, “May 1940,” 159.

58. McAndrew, 91.

59. Murray, “May 1940,” 159.

60. Citino, *The Path to Blitzkrieg*, 229.

61. Alan Shepperd, *France 1940: Blitzkrieg in the West* (London: Osprey, 1990), 6–7.

62. *Ibid.*, 2.

Advances in mechanization in the 1930s forced both Germany and the Allies to consider its use in any future war. Germany's response was the panzer division which, unlike any of the Allies, was a unique solution of large units of tanks in a combined arms formation.<sup>63</sup> Citino points out that the panzer division did not just arise from theoretical work. He describes the long series of manoeuvres with simulated tanks from 1928, followed by the use of real ones after 1935. The last piece of the puzzle that needed to be solved in order to bring about the panzer-division concept was the C2 problem. It was hard enough with the mass of tanks moving about the battlefield at high velocity. Add to the mix the supporting arms and air support, and the problem must have seemed insurmountable. It was in the panzer division that wireless radio came into its own. The German solution to maintain C2 was to have "a radio in each command station and each vehicle unit, from the smallest motorcycle to the heaviest tank, with specialized command vehicles designed to carry radio equipment, both senders and receivers."<sup>64</sup>

The word "blitzkrieg" (lightning war) would soon be coined after the 1939 invasion of Poland, when the rest of the world witnessed the devastating effects of this new German formation. It was the years of considered theory, modelling, and experimentation during the interwar period that led to the concept of the panzer division and ultimately blitzkrieg, rather than the many technological advances that precipitated its development.

William McAndrew contrasts the Allied response to emerging technologies with the Germans during the interwar period. Unlike the German Army, the Allies had not accepted the unpredictable nature of battle. Instead, they tried to impose more order on it through, for example, the refinement and more effective control of artillery. This resulted in a static doctrine where firepower and technology were expected to win over finesse. It also produced a level of rigid, centralized control characterized by the following:

Higher-level staffs carefully crafted detailed plans for others to implement. Divisions, brigades, and battalions were routinely assigned limited tactical objectives, invariably a geographical feature which was usually an enemy strong point. Start lines, report lines, boundaries, and timed artillery barrages gridded the battlefield, confining tactical mobility, let alone operational maneuver [sic], and leaving unit commanders little opportunity to respond flexibly.<sup>65</sup>

Viewed in isolation, it would appear that the German transformation represented an RMA over a short period of time. However, Murray succinctly points out that:

The military culture that supported the Prusso-German approach to war had taken over a century to evolve; decrees from above cannot magically decentralize warfare. German commanders had had to learn to devolve creative freedom and authority upon their juniors—an unprecedented and largely counterintuitive step.<sup>66</sup>

After viewing the state of Allied doctrine relative to the Germans, it is not hard to imagine the relative strength with which Germany entered the war. Their culture of *auftragstaktik* and the development of blitzkrieg demonstrate the revolutionary capabilities that a culture of innovation can

63. Citino, *The German Way*, 254. Citino also describes the Allied solutions of the time. The British invented the "armoured division," hundreds of tanks with little supporting arms. The French invented two formations in the "light mechanized division" and "armoured division." Italy invented the "binary division" of two regiments, which failed in combat.

64. Citino, *The German Way*, 256.

65. McAndrew, 91.

66. Murray, "May 1940," 160.

develop using emerging technologies. The lesson here is that changes to doctrine occurred because the Germans had a long-standing culture of innovation—an ethos that their doctrine should be iterative in nature.

This section has examined the historical “behaviours” in war that have contributed to shaping contemporary C2 theory. The analysis of this limited set of conflicts over the past two centuries has identified many common themes that have been described as enduring or even decisive in the establishment of C2 on the battlefield. Above all, it must be remembered that the impetus for change within the period examined was industrialism. This second wave introduced new ways of thinking about society (French revolution), which in turn brought new military doctrines such as the armies of “free men.” It also brought a mass to armies in the field that had hitherto never been seen, with the requisite industrial capacity to sustain it over long periods. This period also brought about new technologies that, depending on a military’s ability to leverage culture and doctrine, could reap success or failure. Competitive emulation brought about parity at best, which motivated the Prussians after 1806 and also resulted in the trench deadlock of WWI. It was the cultures of innovation, like the Germans in the interwar period (WW I to WWII), that seemed best placed to look beyond achieving parity to the development of new and superior methods of operating (*auftragstaktik* and blitzkrieg).

Above all, a military’s ability to react to change (e.g., new technology, enemy doctrine) came back to the commander’s central role. The Franco-Prussian wars of 1806 and 1813 provided evidence of the importance of the commander as central to establishing a culture of innovation. The framework within which the commander works (political and strategic) can also further help or hinder in the same way. The value of decentralizing C2 clearly provided the advantage of more flexibility and speed of execution in most of the battles analysed; however, Napoleon’s lesson in 1813 also demonstrated that a balance is to be struck between mass and the ability to maintain situational awareness and exert control.

The Hundred Days Offensive also demonstrated Haig’s strong influence of operational control, which overshadowed any doctrinal flexibility. The misuse of field telephones to further centralize at the expense of flexibility on the battlefield was a hard lesson, as were the years of ignoring bottom-up solutions that, in the end, led the Allies to break their own trench deadlock.

The Germans provided the final lesson in their development of the panzer division, thereby introducing the world to blitzkrieg. The relative strength that blitzkrieg provided to the Germans early in the war could not have developed without a long-established culture of professional development, experimentation, and innovation that was demonstrated through the German interwar period and guided by *Truppenführung*. The jewel in the crown of transformation for the German Army was the institution of *auftragstaktik*. The most important lesson from *auftragstaktik* is that the ability for militaries to adapt to emerging trends is as much a zeitgeist<sup>67</sup> as it is an act or policy. In contemplating the future of C2 for the CF, we would do well to remember the successes and failures of past military cultures. If we accept that the only certainty is change, then the conclusions of this section are a call to foster a CF zeitgeist of innovation and open-mindedness best summarized by Murray and Knox:

The claim that military institutions fail in battle because they study the last war too closely is a platitude wholly without foundation. The military institutions that successfully innovated

67. The German word “zeitgeist” is defined as “the spirit of the time; general trend of thought or feeling characteristic of a particular period of time,” <http://dictionary.reference.com/browse/zeitgeist> (accessed November 27, 2012).

between 1919 and 1940 without exception examined recent military events in a careful, thorough, and realistic fashion. Analysis of the past was the basis of successful innovation ... Simple honesty and the free flow of ideas between superiors and subordinates—key components of all successful military cultures—were centrally important to the ability to learn from experience.<sup>68</sup>

### 3. Contemporary theory

*A satisfactory theory of war never conflicts with reality.*

Carl von Clausewitz, *On War*

Alvin Toffler contends that society at the end of the 21<sup>st</sup> century is “the final generation of an old civilization and the first generation of a new one.” He further asserts that much of the confusion today (think contemporary theory) can be directly attributed to internal conflict, both personal and political “between the dying Second Wave civilization and the emergent Third Wave civilization that is thundering in to take its place.”<sup>69</sup> The treatment of contemporary theories that impact C2 should certainly be seen in the same light Toffler portrayed the transition from second to third wave—confusing. It makes sense that there should be such a disparity in theories if one accepts Toffler’s description of our times. The purpose of this section will not be to empirically prove or disprove any theories. Regardless, there is value added in at least looking at the most prominent theories that have shaped C2 structure decisions within the CF.

This section will look at several theories that are necessary to build a common understanding for the discussion that follows in Section 4. Starting with basic C2 theory, further discussion of the Pigeau-McCann model will set the groundwork upon which subsequent theories will rest. Czerwinski’s approach to three types of C2 will also be a necessary discussion in framing the different styles or approaches to C2. The introduction of RMA theory will be looked at as a necessary precursor to NCW, which will form the nucleus of this section given its impact on CF policies regarding the development of network-enabled operations (NEOps)—a CF version of NCW. Counter-arguments and critiques of NCW will be discussed to gain a more balanced perspective, followed by edge organizations—a more detailed conceptual model born of the NCW theory. The central thesis of this section is that C2 theory is complex and dynamic; thus, there are many ways to “skin the cat” when it comes to selecting an appropriate C2 model for a given mission. With an understanding of the common language surrounding C2 theories and an appreciation for some of the complexities, we will be well placed to apply it all to the CF today and tomorrow—the culminating discussion in Section 5.

#### The Pigeau-McCann model

Before getting into any further discussion of C2 theory, it would be wise to review the basic framework of C2 as per the Pigeau-McCann model, which defines command and control as:

- a. **Command:** “the creative expression of human will necessary to accomplish the mission.”
- b. **Control:** “those structures and processes devised by command to enable it and to manage risk.”<sup>70</sup>

68. Williamson Murray and MacGregor Knox, “The Future Behind Us,” in *The Dynamics of Military Revolution*, 188.

69. Alvin Toffler, *The Third Wave: The Classic Study of Tomorrow* (Toronto: Bantam, 1980), 12.

70. Pigeau and McCann, “Re-conceptualizing Command and Control,” 56.

Pigeau and McCann assert that creativity is the most important element of command, because it is creativity that ultimately allows humans to make sense of chaos or, in the military construct, the complexities of battle or “fog of war.” The second element that complements creativity is will, which they define as diligent purposefulness. Pigeau and McCann provide an example where reliance on control only, without the creative expression of will, can remove the ability to solve problems:

The classic instance of proceduralization is the automotive assembly line with its extensive structures and processes (i.e., control) for manufacturing cars. Yet as most unions know, an effective strategy for delaying or obstructing production is work-to-rule—that is, to work only within the explicit guidelines and duties stated for the position. Work-to-rule is effective as a job action because most businesses rely on the good will of their work force to creatively solve the many minor problems for which rules and regulations have not been (and may never be) developed.<sup>71</sup>

Expounding on their model further, they assert that control should not be viewed in terms of an engineering model through which the outcome is compared to the goal and then action is taken to resolve the difference. They assert that control implies much more to include “the personnel, facilities and procedures for planning, directing and coordinating resources in the accomplishment of the mission.”<sup>72</sup> This is expanded further to include standard operating procedures, equipment (including cybernetic processes), rules of engagement, military law as well as policy and regulations. Pigeau and McCann conclude their discussion on control with a warning that will also be pertinent to subsequent discussion—control comes at a price which restricts flexibility once it is imposed. This is because any adopted process or structure “excludes from consideration an infinite set of alternative structures and processes that may suit the problem better.”<sup>73</sup> Consequently, the control process or structure put in place for one mission or situation may not work as well in another.

