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***Network Enabled Operations and Maritime Interoperability:  
Is the Navy on course for CF Transformation?***

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## ABSTRACT

Throughout the 1990s the Canadian Navy increasingly pursued interoperability with the United States Navy (USN), culminating in the ability to effectively integrate a Canadian warship into USN Carrier Battle Groups on numerous occasions. The Navy has continued this pursuit of interoperability, and today it has been incorporated into defence policy and Canadian naval doctrine. With the advent of CF Transformation in 2005, the Navy must ensure it's pursuit of interoperability with the USN is not causing the Navy to diverge from the goals of transformation. This paper examines the concepts of network centric warfare (NCW), transformation, network enabled operations (NEOps), and interoperability; as well as the current status of NEOps within the Army, Air Force, Navy and IM Group, in order to arrive at an informed opinion on this question. It concludes that the Canadian Navy should continue its ongoing practice of maritime interoperability with the USN, and the associated development and implementation of NCW concepts in order to become a more NEOps capable force. As a result, the Navy is better situated to operate jointly with the Army and Air Force, as well as OGDs and agencies.

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## INTRODUCTION

Over the past few years the terms transformation, interoperability, network centric warfare (NCW), and network enabled operations (NEOps) have become some of the common buzzwords in militaries throughout the world. The Canadian Forces (CF) is no exception and all or any of these terms are heard on a frequent basis. They are used regularly by many persons across the spectrum of operations, often frivolously, without an understanding of their true meaning. As a result, there exists the potential that the Canadian Army, Air Force and Navy, could have differences in interpretation in some of these terms, which in turn could lead to misconceptions and misunderstandings, and result in a divergence in how each of the Environments is implementing transformation activities.

In *Shaping the Future of the Canadian Forces: A Strategy for 2020*, eight strategic objectives were identified. Interoperability was one of these objectives, more specifically, “managing our interoperability relationship with the US . . . to permit seamless operational integration at short notice”.<sup>1</sup> The Canadian Navy further amplified this objective in *Leadmark* which identified interoperability as both a principle of medium power and Canadian naval strategy as well as a core Canadian naval competency.<sup>2</sup> Further, *Leadmark* specified that “a guiding principle of future force development will be achieving ‘seamless operational integration at short notice,’ with . . .

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<sup>1</sup> Department of National Defence, *Shaping the Future of the Canadian Forces: A Strategy for 2020* (Ottawa: DND Canada, 1999), 10.

<sup>2</sup> Department of National Defence, *Leadmark: The Navy's Strategy for 2020*, (Ottawa: Directorate of Maritime Strategy, NDHQ/Chief of the Maritime Staff, 2001), 48, 112, 117.

the USN”<sup>3</sup> particularly in the area of C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance). However, both these documents predate the concepts associated with CF Transformation activities currently underway. *Leadmark* acknowledged a Revolution in Military Affairs (RMA) but did not address the issues of transformation, NCW or NEOps directly.

The Canadian Navy has taken the strategic direction concerning interoperability with the USN particularly to heart and has pursued it aggressively over the past decade. The Navy must now also be concerned with transformation, ensuring that its efforts and activities are working in harmony with the goals of CF Transformation and not following a divergent path. One must question therefore, should the Canadian Navy refocus its efforts on activities more in line with the immediate goals of CF Transformation, and scale back its endeavours with regard to interoperability with the USN? Or will the pursuit of interoperability with the USN place the Canadian Navy in a favourable position down the path of CF Transformation? There are arguments against a wholesale pursuit of interoperability with the USN, most notably the potential inability to keep pace with rapid technological advances associated with the US military; the associated high costs of attempting to keep up with the USN in compatible equipment; and the risk already alluded to, of not meeting the goals of CF Transformation, in fact becoming even more interoperable with the USN than with the Canadian Army or Air Force.

This paper argues that the Canadian Navy should continue its ongoing practice of maritime interoperability with the USN, and the associated development and implementation of NCW concepts in order to become a more NEOps capable force, as a

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<sup>3</sup> DND, *Leadmark*, 128.

means to meet the requirements of CF Transformation. By achieving and maintaining interoperability and its associated NEOps capability, the Navy will be better situated to operate jointly with the Army and Air Force, as well as other government departments (OGDs) and agencies. This in turn will assist the CF as it moves towards more joint, interagency, multinational, and public (JIMP) operations.

To address these issues properly, one must first have a basic understanding of NCW, NEOps, and transformation. Only then can the utility of the Navy's pursuit of interoperability with the USN and its relationship to the Army and Air Force with regards to CF Transformation be evaluated.

To establish the necessary background, chapter two will investigate the origins of NCW and discuss the development, concepts and tenets of NCW theory. Chapter three will explore transformation activities in the militaries of the US and Canada. The strategy behind US military transformation and its relationship to NCW will be discussed and a comparison will be made to the strategies and direction of CF Transformation. The main problem areas in CF Transformation activities concerning the Navy will be identified and addressed. NEOps, the Canadian equivalent of NCW will be examined along with the decisions that some of Canada's closest allies have made concerning the adoption of NCW concepts in their forces in chapter four. The problems associated with the lack of strategic guidance concerning NEOps will be highlighted and resulting implications to transformation efforts will be identified. It is from this essential background on which an informed position concerning the activities of the Canadian Navy can be made.

Since the business sector gave rise to the concepts of NCW, chapter five will briefly visit the practices of the private sector at play today. The purpose of this is twofold; first, the confirmation that business has continued to improve their practices through the use of networks provides a rudimentary validation that NCW concepts are still relevant in today's military; and second, to look at whether network applications have further evolved in business, and make a general comparison to military equivalencies.

Each of the CF Environments will then be examined in chapter six to determine to what extent they have embraced NEOps in both doctrine and practice. A comparison of where the Army, Air Force and Navy are positioned in relation to each other, in regards to NEOps and transformation, will be conducted. It will be established that although each of the Environments are at differing levels of NEOps capability, all have incorporated the concepts of NEOps into their doctrine, and have moved towards becoming a more NEOps capable force. This in turn will ascertain that the Navy – the most NEOps capable Environment – although not working in a coordinated fashion with the Army and Air Force, is situated in an advantageous position for possible future NEOps requirements associated with CF Transformation goals.

Chapter seven will then discuss the role of that Information Management (IM) Group fulfills in regards to NEOps and CF Transformation. The strategic vision of IM/IT for the CF will be reviewed and the IM Groups plan to achieve this will be outlined. The lack of strategic guidance for NEOps other than that of a technical nature will be identified and the resultant problems of how this affects maritime interoperability and impacts the Navy's ability to achieve transformation will be determined.



Finally, interoperability between the Canadian Navy and the USN will be examined in Chapter eight. Building on the previous chapters, it will show that the current practice of interoperability with the USN has enabled the Canadian Navy to not only meet national security objectives, but become a highly NEOps capable force. This in turn, has situated the Navy favourably to further its CF Transformation objectives of being more operationally focused and moving towards a more joint capability.

This paper concludes that the Canadian Navy should continue its ongoing practice of maritime interoperability with the USN, and the associated development and implementation of NCW concepts in order to become a more NEOps capable force. As a result, the Navy is better situated to operate jointly with the Army and Air Force, as well as OGDs and agencies.

## NETWORK CENTRIC WARFARE

The concept of Network Centric Warfare (NCW) can trace its roots back to the mid-1990s when Admiral William Owens (USN) spoke of a concept of system of systems in his 1996 paper “The Emerging System of Systems”.<sup>4</sup> The following year, Admiral Jay Johnson, then Chief of Naval Operations (USN) spoke of information superiority and NCW at a US Naval Institute Annapolis Seminar.<sup>5</sup> It was not until 1998 however, that the concept of NCW gained popularity when Vice Admiral Arthur K. Cebrowski (USN), and John J. Garstka claimed a “new era in warfare ... in the midst of a revolution in military affairs”<sup>6</sup> in their article “Network-Centric Warfare: Its Origin and Future”. They also referred to what Admiral Jay Johnson called “a fundamental shift from what we call platform-centric warfare to something we call network-centric warfare”<sup>7</sup>. Cebrowski and Garstka ventured that “network-centric warfare would allow forces to develop a speed of command”<sup>8</sup> and “[enable] forces to organize from the

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<sup>4</sup> Adm William Owens (USN), “The Emerging U.S. System-of-Systems”, *Strategic Forum*, no. 63, (February 1996), available from [http://www.ndu.edu/inss/strforum/SF\\_63/forum63.html](http://www.ndu.edu/inss/strforum/SF_63/forum63.html); Internet; accessed 9 April 2008.