There are many relevant points to take away from the Pigeau-McCann model. First, the cybernetic processes that we will discuss later comprise only a part of the control solution set. Secondly, the method of control established by command is mission dependent; therefore, a one-size-fits-all approach to any C2 model should be treated with suspicion. Lastly, the analysis of the auto workers’ ability to “work to rule” intimates, in a reverse way, the ability for subordinates to contribute to the solution space of military problems outside of the procedures and structures that are in place. Therefore, command, in essence, can be exercised by all ranks and is not reserved for the senior officer at the top of the organizational chart. This last point is an important aspect of subsequent discussions on NCW edge organizations.

### The Czerwinski framework

The essence of the Czerwinski framework asserts that command is carried out in one of three ways: by direction, by plan, or by influence.<sup>74</sup> Command by direction is the oldest form of C2 and is analogous to some of the methods analysed in the Franco-Prussian wars. It involves the commander’s attachment to a decisive element of his force (or moving from one element to another) where they could both observe directly and provide decisions as the battle progressed. This method of C2 saw a renewal in the US Army’s Force XXI, which sought to digitize the battlefield in a

71. Ibid., 55.

72. Ibid., 54.

73. Ibid., 55.

74. Thomas J. Czerwinski, “Command and Control at the Crossroads,” *Parameters* (Autumn 1996): 121–32, <http://www.carlisle.army.mil/usawc/Parameters/96autumn/czerwins.htm> (accessed April 20, 2009, site discontinued).



way that provided commanders with real-time synchronization.<sup>75</sup> The second method, command by plan, is a highly centralized method of C2 that seeks to impose order on a chaotic battlefield through the disciplined implementation of a comprehensive plan. Czerwinski likens this approach to the US Air Force campaign methods, whose organization and tasks are designed to “operate with less information in total, notwithstanding the considerable complexities in achieving targeted expectations.”<sup>76</sup> Finally, command by influence is the use of *auftragstaktik*, or mission-type orders, that was discussed in Section 2. This method accepts chaos on the battlefield and seeks to manage it through more decentralized control where the commander gives their intent (the “what”)—and subordinates are free to pursue the method to achieve it (the “how”).

Czerwinski’s model is important to subsequent discussion here because, as he points out, certain models have traditionally been chosen by different services (air force, army, and navy). This, alone, will make it inherently difficult to select one C2 approach that will work in a joint environment for the CF, which begs further analysis that will be covered in the next section. Before getting any further into other contemporary C2 theories, it is important to backtrack a little and first consider the underlying developments leading up to them, including the concept of RMA.

### Revolution in military affairs

Why such an interest in C2 theory when militaries have been successfully conducting campaigns for hundreds—if not thousands—of years with their own well-established systems? The answer lies in the many discussions about the ongoing RMA. This RMA is widely held to be in response to technological advances brought about from the information age. Theories vary widely as to whether the RMA is moving linearly or exponentially or whether we are at the beginning, middle or end. Regardless, what can be drawn from these theorists is that they all agree that something has, is, or was going to change in a way that requires attention and that existing C2 organizations will be affected in some way. Whether you agree with any one vision of the future, the common thread throughout is that technological innovation requires a concurrent organizational change if there is to be any benefit from it.<sup>77</sup> This section will not indulge in the debate over the existence of RMAs. Instead, it will share in Colin Gray’s approach to RMA “as befits an intellectual construct, it is more or less useful rather than true or false.”<sup>78</sup>

An RMA is defined as “a major change in the nature of warfare brought about by the innovative application of new technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts, fundamentally alters the character and conduct of military operations.”<sup>79</sup> The early roots of RMA have been traced back to 1955 in a lecture given by historian Michael Roberts.<sup>80</sup> The issue reappeared again in the late 1970s and early 1980s through the writings of Soviet Marshal N. V. Ogarkov, who, in his seminal paper of 1982<sup>81</sup> and subsequent works, suggested that the most advanced nations (US, Japan, and those in Western Europe) were on the cusp of transforming conventional warfare through a “military-technical revolution.”<sup>82</sup>

75. “Synchronization is arranging activities in time and space to mass at the decisive point.” US Army, Field Manual 100-5, *Operations* (Washington: Headquarters Department of the Army, 1993), 2-8, <http://www.fprado.com/armorsite/US-Field-Manuals/FM-100-5-Operations.pdf> (accessed November 27, 2012).

76. Czerwinski, 121-32.

77. Stephen J. Blank, “Preparing for the Next War: Reflections on the Revolution in Military Affairs,” in *In Athena’s Camp: Preparing for Conflict in the Information Age*, ed. John Arquilla and David Ronfeldt (Santa Monica, CA: RAND Corporation, 1997), 63.

78. Gray, 17.

79. Thierry Gongora and Harald von Riekhoff, *Toward a Revolution in Military Affairs?: Defense and Security at the Dawn of the Twenty-First Century* (Westport, CT: Greenwood Press, 2000), 1.

80. Knox and Murray. *The Dynamics of Military Revolution*, I.

81. Jeffrey R. Cooper, “Another View of the Revolution in Military Affairs,” in *In Athena’s Camp* (see note 77), 99-100.

82. Thomas K. Adams, *The Army after Next* (Stanford, CA: Stanford University Press, 2008), 12.



The term “RMA” gained further prominence in the Pentagon through the Office of Net Assessment and its director Andrew W. Marshall. Through further study of Ogarkov’s work and the application of his theory to history, they discovered that revolutions were not just about technology. Instead, Marshall broadened the concept of RMA as containing three elements: technological innovation, operational concept (doctrine), and organizational adaptation.<sup>83</sup> In his address to the Senate Armed Services Committee in 1995, Marshall clarified that the term “revolution” was “not meant to insist that the change will be rapid—indeed past revolutions have unfolded over a period of decades—but only that the change will be *profound*, that the new methods of warfare will be far more powerful than the old.”<sup>84</sup> Thus, one of the deciding factors in qualifying an RMA is the paradigm-shift effect it has on the nature of war.

The application of RMA theory since its inception is too broad to discuss here. Suffice it to say that it has been applied and debated over events such as post Vietnam, the Yom Kippur war (1973), post cold war, and the first and second gulf wars, to name a few. Murray and Knox contend that these RMA debates are at the heart of the decisions of future strategy. In other words, whichever definition or RMA theoretical model a government and its military leadership subscribe to affects the decision they make, in terms of equipment purchases, doctrine, and organization. Therefore, RMAs are decided upon and deliberately pursued to a desired end state.<sup>85</sup> The implications for the CF are that a deliberate decision is made as to whether or not it chooses to participate and, therefore, pursue the equipment, doctrine, and organizational changes necessary to achieve this end state. The implications of these theories specific to the Canadian Forces will be discussed in greater detail in Section 5.

The current RMA debate had its genesis in the last decade of the 20<sup>th</sup> century. More specifically, Gray points out the Gulf War in 1991 as the precipitating event that brought about the “information-keyed RMA of the 1990s.”<sup>86</sup> In 1995, RMA enthusiasts at the US Army War College communicated their hope perfectly when they asserted that “American combat effectiveness in the Gulf War suggested that a historic revolution in military affairs (RMA) is underway, possibly solving many of the strategic dilemmas the United States faces in the post-cold War [sic] world.”<sup>87</sup> Within this RMA developed other key concepts such as “transformation” and NCW that have had an impact on the way militaries look at C2.<sup>88</sup>

### Network-centric warfare

NCW has been developing as the US military solution to the information age and is defined as “the organizing principle that guides the military’s adoption of information technologies and its adaptation to these technologies.”<sup>89</sup> NCW promises to deliver a “system of systems” that is a more agile method of conducting operations compatible with the information age, leveraging the latest in technology, commercial solutions in information technology, and sensors (which promise increased operational tempo, responsiveness, lower risk and cost, and improved combat effectiveness.)<sup>90</sup>

83. Thomas K. Adams’ personal correspondence with Andrew W. Marshall as cited in Adams’ book, *The Army after Next*, 12.

84. Andrew W. Marshall, prepared statement before the Senate Armed Services Committee, subcommittee on acquisition and technology, 5 May 1995, 2. As cited in Gray, 33 [emphasis added].

85. Murray and Knox, *The Dynamics of Military Revolution*, 6–14. Murray and Knox further differentiate between “military revolutions” and RMAs, where military revolutions are caused by cataclysmic events outside the control of the military, forcing them to change rapidly.

86. Gray, 15.

87. Steven Metz and James Kievit, “Strategy and the Revolution in Military Affairs: From Theory to Policy,” <http://www.au.af.mil/au/awc/awgate/ssi/stratрма.pdf> (accessed November 27, 2012).

88. Allan English, Richard Gimblett, and Howard Coombs, *Networked Operations and Transformation: Context and Canadian Contributions* (McGill-Queen’s University Press, 2007), 14.

89. David S. Alberts, “Information Age Transformation: Getting to a 21st Century Military,” 7, [http://www.dodccrp.org/files/Alberts\\_IAT.pdf](http://www.dodccrp.org/files/Alberts_IAT.pdf) (accessed November 27, 2012).

90. David S. Alberts, John J. Garstka, and Frederick P. Stein, “Network Centric Warfare: Developing and Leveraging Information Superiority, 2nd edition (Revised),” 89–90, [http://www.nps.edu/Academics/Centers/CEP/docs/Alberts\\_NCW.pdf](http://www.nps.edu/Academics/Centers/CEP/docs/Alberts_NCW.pdf) (accessed November 27, 2012).