<sup>5</sup> Thomas Braunlinger paraphrases Admiral Johnson when he addressed the U.S. Naval Institute Annapolis Seminar and 123d Annual Meeting, Annapolis, MD, 23 April 1997. See Thomas Braunlinger, “Network Centric Warfare Implementation and Assessment” (master’s thesis, U.S. Army Command and General Staff College, 2005), 11.

<sup>6</sup> VAdm Arthur K. Cebrowski (USN) and John J. Garstka, “Network-Centric Warfare: Its Origin and Future,” *United States Naval Institute Proceedings* 124, no. 1 (Jan, 1998): 29.

<sup>7</sup> Admiral Johnson is quoted from his address at the U.S. Naval Institute Annapolis Seminar and 123d Annual Meeting, Annapolis, MD, 23 April 1997. See Cebrowski, “Network-Centric Warfare...,” 29.

<sup>8</sup> “*Speed of Command* is the process by which a superior information position is turned into a competitive advantage. It is characterized by the decisive altering of initial conditions, the development of high rates of change, and locking in success while locking out alternative enemy strategies. It recognizes all elements of the operating situation as parts of a complex adaptive ecosystem and achieves profound effect through the impact of closely coupled events. See Cebrowski, “Network-Centric Warfare...,” 32, 35.

bottom up – or to self-synchronize – to meet the commander's intent.”<sup>9</sup> Speed of command had three parts, information superiority, the massing of effects versus the massing of forces, and “the rapid foreclosure of enemy courses of action and the shock of closely coupled events”<sup>10</sup> which resulted in the disruption of the enemies OODA loop.<sup>11</sup>

Cebrowski and Gartska developed their concept based on the successes that businesses of the mid-1990s had achieved by applying network-centric concepts to business processes and applications. They argued that the innovations implemented by Wal-Mart and other companies had changed the very nature of the way business was conducted in the information age. They asserted that nations conducted war in a similar manner to the way businesses realized profits, and these new concepts would alter the way the US would conduct war in the future. They proposed that “Network-centric

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<sup>9</sup> “*Self-Synchronization* is the ability of a well-informed force to organize and synchronize complex warfare activities from the bottom up. The organizing principles are unity of effort, clearly articulated commander's intent, and carefully crafted rules of engagement. Self-synchronization is enabled by a high level of knowledge of one's own forces, enemy forces, and all appropriate elements of the operating environment. It overcomes the loss of combat power inherent in top-down command directed synchronization characteristic of more conventional doctrine and converts combat from a step function to a high-speed continuum.” See Cebrowski, “Network-Centric Warfare...” 32, 35.

<sup>10</sup> Cebrowski, “Network-Centric Warfare...” 32.

<sup>11</sup> “The OODA loop (Observe, Orient, Decide, and Act) is an information strategy concept for information warfare developed by Colonel John Boyd (1927-1997). Boyd developed the theory based on his earlier experience as a fighter pilot and work on energy maneuverability. He initially used it to explain victory in air-to-air combat, but in the last years of his career he expanded his OODA loop theory into a grand strategy that would defeat an enemy strategically by “psychological” paralysis. Colonel Boyd viewed the enemy (and ourselves) as a system that is acting through a decision making process based on observations of the world around it. The enemy will observe unfolding circumstances and gather outside information in order to orient the system to perceived threats. Boyd states that the orientation phase of the loop is the most important step, because if the enemy perceives the wrong threats, or misunderstands what is happening in the environment around him, then he will orient his thinking (and forces) in wrong directions and ultimately make incorrect decisions. Boyd said that this cycle of decision-making could operate at different speeds for the enemy and your own organization. The goal should be to complete your OODA loop process at a faster tempo than the enemy's, and to take action to lengthen the enemy's loop. One tries to conduct many more loops “inside” the enemies OODA loop, causing the enemy to be unable to react to anything that is happening to him.” See Value Based Management.net, “OODA Loop – John Boyd,” [http://www.valuebasedmanagement.net/methods\\_boyd\\_ooda\\_loop.html](http://www.valuebasedmanagement.net/methods_boyd_ooda_loop.html); Internet; accessed 25 March 2008.

operations deliver to the U.S. military the same powerful dynamics as they produced in American business.”<sup>12</sup>

This concept was further developed in 1999 by Gartska, David Alberts and Fred Stien in their book *Network Centric Warfare: Developing and Leveraging Information Superiority*. The book further described the concept and explained how it embodied the characteristics of the Information Age.<sup>13</sup>

consumers and operate at a thinner profit margin than their competitors.<sup>16</sup> Wal-Mart relied on volume sales and superior business practices based on network-centric operations to revolutionize their market share and gain the competitive edge.

*Network Centric Warfare* was followed in 2001 when Alberts and Gartska, this time with Richard E. Hayes and David A. Signori, published *Understanding Information Age Warfare*. It was in this book that NCW was proposed as an operational theory of warfare. It also identified three “domains that are central to an understanding of the nature and impact of information”<sup>17</sup>: the physical, the information and the cognitive domains. “The physical domain is the place where the situation the military seeks to influence exists”<sup>18</sup> or where events take place and sensors detect them. “The information domain is where information lives”<sup>19</sup> or where the data from the sensors is stored and manipulated, and “[t]he cognitive domain is in the minds of the participants”<sup>20</sup> or where the data is assessed and a decision is made on how to act upon the information provided by the sensors. Later that same year, in a US Department of Defense Report to Congress, it was noted that the term NCW and its definition were not universally acceptable, but the basic tenets of NCW were consistent with other activities being conducted under different terminology.

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<sup>16</sup> Alberts, *Network Centric Warfare*..., 47.

<sup>17</sup> David S. Alberts, *et al*, *Understanding Information Age Warfare* (Washington, DC: CCRP Publication Series, 2001), 10.

<sup>18</sup> *Ibid.*, 12.

<sup>19</sup> *Ibid.*, 12.

<sup>20</sup> *Ibid.*, 13.

The basic tenets of NCW are:

1. a robustly networked force improves information sharing;
2. information sharing enhances the quality of information and shared situational awareness;
3. shared situational awareness enables collaboration and self-synchronization, and enhances sustainability and speed of command;
4. and these, in turn, dramatically increase mission effectiveness.<sup>21</sup>

In 2003 *Power to the Edge* was published (again by Alberts, this time with Richard Hayes) to further developed the concepts of NCW. In *Power to the Edge*, the concept of a fourth domain, the social domain, where interactions between and among individuals and force entities was introduced. It contends that in today's information age, technology and network centric operations have enabled the rapid and effective sharing of information to such an extent that entities at the coal face of operations, or at the edge, become empowered with some aspects of command. By increasing this power to the edge, and increasing the number of edge entities, the overall power of the organization will be increased. This concept supports decentralization of command and empowerment at lower levels. In order to realize the advantages of power to the edge, a hierarchy flatter than traditional military structures would emerge. A shift to the edge entities pulling information from a central repository rather than central entities pushing the information they think is necessary would also ensue. In this manner, the individuals who had access

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<sup>21</sup> United States, Department of Defense, *Network Centric Warfare: Department of Defense Report to Congress, 27 July 2001*, 4-1, available from [http://www.defenselink.mil/cio-nii/docs/pt2\\_new\\_main.pdf](http://www.defenselink.mil/cio-nii/docs/pt2_new_main.pdf); Internet; accessed 19 March 2008.

to the information on the network would be able to self-synchronize without the coordinating efforts of a central command.<sup>22</sup>