Admiral William Owens, one of the early RMA founders, made a pitch for a US “system-of-systems” in February of 1996 and predicted that RMA is inevitable, but “the speed at which we adapt to it depends on recognition of what is emerging and a willingness to embrace these changes in our policy, planning and programming decisions.”<sup>91</sup> NCW was introduced two years later by Arthur Cebrowski and John Gartska and has become the overarching concept for how militaries are predicted to operate in the future.<sup>92</sup> This techno-centric solution, promulgated first within the US military, was touted as the reason for the rapid defeat of forces in the second gulf war and in Afghanistan.

With a striking blend of old and new technology, operating throughout the electromagnetic spectrum and across the range of operations, from ground forces to air and sea platforms and into space, U.S. forces in both conflicts used networked information to achieve huge efficiencies in combat. The “kill chain” against enemy targets was reduced in many cases from hours to minutes, and information about the location of enemy and friendly forces was relayed and tracked just as quickly. In Afghanistan, the deployment of American ground troops was minimal; in Iraq, a force one-quarter the size of the 1991 Desert Storm coalition defeated the Iraqi regime in 21 days, with only 161 troops killed in action. In both theaters [sic], the incidence of civilian casualties and other collateral damage was minimal.<sup>93</sup>

Alberts contends that the net result of adopting an NCW organization is the horizontal and wide distribution of information, obviating the need for supporting staff, that dates back to the Napoleonic era, when information was manpower-intensive to obtain, interpret, store, and disseminate. This results in a significantly reduced number of staff and command layers, resulting in a flatter architecture. Alberts posits that some of these layers of command will be absorbed by NCW decision aids, while others will be automated.<sup>94</sup>

### Network-centric warfare critique

The recent difficulties on operations in Iraq and Afghanistan have led some to doubt the panacea that NCW claimed to be.<sup>95</sup> The failure of NCW to deliver the dominance over adversaries that it promised harkens back to a verbal exchange at the end of the Vietnam War. US Army Colonel Summers commented to North Vietnamese Colonel Tu, “You know, you never defeated us on the battlefield.” To which Tu replied, “That may be so, but it is also irrelevant.”<sup>96</sup> The message in this exchange should have been a warning to the subsequent RMA that the US undertook. While the US loss in Vietnam also involves political and strategic failures beyond the scope of this paper, there is still a lesson at the operational level here. The lesson is that focusing on the development of superior C2 and weapon systems does not always guarantee a decisive victory.<sup>97</sup> It is a lesson that, unfortunately, Western nations are rediscovering again in Iraq and Afghanistan.

91. Admiral William A. Owens, “The Emerging U.S. System-of-Systems,” [http://www.ndu.edu/inss/Strforum/SF\\_63/forum63.html](http://www.ndu.edu/inss/Strforum/SF_63/forum63.html) (accessed November 27, 2012).

92. Matthew Duncan and Marie-Eve Jobidon, “Spontaneous Role Adoption and Self-Synchronization in Edge Organizations Using the ELICIT Platform,” (Toronto: Defence Research and Development, 2009), 3.

93. John Luddy, “The Challenge and Promise of Network-Centric Warfare,” <http://www.lexingtoninstitute.org/docs/521.pdf> (accessed April 19, 2009, site discontinued).

94. Alberts, “Information Age Transformation,” 41.

95. English, Gimblett, and Coombs, 5.

96. Phillip Carter, “Irrelevant Exuberance: Why the Latest Good News from Iraq Doesn’t Matter,” *Slate*, <http://www.slate.com/id/2171510/> (accessed November 27, 2012).

97. Blank, 62.

One of the problems with NCW is that it creates a focus on the rewards of information without analysing the implications of over-reliance on such network systems. Some network-centric financial firms that boast of information superiority have experienced unexpected results leading to massive economic losses. Michael Schrage provides an example from 2001, when Cisco Systems was forced to take one of the largest quarterly write-downs in US corporate history. Cisco bragged often about its sophisticated tracking system with its data-driven operational controls. Their world-class, information-intensive infrastructure, however, contributed to inducing the poor decisions that led to the write-downs. This was caused, in large part, by a situation where “the presumed excellence of information systems may have invited managerial overreliance, and that overreliance led to overconfidence. Executives may have ignored unambiguous external signals in favour of their own networked data.”<sup>98</sup> Schrage asserts this lesson, among others that he discussed, and points out a flaw in the claims of NCW: “having the ‘right’ information at the ‘right’ time may not lead to the ‘right’ decision.”<sup>99</sup>

The ability to synchronize and adapt faster than the adversary, owing to the connectivity of NCW, provides a definite advantage. The focus on the simultaneity and rapid effects provided by NCW should not come at the expense of what should be the primary concern: protection of the network systems themselves. As identified by Lieutenant-Colonel David Schmidtchen, NCW doctrine often “does not identify the increased fragility of the entire network as a significant risk... ”<sup>100</sup> While experts may speak of redundancy as a method of ensuring that expected breakages and system failures do not impede operations, Schmidtchen identifies that NCW should not assume system superiority or that a foe that does not possess equally capable NCW. In this case, the obvious fight becomes more about the defence of our own, or denial of the enemy’s network, rather than the exploitation of the advantages these systems provide.

The prevalence and transparency of information may lead to a higher degree of accountability for commander’s decisions. This higher degree of accountability and oversight may give rise to a new form of command paralysis. While the information flows quickly through all levels of command, the prevalence of conflicting information may also be used to second guess some commanders’ decisions. The faith that we place in the automated data provided by our NCW systems may lead us to miss less ambiguous signals provided by the outside, analog world. In a worst case scenario, “failure to minimize casualties or protect civilians may be digitally reviewed and used to politicize flawed military decisions.”<sup>101</sup>

The distribution and the volume of information are seeing the greatest changes brought by NCW. The genesis of this issue is found in the long-term trends of computing hardware. Moore’s Law describes the increase of computing power as growing exponentially: doubling in processing speed and memory every 18 months.<sup>102</sup> Subsequently, technological and social change into the early 21<sup>st</sup> century will be driven by the ever-increasing importance of computers to the way we live everyday life. While electronics form the main focus of many future C2 systems, there are those who would disagree with such a techno-centric approach. The danger in shifting our reliance from human systems to computer systems lies in the “semantic twist by which the responsibility for action is shifted from man to a machine” which makes us “lose sight of the problem of cognition.”<sup>103</sup>

98. Michael Schrage, “Perfect Information and Perverse Incentives: Costs and Consequences of Transformation and Transparency,” 4, <http://ebusiness.mit.edu/schrage/Articles/ssp-workingpaper.pdf>; (accessed March 1, 2009, site discontinued).

99. Ibid., 5.

100. David Schmidtchen, “Network-Centric Warfare: The Problem of Social Order,” *Working Paper No. 125* (Australia: Land Warfare Studies Centre, June 2005), 10.

101. Clay Wilson, “Network Centric Operations: Background and Oversight Issues for Congress,” *CRS Report for Congress* (Congressional Research Service: March 15, 2007), 51.

102. Michio Kaku, *Visions: How Science will Revolutionize the 21st Century* (New York: First Anchor Books, 1997), 14.

103. Heinz Von Foerster, “Thoughts and Notes on Cognition,” University of Illinois, <http://ada.evergreen.edu/~arunc/texts/cybernetics/heinz/cognition.src/cognition.pdf> (accessed November 27, 2012), 3.

Heinz von Foerster describes cognition as higher mental faculties that allow humans to learn, remember, perceive, recall, and predict.<sup>104</sup> He argues that the anthropomorphization (the attachment of human traits to objects) of computers has led many to think that computers really have memories like humans do, and can solve problems in the same way. However, the speed at which computers operate and the vast quantities of data that they can store does not equate to human cognition. Information superiority, as we have seen earlier, does not guarantee good decisions. Therefore, the abundance of information provided through a network and shared widely does not equate to shared situational awareness. As Alberts succinctly put it, “strictly speaking, of course there are no shared cognitions since there are no shared brains.”<sup>105</sup> Thus, the cognition of the commander is also a key element in the exercise of C2 that must be matched with the system, or vice versa.

While there is a preponderance of NCW enthusiasts and a raft of literature singing its praises, there are those who are more cautious. Mark Mandeles, in his book *The Future of War: Organizations as Weapons*, posits that success in 21<sup>st</sup> century operations will rely on an institutional-organizational structure of society. His main critique of NCW theory and its surrounding RMA is that discussions often ignore the role that organization plays in improving combat capability. He blames this on a love affair with technology within the US that equates increased technical performance with improved operational effectiveness. Like the title of his book, Mandeles’ central thesis is that “the key to future combat effectiveness is not technology but rather this institutional and organizational structure and its effect upon incentives to invent and innovate.”<sup>106</sup> His argument is compelling and aims at the heart of NCW theory.

The first concern Mandeles articulates is that NCW theory references other theories (e.g., chaos theory, edge of chaos, self-synchronization) that have not been proven sufficiently to use as evidence. He is critical of David S. Alberts and his colleagues who use analogies of the sports or business world<sup>107</sup> (e.g., Walmart, Dell computers) without justifying the comparison by discussing the evidence required. He further suggests that the NCW enthusiasts’ approach in the use of metaphors is at odds with the empirical and experimental approach that, in the past, has brought about demonstrable improvements in operational effectiveness.<sup>108</sup>

Mandelés does not throw the NCW argument out in the end. One of the recommendations from Mandeles’ analysis of NCW is that the development of any future military system needs to progress along a methodical and empirical approach. He also articulates value in the network approach to C2 but cautions that the matching of the organizational structure to the level of decentralization is critical to making things work. In other words, a one-size-fits-all approach to C2 does not work, especially given the differing nature of the mission, capabilities, and level of war (strategic, operational, and tactical) across which NCW is meant to work.<sup>109</sup>

Schmidtchen would also caution against drawing overly simplistic conclusions about the value of networked organizations over hierarchies. He points out that traditional hierarchies, even in the military, have always drawn additional strength from informal networks. Hierarchies will always have a necessary role in military organizations for “power sharing and the source for decision-making authority in areas like conflict resolution and resource allocation.”<sup>110</sup> Networks exist within the gaps

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104. Ibid., 2.