Since then, there have been an ever growing number of publications dealing with NCW, and as one might expect, there has been much debate over whether NCW is indeed an emerging theory of warfare, and whether it should be at the forefront of a military's response to the Information Age. As a result, there have been many interpretations of NCW put forward by many different authors since the original concept was introduced. The outcome is that although the term network centric warfare is commonly used, the understanding of what that term actually means is less understood than should be the case. It is a concept, some ten years after its introduction, still under development and "much of the work on NCW remains speculative."<sup>23</sup>

Today, a decade after NCW concepts were introduced, "[t]he technologies that drive our military transformation are now embedded into our daily lives."<sup>24</sup> Things such as broadband access and wireless portable handheld devices are common place and almost taken for granted. Satellite radio and global positioning system (GPS) receivers are becoming standard features in our automobiles. Today, it is difficult to look back and position ourselves in relation to where technology was in 1998.

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<sup>22</sup> Joel N. Brown, "Power to the Edge ... Sometimes," Conference Paper, 10<sup>th</sup> International Command and Control Research and Technology Symposium: The Future of C2 (June 2005); available from <http://stinet.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA464284>; Internet; accessed 27 March 2008.

<sup>23</sup> Paul T. Mitchell, *Network Centric Warfare: Coalition operations in the age of US military primacy*, (New York: Routledge, 2006), 7.

<sup>24</sup> Eliot A. Cohen, "Change and Transformation in Military Affairs," *The Journal of Strategic Studies* 27, no. 3 (September 2004), 398.

At that time, in the Canadian Navy, systems such as GPS had been introduced throughout the fleet, but others such as Inmarsat, a worldwide satellite telephone service, and rudimentary networks on the ships, were not necessarily fitted throughout the entire fleet. Thus, capabilities as basic as email and telephone access at sea were fairly new concepts. The bandwidth available could not support video teleconferencing or internet access. Data exchange was limited to military applications and systems such as Link-11, GCCS, BF Email and the Message Handling System.<sup>25</sup> Ashore, the CF was at varying stages of becoming network enabled, with the majority of effort occurring at the base, wing or formation level. Video teleconferencing was available, but only through the use of multiple dedicated landlines, in specialized facilities. Internet access was normally restricted to single, stand-alone computers that were not necessarily available at all units. It is easy to forget how far we have come in the last decade, and the environment in which Cebrowski made his observations and proposals from. It may be that today we are so familiar with the technology he envisioned being used; we fail to see how much change it has actually brought about.<sup>26</sup>

To summarize, the USN introduced the concepts of NCW in the mid-1990s in an attempt to define what they saw as the revolution in military affairs that was gripping US military forces as they transitioned from the industrial age to the information age. It

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<sup>25</sup> Link-11 is a tactical data information link that provides target data via a high speed information exchange between fitted ships. Global Command and Control System (GCCS) is a world wide command, control, communications and intelligence system used by the US military to provide a world wide combined operating picture (COP). BF Email is a point to point HF email exchange system that uses commonly fitted High Frequency receivers and transmitters. The Message Handling System (MHS) is the system fitted on board ships to automatically receive and transmit teletype messages using a computer interface.

<sup>26</sup> *Ibid.*, 399.



was based on the success that networking in the business sector had achieved through the 1990s and the premise was that the US military could achieve similar success in warfare. In 1998 the term NCW gained popularity and contended that it would enable forces to develop a speed of command and allow self-synchronization to meet the commander's intent. By 2001 NCW was proposed as an operational theory of warfare and the four basic tenets had been identified. The concepts were further developed and in 2003 the notion that through increasing and empowering edge entities by rapid and effective sharing of information, a flatter, more effective command structure – decentralized command – could be achieved. Synchronization would be enabled without the coordinating efforts of a central command authority.

At present, there is no authoritative definition of NCW, it is still an evolving concept, and there is still significant discussion on whether it is an operational theory of warfare. However, the four basic tenets are generally agreed upon and can be used as a basis of discussion.<sup>27</sup> These days we tend to forget where technology was in the CF when the concepts of NCW were first introduced. Satellite telephone services and access to email were just being introduced to warships and the CF was rapidly increasing its network enabled capabilities but was still working at the regional or base level. Today we take basic email with attachments, real-time streaming video, instant wireless access to the internet, and the ability to do it globally for granted. In 1998 it was precisely this type of capability that proponents of NCW suggested be developed to gain the operational advantage.

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<sup>27</sup> United States, Department of Defense, *Network Centric Warfare: Department of Defense Report to Congress, 27 July 2001*, 4-1, available from [http://www.defenselink.mil/cio-nii/docs/pt2\\_new\\_main.pdf](http://www.defenselink.mil/cio-nii/docs/pt2_new_main.pdf); Internet; accessed 19 March 2008.

## TRANSFORMATION

Following the end of the Cold War and dissolution of the Soviet Union in 1991, western military forces, particularly those of NATO, found themselves faced with force organizations designed for a threat that no longer existed. Over the next ten years, most of these militaries went through a period of retrospection and downsizing as their respective governments cashed-in on the perceived peace dividends associated with this reduced threat. As early as the late 1990s, the term transformation was being used by the US Army to describe a required change from the Cold War organization to a lighter and more strategically responsive force in order to respond to emerging non-traditional threats.<sup>28</sup> At roughly the same time, the ideas of network centric warfare and the associated revolution in military affairs were suggesting that military forces were in the midst of a transition from the industrial age to the information age; this was also referred to as transformation. Regardless of its origin, the new aim of military operations was shifting to defined effects rather than attrition of forces.<sup>29</sup> Transformation is the policy response to this change.

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<sup>28</sup> United States General Accounting Office, *Report to Congressional Committees: Military Transformation: Army has a Comprehensive Plan for its Managing Its Transformation but Faces Major Challenges, November 2001*, 7. available from <http://www.gao.gov/new.items/d0296.pdf>; Internet; accessed 15 April 2008.

<sup>29</sup> Cohen, "Change and Transformation ...," 395.

## US TRANSFORMATION

Military transformation is a vital component of the US Defense Strategy and was outlined in detail in the fall of 2003 in *Military Transformation: A Strategic Approach*. This strategy expresses quite clearly what US military transformation is based on, and where it is taking their armed forces. Military transformation is identified as being “at the heart of the new [defense] strategy”<sup>30</sup> requiring “agile, network-centric forces”<sup>31</sup> that can “defeat adversaries swiftly and decisively”<sup>32</sup> while at the same time actively defend US territories. Transformation activities will include changes to planning, budgeting, acquisition and their personnel management system and will be shaped by “realities of competition in the information age and the concepts of network-centric warfare.”<sup>33</sup>

US military transformation is based on four pillars: strengthening joint operations, exploiting US intelligence advantages, concept development and experimentation, and developing transformational capabilities. Three parts: transforming culture, transforming processes, and transforming capabilities. With six operational goals; three mission-oriented: protect critical bases, project and sustain forces, and deny enemy sanctuary; and three enabling: leverage information technology, assure information systems, and

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<sup>30</sup> United States, Department of Defense, Office of Force Transformation, *Military Transformation: A Strategic Approach*. (Washington, DC: Director, Force Transformation, Office of the Secretary of Defense, 2003) 7.

<sup>31</sup> *Ibid.*, 13.

<sup>32</sup> *Ibid.*, 13.

<sup>33</sup> *Ibid.*, 13.

enhance space capabilities.<sup>34</sup> It also predicts that “future military operations will be conducted using more network-centric forces”<sup>35</sup>.

US Transformation is described as:

a process that shapes the changing nature of military competition and cooperation through new combinations of concepts, capabilities, people and organizations that exploit our nation's advantages and protect against our asymmetric vulnerabilities to sustain our strategic position, which helps underpin peace and stability in the world.<sup>36</sup>

From this strategy, it is clear that one of the essential elements of US military transformation is NCW. The US has embarked on a path of transformation in which NCW is an integral component. Thus, in cases where we are discussing the potential interoperability with any branch of the US military, one must fully expect that NCW will be a significant factor. This will be the case in any continued interoperability between the Canadian Navy and the USN, and must not be ignored or downplayed.