105. Alberts and Hayes, “Understanding Command and Control,” 171.

106. Mark D. Mandeles, *The Future of War: Organizations as Weapons*, (Washington, DC: Potomac Books Inc., 2005), 4.

107. Alberts, Garstka, and Stein, 35.

108. Mandeles, 93.

109. Ibid., 170.

110. David Schmidtchen, *The Rise of the Strategic Private: Technology, Control and Change in a Network Enabled Military* (Duntroon, Australian Capital Territory: Land Warfare Studies, 2006), 27.

of the hierarchy and provide a basis for social organization. Schmidtchen does not discount the increased adaptability and agility of networked organizations, but he does caution that the same adaptive change that is of benefit to networks can develop quickly “without direct reference to the upper levels of the hierarchy.”<sup>111</sup> Consequently, he contends that the price an organization pays for the adaptability that NCW offers is a type of organizational fragility.

### Edge organizations

Enter the concept of “power to the edge” by Alberts Hayes.<sup>112</sup> Power to the edge addresses some of the critiques of NCW in the area of self-synchronization, relationships, and the role of organization. The basic premise of the concept is described as follows:

Power to the edge is about changing the way individuals, organizations, and systems relate to one another and work. Power to the edge involves the empowerment of individuals at the edge of an organization (where the organization interacts with its operating environment to have an impact or effect on that environment) ... empowerment involves providing access to available information and expertise and the elimination of procedural constraints previously needed to deconflict elements of the force in the absence of quality information.<sup>113</sup>

Alberts and Hayes define the range of possible C2 systems using two different, three-dimensional models. The first is the “approach space” and the second is the “problem space.” Simply put, approach space lays out the variables which define any approach to—or system of—C2. The problem space lays out the variables of the environment within which that C2 system must operate. The relationship between the two is simple. Wherever an organization exists in the problem space, the corresponding position in the approach space provides a C2 solution that works best. By relating these two spaces, Alberts and Hayes have qualified the dynamics of our approach to C2 (approach space) and its interaction with the environment (problem space).

Looking closer at the approach space, there is a three-dimensional representation of the variables within a C2 system that a commander has to consider in establishing control. These three interrelated variables are decision rights, information dissemination, and patterns of interactions.<sup>114</sup> Decision rights describe the assignment of responsibility for choices. This could range from a commander’s intent from a single person to a form of democratic decision making in a group. Information dissemination describes the method, origin, and destination of information and could be from one person to another or broadcast widely to all members of a network (and everything in between). Patterns of interaction are types of professional/social relationships between individual members and/or organizations and could be represented by the traditional top-down hierarchy or a more open form of distributed or networked structure.

Traditional military C2 is represented in this model as having tightly constrained interactions, tightly controlled information dissemination, and unitary decision rights. The bottom-left position might represent the type of C2 that existed at the beginning of WWI. Haig’s early use of field telephones within the BEF to constrict movements on the battlefield is an example of this approach to C2. The interactions were tightly constrained from the top down (fully hierarchical); decisions for subsequent exploitations were tightly held with the BEF, which stifled any initiative (unitary decision rights); finally, passage of information went vertically rather than horizontally (tight control

111. Ibid., 43.

112. David S. Alberts and Richard E. Hayes, “Power to the Edge: Command ... Control ... in the Information Age,” [http://www.dodccrp.org/files/Alberts\\_Power.pdf](http://www.dodccrp.org/files/Alberts_Power.pdf) (accessed November 27, 2012).

113. Ibid., 5.

114. Alberts, “The Future of C2,” 8.



of information dissemination). At the other end of the spectrum from the classic C2 structure, edge organizations are characterized by broad dissemination of information, unconstrained patterns of interaction, and peer-to-peer type (collaborative) decision rights.

As discussed throughout this paper, a specific C2 solution for one mission, situation, or organization might not work for another. The question then becomes, where do you place an organization within the three-dimensional approach space when considering C2? Alberts and Hayes say it depends on the problem (or mission) you are trying to solve. They define the problem using a second three-dimensional model called the “problem space.”

Problem space is comprised of three variables: rate of change (static versus dynamic), degree of familiarity (known versus unknown), and strength of information position (informed versus uninformed).<sup>115</sup> A static rate of change could be compared to the trenches of WWI, where the component parts of the situation (e.g., front lines, enemy methods) change little over time. Dynamic problems involve rapid situational changes: “the location of critical times and places during the struggle change quickly, the operating environment is unstable, and the parties to the conflict innovate frequently and rapidly.”<sup>116</sup> Degree of familiarity refers to how well the nature of the problem is known or the certainty with which particular things can be predicted. Strength of information position describes the degree to which an organization can fulfill its information requirements. In other words, an insurgent organization may have all of its relatively simple information requirements fulfilled, placing it in a position of information strength. The modern military attempting to fight the insurgency may have vastly larger information requirements that are less easily met, leaving them in a weaker position. A strong position of information (not to be mistaken with amount of information) allows organizations to devolve decision rights and also allows a more broad distribution of the information, given its accuracy and timeliness.

The value of Alberts and Hayes’ analysis of the approach and problem space is that it allows for a qualitative discussion of both traditional C2 and edge organizations at the same time. The premise provided so far has been theoretical, and the debate between the agility of hierarchical structures and edge-like (networked) structures has not been proven. However, there is a growing body of empirical study that is comparing traditional hierarchical approaches to C2 with more networked forms such as edge organizations. Numerous studies have compared the interaction of personnel in hierarchies and networked organizations. More recently, the US Department of Defense and the CF have been sponsoring research in this area with interesting results. In 2007, the US Naval Postgraduate School concluded a study that provided empirical evidence which demonstrated that edge organizations are more agile and, therefore, outperform traditional hierarchies across “abrupt environmental shifts.”<sup>117</sup>

This section has looked at the complexities of C2 theory and some of the emerging trends surrounding the RMA. Pigeau and McCann reminded us that only humans command and that it is the creative will that imposes itself in the choice of control methods. The analysis of human will as being essential to command expanded the perception of command to include everyone. Everyone has the capacity to exercise command, regardless of the structures in place. The concept that those outside established C2 structures can contribute to the overall effectiveness of the organization (auto-workers analogy) was further supported by Schmidtchen, who provided a balanced view of the importance of social networks that operate within the spaces of hierarchies. The value of hierarchy and

115. Alberts and Hayes, “Understanding Command and Control,” 77.

116. *Ibid.*, 78.

117. Tara A. Leweling and Mark E. Nissen, “Hypothesis Testing of Edge Organizations: Laboratory Experimentation using the ELICIT Multiplayer Intelligence Game,” (June 2007), 4, [http://www.dodccrp.org/events/12th\\_ICCRTS/CD/html/papers/017.pdf](http://www.dodccrp.org/events/12th_ICCRTS/CD/html/papers/017.pdf) (accessed November 27, 2012).



network came to the fore several times during competing arguments surrounding NCW and edge organizations. The central point from this is that one-size-fits-all does not work in the realm of C2.

Czerwinski's models gave further definition to the styles of command: by plan, by direction, and by influence. These definitions were useful in pointing out that elements within a joint force (army, navy and air) have taken culturally different approaches to C2. Czerwinski's model also reminded us that *auftragstaktik* is alive and well today in the form of command-by-influence; the model he posits operates best in situations where chaos is prevalent, a useful concept that will be pertinent to the next section.

An analysis of RMA theory puts the NCW argument within a context that the ongoing push for NCW in the US is a choice that is widely debated, and not inevitable. An analysis of the promises of—and counter-arguments to—NCW provide a more balanced view of this theory. NCW promises a “system-of-systems” that can deliver fully synchronized, agile, joint forces with rapid and decisive effects across the full spectrum of conflict. This theory has shown early signs of promise, debatably, in the decisive operational battles in Iraq and Afghanistan. Does this same RMA imply a decision for Canada as well? If Canada does not subscribe to the information RMA, will it slide into obscurity? Is the argument as polarized for Canada as it is in the US?

Lastly, an analysis of Alberts and Hayes' approach and solution space pointed out that as problems change, so do the ideal solutions from a C2 perspective. Mandeles' critique of NCW also complemented our understanding of Alberts and Hayes' approach and solution space in that he described how organizational structure can hinder or help performance. This last lesson will be critical in the next section, where the CF is looked at specifically, using all of the lessons from the past and contemporary theory discussed thus far. Given that the CF conducts military operations where consequences of error are high, “the appropriateness of an organizational structure to its task environment should be a matter of a continual empirical review.”<sup>118</sup> This will be the focus of the next section, which, to use Mandeles' terms, will answer the following questions: What will the task environment look like for the CF and what are the optimum organizational structure decisions (C2) that will enhance its performance to meet these challenges?

#### 4. Canadian Forces command and control

*If I always appear prepared, it is because before entering on an undertaking, I have meditated for long and have foreseen what may occur. It is not genius which reveals to me suddenly and secretly what I should do in circumstances unexpected by others, it is thought and preparation.*

Napoleon Bonaparte, 1812

The above quote is sage advice from a leader who, as we saw in Section 2, was at the forefront of an RMA. Like Napoleon, in order to discuss where the CF should be going in terms of C2, thought and meditation must be applied to what the future will look like. Wherever possible, references to CF doctrine, research, and writings have been used in this section. However, the majority of the C2 concepts discussed in the previous section were developed outside of the CF. If they do exist at any level, it is within CF land forces.<sup>119</sup> This makes it difficult to find distinctively joint and operational literature within the CF.

118. Mandeles, 97.

119. Allan English and others, *Operational Art: Canadian Perspectives, Context and Concepts* (Kingston, ON: Canadian Defence Academy Press, 2005), 2.

The purpose of this section is to complete the central argument of this paper: that future C2 structures in the CF will need to move away from a hierarchical structure to a flatter, more agile one. This will be accomplished by drawing together the lessons from history and an understanding of contemporary C2 theory and applying them specifically to the CF. The argument that follows will consider the CF and the strategic context in which it expects to operate. This is comprised of two parts: the future security environment (FSE) and what the CF has been asked to do (expectations) within this environment. This analysis should provide a description of what will closely parallel the C2 “problem space” discussed in the previous section. The culminating point will draw everything together to demonstrate that a flatter, more agile C2 structure is best suited for the future of the CF. This will be accomplished by comparing the “problem space” from earlier analysis and transposing it into the C2 “approach space.” Finally, a look at where the CF is today in terms of its own transformation will allow some considerations for the changes that need to occur in order to get it to where its needs to be in the future. While the central thesis points to organizational change, it is not possible to effectively change an organization without changes in other areas such as technology, ideas, and people.<sup>120</sup> While there is insufficient scope to address all of these other issues fully, they will be touched on. Hopefully, this will spark further debate and research in these other areas.