## **CF TRANSFORMATION**

The Canadian Forces are also in the midst of transformation. It has been noted that “the US military first identified the implications of the RMA and then went on to discuss how these would be dealt with within their armed services”.<sup>37</sup> The CF conversely seems to be undergoing an almost endless discussion on whether the changes currently

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<sup>34</sup> *Ibid.*, 17.

<sup>35</sup> *Ibid.*, 20.

<sup>36</sup> *Ibid.*, 2.

<sup>37</sup> Paul T. Mitchell, “A Transformation Agenda for the Canadian Forces: Full Spectrum Influence,” *Canadian Military Journal*, 4 no. 4 (Winter 2004): 56.

being experienced are in fact revolutionary or simply evolutionary; whether NCW is the path to follow; and how best to respond to these undefined changes.<sup>38</sup> Paul Mitchell noted in late 2004 “that Canadian interest in the RMA appears to have been relatively low key.”<sup>39</sup> He argues that the US will set the standard for technology, organization and doctrine, and that the current approach of the CF is “to allow these developments to mature and then determine where Canada might be able to fit into them.”<sup>40</sup> Since the US is already well on their way to transformation, Canada’s approach could be to simply follow suit.

If this were the case then it could be argued that aggressive pursuit and execution of full interoperability with the US Navy would allow the Navy to accomplish successful transformation, fully in line with an overall CF vision. CF Transformation however, is not so straight forward. While the US has tied transformation inescapably with NCW, Canada has not.

Although CF Transformation has been one of, if not the highest priority in the CF for the past three years, it remains difficult for one to define in simple terms. As early as 2004 General Ray Henault “had clearly recognized that fundamental changes to the CF were necessary in order to better position the institution for the coming decade.”<sup>41</sup> The 2005 Defence Policy provided the foundation required for “fundamentally reorienting

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<sup>38</sup> *Ibid.*, 56.

<sup>39</sup> *Ibid.*, 55-56.

<sup>40</sup> *Ibid.*, 56.

<sup>41</sup> BGen Daniel Gosselin and Dr. Craig Stone, “From Minister Hellyer to General Hillier: Understanding the Fundamental Differences Between the Unification of the Canadian Forces and its Present Transformation,” *Canadian Military Journal*, 5 no. 4 (Winter 2005): 9.

and restructuring the functions and the command and control of the CF to better meet the emerging security demands at home and abroad.”<sup>42</sup> The *2005 Defence Policy Statement* identified the CF to: adopt a fully integrated and unified approach to operations; evaluate the force structure on an ongoing basis; improve coordination with other government departments and interoperability with allied forces, particularly the US; update the command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities; place greater emphasis on experimentation to develop doctrine and concepts; and continue to invest in people.<sup>43</sup>

General Hillier further explained the concepts of transformation in simpler terms:

... for the CF to achieve greater operational effects in Canada and around the world, it will need to assume a more integrated and unified approach to operations, which can only be achieved through a major transformation of the existing command structure, the introduction of new operational capabilities, and the establishment of fully integrated units capable of a high-readiness response to foreign and domestic threats.<sup>44</sup>

Operational effectiveness was to be at the heart of CF Transformation. Transformation would enable the CF to become more relevant, responsible and effective.<sup>45</sup> It was from this foundation that transformation was launched with an end state of “a CF that is strategically relevant, operationally responsive and tactically decisive, supported by an

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<sup>42</sup> *Ibid.*, 9.

<sup>43</sup> Canada, *Canada's International Policy Statement: A Role of Pride and Influence in the World. Defence* (Ottawa: Government of Canada, 2005), 11-12.

<sup>44</sup> Gosselin, “From Hellyer to Hillier...,” 9-10, quoted Gen Rick Hillier, “Canadian Forces Transformation: From Vision to Mission,” *The Hill Times*, 26 September 2005, p. 24.