### Expectations for the Canadian Forces

In order to understand where the CF needs to go in terms of operational C2, we must first examine those aspects of the strategic framework that affect the future of C2. One of the most important questions to address is: what has the CF been asked to do in the future? The *Canada First* Defence Strategy “puts forward clear roles and missions for the armed forces, outlining a level of ambition that will enable them to protect Canadians from the variety of threats and challenges they may face in the years to come.”<sup>121</sup> This policy directs the CF to be ready for any possible mission (e.g., peacekeeping, disaster relief, conflict) within every possible framework (domestic, coalition, or stand-alone) at home and abroad. Essentially, the CF is asked to be ready for anything.

The *Canada First* Defence Strategy, while largely applauded for its 20-year funding framework and prioritization of defence tasks, provides very little rationale for the plan in terms of the FSE. The document has been described by some defence experts as truncated in its “assessment of the current and future strategic environment, military technological and doctrinal trends, force structure, [and] personnel issues ...”<sup>122</sup> Thus, the plan that has been committed to over a 20-year horizon has been largely reactionary to circumstances at the time, rather than the result of academic rigour, operational research, and development and experimentation. While the *Canada First* Defence Strategy may not provide the clarity required to assess the FSE, it does point out the importance of the CF’s interoperability with its allies, especially the US. Therefore, an analysis of North Atlantic Treaty Organization (NATO) doctrine and other academic writings will provide the grounding for what the future will look like, so that we can reasonably guess where the CF will fit within the “problem space” of the future.

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120. Schmidtchen, *The Rise of the Strategic Private*, 11. Schmidtchen uses the analogy of four horsemen to describe technology, ideas, people, and organizations. He asserts that these four elements are essential ingredients in managing the transition from an industrial-age to an information-age military. They must be synchronized like a cavalry charge; “the four horsemen must move to the gallop in unison, coordinating their movements over time and space.”

121. Canada, *Canada First* Defence Strategy, <http://www.forces.gc.ca/site/pri/first-premier/index-eng.asp> (accessed November 27, 2012).

122. Martin Shadwick, “The Canada First Defence Strategy,” *Canadian Military Journal*, 9, no. 2 (2009): 112.

### The future security environment

NATO countries commonly use the term “future security environment” to describe the way they expect the world to look in the future.<sup>123</sup> While its focus is strategic in nature, it does include an analysis of future warfare and what allies can expect in terms of the future battlespace. By looking at the FSE (the nature of conflict as an element of future societies), common themes will emerge that have an impact on C2 for the CF. The end of the cold war is one event that prompted changes in the FSE.

The rise of US hegemony and the lack of a foreseeable peer competitor means that any adversary to the US cannot win using conventional means. Paul Mitchell refers to US military primacy as a “command of the commons.”<sup>124</sup> The “commons” he defines as “those areas over which there is no national jurisdiction (most obviously, the sea and outer space) and those areas where military control is difficult to enforce.”<sup>125</sup> The significance of US “command of the commons,” for Mitchell, is that it provides the US an unmatched global capability, effectively organized within its unified command plan.

This US global military dominance is living up to Alvin and Heidi Toffler’s third-wave vision of future warfare: “the real-time coordination of numerous weapons over great distances, creating an unprecedented combat capability—something that has been unimaginable prior to the emergence of information age technology.”<sup>126</sup> The lack of a peer competitor to the US has driven adversaries down unconventional roads and will continue to do so for the foreseeable future. This shifts where the CF can expect to operate in the three-dimensional “problem space” model from the cold war region towards the 21<sup>st</sup>-century missions. What are 21<sup>st</sup>-century missions and how are they defined?

The Tofflers warn that the form future conflict takes, who the adversary is, and under what conditions these conflicts are played out are only limited to imagination. However, the inability to know with certainty the Five Ws (what, who, why, when, and where) of future warfare has not prevented a plethora of theoretical writings on the subject. Bernd Horn describes the future battlespace as “volatile, uncertain, constantly changing, and ambiguous.”<sup>127</sup> He further points out that the nature of the enemy will force militaries to operate in smaller, more agile, and widely dispersed units, causing greater reliance on networked technology to maintain situational awareness. Conflict will become more complex, not just because of the growing asymmetry of threats, but also because of the ever-growing scrutiny of media coverage at all levels. In order to function within the daunting environment described by Horn, militaries will require a “reorientation of how we think and operate on the battlefield.”<sup>128</sup> He concludes that what will be required are “adaptable (highly trained and educated), highly mobile, well-equipped forces capable of rapid deployment on complex multi-dimensional coalition operations ...”<sup>129</sup>

### NATO future security environment

In its introductory remarks, the NATO FSE document asserts that predicting the future is “an impossible and fanciful nonsense. That said, it would also be irresponsible not to look at current

123. North Atlantic Treaty Organization (NATO), “Future Security Environment,” (FSE) 13 June 2007, <http://www.act.nato.int/multiplefutures/ACTFutureSecurityEnvironmentFirstEdition.pdf> (accessed March 1, 2009, site discontinued).

124. Paul T. Mitchell, *Network Centric Warfare and Coalition Operations—The New Military Operating System*, 18.

125. Ibid.

126. David Potts, ed., *The Big Issue: Command and Combat in the Information Age* (Washington, DC: Department of Defense, Command and Control Research Program, 2002): 9, [http://www.dodccrp.org/files/Potts\\_Big\\_Issue.pdf](http://www.dodccrp.org/files/Potts_Big_Issue.pdf) (accessed November 27, 2012).

127. Bernd Horn, “Complexity Square: Operating in the Future Battlespace,” *Canadian Military Journal* 4, no. 3 (Autumn 2003): 14, <http://www.journal.forces.gc.ca/vo4/no3/command-ordre-eng.asp> (accessed November 27, 2012).

128. Ibid.

129. Ibid.

trends and their drivers and then logically ask the ‘So what’ or ‘What next’ questions.”<sup>130</sup> NATO has devoted effort in keeping its own version of the FSE updated. The most recent version (2007) delivered insights into the future of operations for NATO countries. One of these insights is that the future is characterized by easily accessible technology that will enable a determined enemy to attack, creating vulnerabilities in unexpected ways. They conclude the insight by asking NATO allies to consider changes in their operating concepts, capabilities, and future force structures in response to this.<sup>131</sup>

The NATO FSE also identifies a growing need for militaries to operate in a less conventional manner. Specifically, it identifies “other than military threats” as providing the biggest challenge, one that will increasingly require militaries to operate in non-traditional areas. “Global challenges will require comprehensive global solutions to combat elusive, non-state foes. Seamless integration with other international organizations such as the United Nations, regional alliances, and non-governmental organizations will be absolutely critical to success.”<sup>132</sup> While NATO identifies this comprehensive approach at a higher level (political and strategic), the CF C2 systems will require no less integration at the operational level as well. The use of the popular term “joint, interagency, multinational and public” (JIMP) captures the diversity and level of cooperation/synchronization that will be required.

To complicate things further, promulgating the term JIMP into doctrine is the easiest part of the process. Translating that doctrine into a workable system will require broad paradigm-breaking organizational changes and delegation of authorities that cut across so many boundaries (non-governmental organizations and other government departments) within Canadian society that it will be a challenge for the CF, and possibly even the Government of Canada, to achieve. Therefore, the CF cannot, from within, develop an operational C2 system that will work without the full collaboration and consensus of all stakeholders defined within the JIMP framework. If the CF was allowed to develop its own approach to operational C2, what would it look like? The application of the “problem space” to the FSE should provide some indication for where the CF will need to be within the “approach space” to ensure that the C2 solution that is developed is solving the right problem. In other words, we cannot assume that the C2 solution we have will be effective at dealing with future challenges. Alberts put it succinctly when he wrote:

*Command and Control* is an approach that, while it was once very effective in achieving its ends, is no longer the only possible or even the best approach that is available. *Command and Control* is a solution to a problem that has changed ... *Command and Control* is not well suited for coalition operations, particularly the kind of complex endeavors [sic] called for in the twenty-first century. Furthermore, while it may come as a surprise to some, *Command and Control* is not necessarily the best choice for some military operations.<sup>133</sup>

Remember that, despite its size, the CF has been asked to be ready for anything from the direction given in the *Canada First* Defence Strategy. While the Defence Strategy is truncated in its consideration of the FSE, an analysis of other doctrine has nonetheless provided a clear enough vision to proceed to the next step of matching the problem space (nature of the problem) to the right approach space (C2 solution). As seen in Table 1, the language used to describe the FSE can be translated into the three variables of the “problem space” model:

130. NATO, “Future Security Environment,” 10.

131. NATO, “The Multiple Futures Project: Interim Report on Security Implications” (released 18 December 2008), <http://www.act.nato.int/multiplefutures/081212%20-%20MFP%20Interim%20Report%20-%20Final%20Version.pdf> (accessed 15 March 2009, site discontinued).

132. NATO, HQ SACEUR, “Chiefs of Transformation Conference 2008: Analysis Report 19 December 2009,” <http://www.act.nato.int/multiplefutures/COTC%2008%20Analysis%20Report%20FINAL.pdf> (accessed March 15, 2009, site discontinued), 19.

133. Alberts, “The Future of C2,” 4.

Variables	CF FSE
Rate of change	Static .....X.....Dynamic
Strength of information	Strong.....X.....Weak
Familiarity	High.....X.....Low

*Table 1. CF FSE problem space*

These characteristics place the FSE missions into the same area of the three-dimensional model for “approach space” that is occupied by the edge organization. By transposing the characteristics of the FSE into a more qualitative description of the C2 environment, an optimum C2 “approach space” emerges as shown in Table 2:

Variables	CF optimum C2
Decision rights:	Unity.....X.....Peer-to-peer
Patterns of interaction:	Tight constraint.....X.....Unconstrained
Distribution of information:	Tight.....X.....Broad

*Table 2. CF optimum approach space*

Arguably, the application of the FSE and task analysis against Alberts and Hayes’ model is overly simplistic, but it still merits consideration that there is a space between classic C2 and the edge organization, which represent a more optimized solution for the future of C2 in the CF. According to the analysis herein, the battlefields of the cold war are less likely, and the future of 21<sup>st</sup> century conflict will require more agile organizations with a C2 structure characterized by a flatter C2 architecture.<sup>134</sup> While the argument for a flatter C2 may have culminated, it is still important to remember the historical lessons from Section 2, given the attention this section gave to the importance of a culture of learning and innovation to the successful completion of transformation. An analysis of where CF transformation is now and where it is going will provide some insight into the challenges in achieving a flatter, more agile C2 structure.

### Canadian Forces transformation and C2

The use of the word “transformation” is often synonymous with the US RMA discussion. Donald Rumsfeld could have been talking about the CF when he said: “we have to put aside the comfortable ways of thinking and planning, take risks and try new things so that we can prepare our forces to deter and defeat adversaries that have not yet emerged to challenges.”<sup>135</sup> To be fair, the CF has enjoyed the innovative leadership of recently retired General Rick Hillier. He was, perhaps, the Chief of Defence Staff (CDS) who most understood the challenges Rumsfeld laid out in his speech.

134. Alberts and Hayes, “Power to the Edge,” 127–28. Alberts defines agility as “the synergistic combination of robustness, resilience, responsiveness, flexibility, innovation, and adaptation.”

135. Secretary Donald Rumsfeld, speech given at the National Defense University, Washington, DC, 31 January 2002, <http://www.defenselink.mil/speeches/speech.aspx?speechid=183> (accessed November 27, 2012).



Not since the Hellyer days of unification<sup>136</sup> has the CF seen the level of ambition to change itself, represented in the CDS's Transformation Plan for the CF.

One of the biggest changes within CF transformation was the creation of multiple new operational command headquarters.<sup>137</sup> These organizations are currently under review and have created the need for more staff at multiple headquarters than the CF can muster. The stand-up of these new national-level headquarters is modelled from a US construct that has been described as largely a stand-alone solution or “maitre chez nous to DND, which is only one house to put in order.”<sup>138</sup> In other words, the creation of these new headquarters solved a national command problem, but it did not consider the wider CF needs (strategic, operational, and tactical level).

Initial decisions to create certain organizations may have received criticisms such as the above in its early stages. However, like the historical analysis of the German Army during the interwar period, the zeitgeist of the organization and the message from its leadership in terms of taking risks and innovation were as important as the technology that emerged. What is the zeitgeist of CF transformation?

The CDS's second transformation situation report provides the answer to the zeitgeist behind CF transformation and lists six key principles:

- a. Change initiatives must build a CF culture vice functional or environmental cultures.
- b. The C2 structure must shift from a staff-centric to a command-centric construct.
- c. The chain of command must shift from a risk-averse approach to an empowered mission-command approach.
- d. The C2 structure must transform from a staff matrix to a chain of command empowered with authority, responsibility, and accountable to a higher commander.
- e. The CF must focus primarily on operational effectiveness.
- f. CF transformation must consider the Regular and Reserve components and DND civilians as part of a single solution.<sup>139</sup>

Despite any controversy, these new joint and integrated headquarters (if they survive the review) will steadily add to the corporate knowledge within the CF as they deliver an operational capability. However, the culture of innovation and change that started with Hillier must survive beyond the ongoing force structure review to whatever happens after the draw-down of forces in Afghanistan in 2011. Any reduction in funding to the CF will only push the three services back into a situation where they will be competing for scarce resources, making it even more difficult to break down cultural barriers. A change from a status quo CF to something entirely different cannot happen without the requisite resources.

136. Paul Hellyer was a Canadian politician who served as Minister of National Defence (1963–1967). He was a strong proponent and leader of the controversial integration and unification of the three independent services into what is now known as the Canadian Forces. See Wilf Lord, “Integration of the Forces,” [http://www.navalandmilitarymuseum.org/resource\\_pages/controversies/unification.html](http://www.navalandmilitarymuseum.org/resource_pages/controversies/unification.html) (accessed November 27, 2012).

137. Canada Command, Expeditionary Force Command (CEFCOM), Operational Support Command (CANOSCOM), and Special Operations Forces Command (CANSOFCOM).

138. Bernd Horn, Tony Balasevicius, and David Barr, *Casting Light on the Shadows* (Dundurn Press, 2007), 202. The authors provide further reference on the Department's reorganization in Charmion Chaplin-Thomas, “Origins and Growth of the DCDS Group” (DND, Feb 2006). On problems of operational command see T. Fitzgerald and M. A. Hennessy, “An Expedient Reorganization: The NDHQJ-Staff System in the Gulf War,” *Canadian Military Journal* 4, no. 1 (Spring 2003): 23–28.

139. General R. J. Hillier, “CDS Transformation SITREP 02/057” National Defence Headquarters, (September 2005).



There is still hope that the CF can find its way to a joint and integrated C2 solution in a critical position formed through transformation: Chief of Force Development (CFD). CFD is charged with leading the CF development efforts from a joint perspective. This differs substantially from earlier CF force development, which, until the creation of CFD, occurred within single-service stovepipes. CFD's mission is to "harmonize, synchronize and integrate the force development activities of the Canadian Forces"<sup>140</sup> CFD's role provides an interesting parallel to *Truppenführung* from Section 2, which provided guidance to the German Army's transformation in a "coherent, careful, evolutionary fashion."<sup>141</sup> It is within CFD's organization that the potential development of a different C2 system resides. It is, therefore, worth examining the status of CFD initiatives in this area and where these developments are leading.

### Network-enabled operations

As part of CF transformation, the CDS tasked CFD with creating joint doctrine, part of which included a vision of future command, control, communications, computers, information, surveillance and reconnaissance (C4ISR). CFD's C4ISR vision statement reads as follows:

A command-centric, operationally focused and tactically responsive system of C4ISR that supports commanders and connects people, sensors and systems, through a fully integrated information-based network, from the strategic to the tactical levels . . . It will meet evolving requirements for a Comprehensive Approach (CA) by ensuring full integration and interoperability with stakeholders in a comprehensive, joint, interagency, multinational and public (JIMP) environment. To ensure continued relevance this system will include the flexibility, agility and adaptability necessary to anticipate, endure and drive change.<sup>142</sup>

Much like the genesis of NCW in the US, the CF has been looking at an NCW-like solution to the problem under the name NEOps. Sandy Babcock, a defence scientist with Director Defence Analysis, relates the genesis of NEOps. He posits that NEOps was developed for the CF because the Canadians involved in the bilateral development (Canada-US) of NCW over the past few years considered the US concept of NCW too focused on technology and not on the human elements of C2.<sup>143</sup> Babcock goes further to suggest a draft definition of NEOps as an approach to the conduct of military operations "characterized by common intent, decentralized empowerment and shared information, enabled by appropriate culture, technology and practices."<sup>144</sup>

The Director General Capability Development<sup>145</sup> has been producing renditions of a draft campaign plan which had strongly endorsed NEOps as the solution to the CFD promulgated vision articulated earlier. The draft plan entitled "C4ISR Strategy 2028" was recently denied approval for various reasons. Most importantly, the C4ISR strategy was meant to outline a generic capability or effect that should not intuitively imply any one solution from off the shelf. In other words, there was a growing trend that the solution to the C4ISR vision would be NEOps, rather than something entirely different. This does not mean that NEOps is no longer considered a viable solution. Director General Capability Development's message in denying approval to "C4ISR Strategy 2028" was

140. Canada, Chief Force Development (CFD), <http://www.cfd-cdf.forces.gc.ca/sites/page-eng.asp?page=5182> (accessed April 23, 2009, site discontinued).

141. Murray, "May 1940," 159.

142. Canada, CFD, "Draft C4ISR OC1." This draft was approved by CFD in April 2009 and distributed higher for consideration.

143. Sandy Babcock, "Canadian Network Enabled Operations Initiatives," [http://www.dodccrp.org/events/9th\\_ICCRTS/CD/papers/001.pdf](http://www.dodccrp.org/events/9th_ICCRTS/CD/papers/001.pdf) (accessed November 27, 2012).

144. Ibid., 4.

145. All points regarding the C4ISR strategy come from Dr. David Goldsmith and are based on Director General Capability Development C4ISR update brief given April 21, 2009.

aimed at stopping the CF from “chasing its allies” in the pursuit of NCW, specifically, and risking delivering nothing in terms of a CF-specific C4ISR capability.

The direction for the new plan is more pragmatic and will fully consider available theory, research, and the unique capabilities of the CF in the future. This more deliberate approach is good news considering the assertion by some that Canada cannot afford the technology to fully achieve its own NCW architecture.<sup>146</sup> The futility of trying to model the CF after our biggest ally makes sense considering the US spends more on C4ISR than any nation spends on defence.<sup>147</sup>

Sheer technological innovation ... does not win wars. Instead, the interaction of technical change and organizational adaptation within realistic strategic assessment determines whether good ideas turn into real military capabilities.<sup>148</sup>

### CF culture and change

*[N]either rigid planning for the future nor reacting to events is satisfactory ... . Thus it is even more important for combat organizations to adopt mechanisms for change and adaptation.*<sup>149</sup>

Military organizations (not unlike many others) are resistant to change, perhaps for good reason. Any process of change implies a certain degree of risk. In a military context, failures that occur because of change can have devastating consequences. This is why the US military keeps 15 per cent of its forces in a state of change, leaving the remainder to form the core of their combat capability.<sup>150</sup> The comparison in Section 2 between the Allies and the Germans during the interwar period of mechanization development provides an example of this. Robert Scales suggests that the Germans started with “first principles”: assess lessons learned, form a clear picture of mobile warfare, develop operational concepts, build machines, and organize units.

In contrast, Scales contends that the Allies fielded their new mechanized vehicles with much less intellectual rigour, contributing to their shocking defeat to Germany’s blitzkrieg. As the French and British learned early in World War II, “if the vision and the concepts are wrong, adding resources simply compounds the error.”<sup>151</sup> The interwar period for the Germans gave birth to blitzkrieg because of a culture of change. At the start of WWII, both the Allies and the Germans had officers who experienced WWI. In that sense, both sides started on a level playing field. However, it was what the Germans did with those experiences that made all the difference.

Like the Germans in Section 2, the post-Afghanistan period for the CF could be called, for lack of a better word, the start of the CF’s own interwar period. For CF members, post-Afghanistan represents a period of potential transformation through which innovation, experimentation, and transformation can occur if a culture of change is fostered. So why has it been so difficult for the CF to effect change? To use Hillier’s words, the problem of transformation is like changing the tires on a car while it is still moving. It will be very difficult to leverage lessons learned and pursue innovation during any interwar period as long as funding and personnel shortages due to Afghanistan and

146. English, Gimblett, and Coombs, *Networked Operations and Transformation*, 6.

147. Vance White, “Canadian Forces Transformation: From Vision to Mission,” [http://www.forces.gc.ca/site/Community/MapleLeaf/vol\\_8/vol8\\_38/838\\_08.pdf](http://www.forces.gc.ca/site/Community/MapleLeaf/vol_8/vol8_38/838_08.pdf) (accessed March 15, 2009, site discontinued).

148. Alan R. Millet, “Patterns of Military Innovation in the Interwar Period,” in *Military Innovation in the Interwar Period*, ed. Williamson Murray and Alan R. Millet (Cambridge: Cambridge University Press, 1996), 368.

149. Kishore Sengupta and Carl R. Jones, “Creating Structures for Network-Centric Warfare: Perspectives from Organization Theory,” [http://www.dodccrp.org/events/1999\\_CCRTS/pdf\\_files/track\\_4/017sengu.pdf](http://www.dodccrp.org/events/1999_CCRTS/pdf_files/track_4/017sengu.pdf) (accessed November 27, 2012).

150. David Hughes, “The Future of Joint Warfighting,” *Aviation Week & Space Technology*, 158, no. 21 (2003): 76.

151. Major General Robert H. Scales Jr., *Yellow Smoke: The Future of Land Warfare for America's Army* (Rowman & Littlefield, 2005), 19.

Operation PODIUM<sup>152</sup> persist. But Hillier did try to develop an organization that broke many of the single-service stovepipes within the CF. It was called the Standing Contingency Force (SCF),<sup>153</sup> and it merits analysis.

The Defence Policy Statement of 2005 ordered the creation of the SCF, which was to be the “jewel in the crown” of CF transformation, creating integrated and joint effects across the full spectrum of conflict for the CF. The vision of the SCF read as follows:

A Standing Contingency Task Force will be established to respond rapidly to emerging crises. This high-readiness task force will be made up of existing, designated maritime, land, air and special operations elements, organized under a single integrated combat command structure. It will be ready to deploy with 10 days’ notice, and provide an initial Canadian Forces presence to work with security partners to stabilize the situation or facilitate the deployment of larger, follow-on forces should circumstances warrant.<sup>154</sup>

The SCF<sup>155</sup> was intended to be a joint unit, with all of the necessary enablers integrated into a common C2 system. The span of control within the SCF was beyond that of any other formation in the CF at the time. Shortly after its inception and creation, the SCF embarked on its first exercise in November 2006, titled the Integrated Tactical Effects Experiment (ITEEx). The post-exercise report identified six lessons, of which three were directly related to C2.

The first point was that the integrated joint staffs of the SCF headquarters were a model for CF cultural transformation. The second was that the SCF C2 required further refinement and experimentation. The third lesson was that the SCF required a fused, common operating picture.<sup>156</sup> The last two lessons were due to the lack of any investment in a C2 system that could enable the experiment to occur. The C2 arrangement for the ITEEx cobbled together the existing systems on its amphibious headquarters ship (USS *Gunston Hall*) and combined it with Canadian naval systems (naval task group) and Land Force systems (embarked landing forces) among others. Therefore, there are no deductions to be made from an equipment perspective, other than to state the obvious: the SCF did not have anywhere near the technology required to fulfil its role. The first lesson regarding cultural transformation generated the least amount of attention, but based on our historical analysis, deserves the most.

In the one year that the SCF was together as a functioning headquarters, there was recognition of cultural differences in C2 and a willingness to let go of service-specific (Army, Navy and Air Force) procedures. This may be attributed to service parochialism, which can also serve to hinder the progress of any transformation to C2. Admiral Bill Owens defines service parochialism as a member’s “traditional loyalty to service or military specialty over the armed forces as a whole, whatever his or her rank or position.”<sup>157</sup> These parochialisms have resulted in the different styles of C2 between the services in the CF and also provide examples with which to apply Czerwinski’s command model (by plan, direction, or influence).

152. Operation PODIUM is the name given to the CF contribution to security at the 2010 Winter Olympic Games in Vancouver.

153. The name “Standing Contingency Force” (SCF) was the name when the project was cancelled. The original name was “Standing Contingency Task Force” (SCTF), hence the discrepancy in names between the Defence policy and this paper.

154. Canada, “Canada’s International Policy Statement: A Role of Pride and Influence in the World: Defence,” [http://www.forces.gc.ca/site/reports/dps/pdf/dps\\_e.pdf](http://www.forces.gc.ca/site/reports/dps/pdf/dps_e.pdf) (accessed April 22, 2009, site discontinued).

155. There is very little official documentation regarding the SCF. The author served in the headquarters during its first and only year. The observations in this section stem from the author’s personal experience.

156. Commodore Paul Maddison, presentation to Dalhousie Maritime Security Conference, 15 June 2007, [http://centreforforeignpolicystudies.dal.ca/pdf/msc2007/Maddison-SCF\\_Brief.pdf](http://centreforforeignpolicystudies.dal.ca/pdf/msc2007/Maddison-SCF_Brief.pdf) (accessed April 22, 2009, site discontinued).

157. William A. Owens, *Lifting the Fog of War / Admiral Bill Owens with Edward Offley* (New York: Farrar, Straus and Giroux, 2000), 151.

Czerwinski asserted earlier that the Air Force operates on a command-by-plan model. This is evident in the 48- to 72-hour air tasking order (a plan for the assignment of air resources to missions) that has come to frustrate Army planners on operations for its lack of responsiveness. Canadian land forces, however, subscribe to a command-by-influence model, relying more on the commander's intent to set the stage of operations and allowing subordinate commanders to decide on the course of action to satisfy the commander's intent. Both approaches to C2 may be valid and necessary for the environment within which each must operate. The road to developing a C2 system that can work in a joint environment will require further integration of joint forces on training, exercises, and experimentation in order to shape service cultures toward a more common ethos that will work for one integrated C2 solution.

Despite any dismal picture that may be painted of C2 in the CF, the operational research community is taking the issue seriously and working toward clarifying the claim that edge organizations outperform traditional hierarchies in complex environments. Based on the foundational work discussed in the previous section, a Defence Research and Development Canada team provided a report that supported some of the earlier US findings that edge organizations provide greater self-synchronization: a key factor in network centric operations.<sup>158</sup> This Canadian team is continuing to build on the existing body of research.

While it is still too early to tell, empirical evidence is emerging which supports the theory that C2 organizations that are less hierarchical and more collaborative in nature (a flattened architecture) are more agile and better suited to meet the demands of 21<sup>st</sup> century conflict. Funding for the 2009–2010 fiscal year will see Canadian scientists looking at the relationship between role adoption, team structure, and agility,<sup>159</sup> which promises to provide further analysis of the “patterns of interaction” variable of Alberts and Hayes’ “approach space” model. We have seen how the research community is looking at organization and technology and how humans interact within them. The key to command and control, if we hearken back to Pigeau and McCann, is the leader itself. I would be remiss if the human—the leader, the commander, as the central element of a C2 solution—was not addressed as well.

### Building agile leaders

Agility can be used to describe equipment, doctrine, and even organizations. According to Alberts, agility is described as one of the main tenets of successful edge organizations. Before any of these can become agile, arguably, it is the mind of the leader that must be agile. Warren Bennis, a leading researcher on leadership, provides an interesting analysis of adaptability in leaders in the book *Geeks and Geezers*. Bennis’ theory is that the most effective leaders are those who have experienced at least one intense transforming experience. This “crucible experience,” he asserts, is “both an opportunity and a test. It is a defining moment that unleashes abilities, forces crucial choices, and sharpens focus. It teaches a person who he or she is.”<sup>160</sup> What defines success in these crucible moments, he argues, is called “adaptive capacity.”<sup>161</sup> This adaptive capacity is what allows leaders to respond rapidly and effectively to constant change. It also includes a form of self-awareness that allows analysis and learning, preparing them for further challenges.

The organization that prepares senior officers to make the leap from the tactical to the operational level of war is the Canadian Forces College. It is this organization that provides some

158. Duncan and Jobidon, presented at the 13th International Command and Control Research and Technology Symposium, 2007.

159. Matthew Duncan, email with the author, October 15, 2008.

160. Warren G. Bennis and Robert J. Thomas, *Geeks & Geezers: How Era, Values, and Defining Moments Shape Leaders* (Boston: Harvard Business School Press, 2002), 16.

161. *Ibid.*, 92–93.

of the first opportunities to develop adaptive capacity at the operational level of war. The Canadian Forces College (Toronto, Ontario) is “the cornerstone in the development of the Canadian Forces’ senior officer cadre.”<sup>162</sup> Of the courses provided to CF leadership, the Joint Command and Staff Programme is the one that “prepare[s] selected senior officers of the Defence Team for Command or Staff in a contemporary operating environment across the continuum of operations.”<sup>163</sup> The Joint Command and Staff Programme covers the following subjects:

- a. officership studies;
- b. national security, international affairs and defence management studies;
- c. joint warfare—yesterday, today, and tomorrow;
- d. joint operational planning;
- e. the joint force; and
- f. a choice of an elective course.

Included in the syllabus are four practical exercises that are conducted as part of the joint operational planning course. This section focuses on the application of the operational planning process, a staff function whose aim is the production of an operational or campaign plan.

None of the plans developed are executed by the students, leaving a void in the opportunity for these future commanders to experience Bennis’ crucibles of leadership, or even testing their adaptive capacity. Given the CDS’s direction in his second situation report to move away from staff functions towards a more command-centric C2 environment, it would benefit the CF if it tested its budding leadership more thoroughly on the execution side. The consequence of not doing so is that without operational tours to validate the theories learned, there is little other chance that these senior officers will experience the human nature of command. To make things more difficult for the Canadian Forces College, the CF does not have a standard C2 suite within which students could experience the “fog of war,” pros and cons of different “approach spaces” to C2, or the crucible of operational warfare that was so critical to the development of blitzkrieg during the interwar period.

This section has culminated in the central thesis of this paper: CF C2 needs to move from a hierarchical to a flatter, more agile structure. This was accomplished by considering the nature of both the tasks assigned (expectations) to the CF and the environment (FSE) within which these tasks will be carried out. These factors were superimposed on Alberts and Hayes’ problem space in order to identify the region within the three-dimensional approach space that provided the optimum C2 solution for future CF operations. The end result of this analysis was that the uncertainty, complexity, and unconventional nature of future conflict required a C2 structure that is characterized by less-constrained patterns of interaction, broader dissemination of information, and decision rights devolved to a lower level more akin to a peer-to-peer construct. The first half of this section concluded with Alberts’ assertion that the best organization to provide the necessary C2 approach space for the future of the CF is the flatter, more agile structure of the edge organization.

162. DND, Canadian Forces College website, <http://www.cfc.forces.gc.ca/200-eng.html> (accessed (November 27, 2012)).

163. DND, Canadian Forces College, “Joint Command and Staff Programme (JCSP): Syllabus 35” page 1-3/6, [http://www.cfc.forces.gc.ca/DP3/JCSP35/cfc300\\_e.pdf](http://www.cfc.forces.gc.ca/DP3/JCSP35/cfc300_e.pdf) (accessed December 10, 2008, site discontinued).



The second half of this section analysed the CF specifically to identify where its efforts to transform C2 are today, and what direction it is taking. The results from this analysis portrayed the CF in the early stages of transformation with a zeitgeist not unlike that of the German Army prior to the development of blitzkrieg. Early attempts within the CF to join the US RMA and to pursue NCW were dampened by the rejection of a CF strategy to develop NEOps as the solution to the CF's C4ISR problem. The reality is that the CF has its own unique requirements that must fit within the strategic context in which it operates. Most importantly, the CF must transform within its own constraints of operational tempo, resource constraints, and the will of its political masters.

## 5. Conclusion

The aim of this paper has been to demonstrate that the best future C2 structure for the CF is a flatter, more agile one. The method chosen was meant to be simple: Look at the history of C2 across various conflicts, bring the lessons forward into contemporary theory, and apply the theory to future CF operations in order to identify the optimum C2 solution. The impetus for this paper lies within Toffler's wave theory, which places the CF in a transition from the industrial era (dominated by hierarchy) to the information age. As we discovered in Section 2, "The past as prologue," this is not the first time that militaries have found themselves at the crossroads of innovation and change. The RMAs that these past leaders found themselves dealing with were as difficult as the challenge facing the CF today. As the old saying goes, "the more things change, the more they stay the same."

Section 2 examined the historical "behaviours" of conflicts in Toffler's second wave, the industrial era. These behaviours contributed to success and failure on the battlefield. From the Franco-Prussian wars to the development of blitzkrieg in WWII, this period demonstrated the importance of leveraging culture and doctrine in the face of emerging technologies. Whether it was Napoleon and his new divisions and corps or the Germans demonstrating blitzkrieg for the first time in WWII, the critical role of the commander in fostering a culture of innovation and change was critical to some of the most important developments in military history. It was their zeitgeist that most affected an organization's ability to adapt, innovate, and make the best of the rapid technological challenges facing them. There were also examples of what not to do. The many years it took to break the trench deadlock during WWI can be contrasted to the rapid advancements of the Hundred Days Offensive. After years of static trench warfare, the BEF eventually learned that a little trust in bottom-up solutions and a willingness to take risks can pay dividends.

Section 3 discussed the contemporary C2 theory that has dominated the ongoing RMA. NCW, the primary solution to the US military's C2 problems, has made great promises of broadly networked, far-reaching and integrated effects, offering domination over any adversary. Through further analysis of NCW, critics identified that it is not yet the panacea that some proclaim it to be. Buzzwords like "self-synchronization" and "role adoption" still beg empirical proof before NCW can move from the realm of theory to reality.

Other important factors came to the fore, including an appreciation of the limits to human cognition and the idea that an organization itself can have as decisive an effect as the technology that serves it. Alberts and Hayes' important C2 work is suggesting that a classic C2 approach is a solution to a problem that is disappearing in the 21<sup>st</sup> century. Their flatter-architecture edge organization was theoretically shown to provide more agile C2 in complex and dynamic environments than its rival, classic C2 structure. This assertion proved central to an examination of the CF as a potential future user of edge-like organizations in Section 4.



Section 4 looked specifically at C2 in the CF today and where it needs to be in the future. An examination of the CF portrayed an organization that has been asked by its political masters to be ready for anything. The FSE was characterized by volatility, uncertainty, asymmetry, and unconventional threats. The missions to be carried out in these environments were predicted to be multidimensional, complex, dispersed, and within a JIMP construct. The central thesis of this paper was tested by applying Alberts and Hayes' three-dimensional C2 models for "approach space" and "problem space." By doing so, a clearer idea of the variables at play in future CF operations emerged.

The ideal C2 solution for future CF operations was characterized by broader information dissemination, less-constrained patterns of interaction, and peer-to-peer decision rights. The characteristics defined using the models provided further evidence that the nature of future CF operations requires a C2 solution that is more akin to an edge organization than it is to the classic C2 the CF currently uses. In other words, the CF will need to change from a traditional C2 hierarchy towards a flatter, more agile networked structure.

Finally, this paper concluded by considering where the CF is today and where it needs to be to meet the challenges of future operations. The CF is in the midst of a transformation that is in its infancy. Early attempts to provide a strategy for dealing with future C4ISR challenges have wandered down the US RMA path toward an NCW solution under the guise of NEOps. Like the Germans in Section 2, CF transformation is not without its own challenges. However, there is much strength to the momentum initially gained through transformation under General Hillier, not the least of which is a zeitgeist of innovation and change. We are seeing again in Afghanistan, Bennis' crucibles, which can serve to inform future C2 development if its strategic leaders are willing to take risks. The mission in Afghanistan will end, eventually. The CF, like many militaries before it, will find itself in an interwar period where lower operational tempo and the return of experienced personnel will pay dividends in terms of advancing new concepts pertinent to C2.

The future is unclear, but there are some clear trends for future military operations. The first is that change is certain, and it will be frequent and rapid, manifesting itself in operational environments of increasing chaos. Secondly, potential adversaries will possess technology never thought of before and use it in ways that we would never expect. Thirdly, the laws of increased computing power and bandwidth will open doors to methods of operating that can provide the CF relative strength. The catch, as we have discussed in previous sections through an analysis of history and theory, is that only the agile organization will keep pace and survive. Only learning organizations with leaders that give the latitude to take risks in the crucible of conflict will adapt and overcome.

One of the keys to getting it right will be an ability to think unconventionally about C2 and treat organizations as weapons. All weapons have their use, time, and place on the battlefield. Every weapon in the operational commander's inventory is another tool in the tool box: the more the choice, the greater the agility. So, too, is the spectrum of C2 types; it is a tool in the commander's toolbox that needs to adapt quickly to the situation to provide the best effect, at the right time. Alberts put it best when he said that the need for a renewed look at C2 "does not imply that the traditional approach to command and control will never be appropriate; rather that there will be situations and circumstances when a different approach will be better suited."<sup>164</sup>

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164. Alberts, "The Future of C2," 2.

Finally, there is insufficient empirical proof that edge organizations will outperform the traditional hierarchy on more complex military operations. As Moore's Law pushes the CF into the 21<sup>st</sup> century, contemporary theory, as a minimum, is calling for a more rigorous analysis of the way the CF will approach C2 in the future. While militaries may be experiencing an RMA, the CF should share the caution of NCW critics and advance its own solutions on a deliberate and empirically proven path.

The analysis of both history and contemporary theory points to the need for organizational changes that must accompany these new RMA technologies. These changes cannot occur overnight. They will necessitate long-range planning, unique training, broad organizational changes, and devolution of decision making in a flatter architecture overall. The friction in developing a more agile and flatter C2 structure for the CF could read as follows:

It stood on the threshold of the old and the new, somehow contrived to combine the advantages of both without falling victim to their weaknesses. Its organization was superior to that of any of its predecessors, yet still unburdened by excessive rigidity and specialization. It placed heavy reliance on careful planning and preparation but was not misled into believing that this planning and this preparation could be extended beyond the reach of the railheads and into the battlefield. It made use of the best that contemporary technology had to offer but did not allow itself to become the slave of that technology ...<sup>165</sup>

If you had guessed that this quote was describing the ongoing RMA, you would be wrong. The above quote is, in fact, a description of the Prussian General Staff of 1866. It seems that “what was old has become new again.”

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165. Van Creveld, *Command in War*, 147.

## Abbreviations

<b>BEF</b>	British Expeditionary Force
<b>C2</b>	command and control
<b>C4ISR</b>	command, control, communications, computers, information, surveillance and reconnaissance
<b>CDS</b>	Chief of the Defence Staff
<b>CF</b>	Canadian Forces
<b>CFD</b>	Chief of Force Development
<b>FSE</b>	future security environment
<b>ITEEx</b>	Integrated Tactical Effects Experiment
<b>JIMP</b>	joint, interagency, multinational and public
<b>NATO</b>	North Atlantic Treaty Organization
<b>NCW</b>	network-centric warfare
<b>NEOps</b>	network-enabled operations
<b>RMA</b>	revolution in military affairs
<b>SCF</b>	standing contingency force
<b>US</b>	United States
<b>WW I</b>	World War I
<b>WW II</b>	World War II