<sup>45</sup> “Talking Points: CF Transformation – CDS Seminar,” 18 Jun 05, 2; available from: [http://cds.mil.ca/cft-tfc/pubs/paproducts\\_e.asp](http://cds.mil.ca/cft-tfc/pubs/paproducts_e.asp); DND Intranet; accessed 29 January 2008.

effective, efficient and adaptable defence institution, and capable of operating within a dynamic and evolving security spectrum.”<sup>46</sup>

CF Transformation was to be accomplished in a four phase approach, and based on six principles:

Phases of CF Transformation:

1. Development of CF vision and analysis.
2. Restructure CF command and control.
3. Alignment of enabling functions and organizations; and
4. Force generation re-design.

Principles of CF Transformation:

1. Joint Operations – from an environmental culture to a CF culture.
2. Operations Primacy – from an institutional focus to operational goals.
3. Command Centric – from a staff-centric, matrix command and control construct to a command-centric one.
4. Authority – a chain of command empowered with authority, responsibility and accountability to a higher command.
5. Mission Command – from a risk adverse approach to an empowered mission command.
6. Structure – towards an integrated structure to reflect the regular, reserve and civilian components the CF is.<sup>47</sup>

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<sup>46</sup> Gen Rick Hillier, “CDS Planning Guidance – CF Transformation,” 10 November 2005, 2/10; available from [http://www.cds.forces.gc.ca/cft-tfc/pubs/documents\\_e.asp](http://www.cds.forces.gc.ca/cft-tfc/pubs/documents_e.asp); Internet; accessed 29 January 2008.

CF Transformation focus is on the establishment of new integrated (beyond joint) organizations and structures, including a unified national command and control system.<sup>48</sup>

In 2006 Chief of Transformation, General Natynczyk stated “transformation is not a destination but is a journey . . . its continual because the world changes and with those changes the Canadian forces has to adapt”<sup>49</sup> in much the same manner as the US describes their transformation. This suggests that there is no definitive end state, as previously expressed, to achieve. Unfortunately, unlike the US where there are a number of published documents readily available to describe transformation activities, there is no definitive CF document to turn to in these matters. The CF Transformation websites, both on the internet and the DWAN intranet, have not been updated since 2006, and regular reports on transformation activities seemed to cease after the unified commands of Canada Command (CANCOM), Canadian Expeditionary Forces Command (CEFCOM), Canadian Special Operations Forces Command (CANSOFCOM) and Canadian Operational Support Command (CANOSCOM) were established. CF Transformation has been described as “a ‘personality-driven’ and ‘fragmented’ command structure that leaves senior officers out of the loop . . .”<sup>50</sup> and “a much-reported yet very slow-moving ‘theme’”.<sup>51</sup> General Hillier himself adds to the confusion when he makes

<sup>47</sup> Gen Rick Hillier, “Transcript of a speech to the Conference of Defence Association Annual General Meeting,” 24 February 2006, available from [http://cds.mil.ca/cft-tfc/pubs/speeches\\_e.asp](http://cds.mil.ca/cft-tfc/pubs/speeches_e.asp); DND Intranet; accessed 29 January 2008; and “Talking Points: CF Transformation – CDS Seminar,” 3.

<sup>48</sup> Hillier, “CDS Planning Guidance – CF Transformation,” 3/10.

<sup>49</sup> Army News Online, “Team Ensures CF Transformation (video – 21 Feb 2006),” [http://www.army.gc.ca/lf/English/6\\_1\\_1\\_1.asp?FlashEnabled=0&id=914](http://www.army.gc.ca/lf/English/6_1_1_1.asp?FlashEnabled=0&id=914); Internet; accessed 15 January 2008.

<sup>50</sup> “Defence Makeover Needs Work,” *Toronto Star*, 20 July 2007; available from <http://www.thestar.com/printArticle/237987>; Internet, accessed 1 February 2008.



statements of the sort he did during a speech in 2007 when he “spoke proudly of the transformation of the Canadian Forces - shiny new planes and tanks, some already in the field - as well as equally shiny new recruits, eager to serve their country”<sup>52</sup> which seemed to imply that transformation was now about acquiring new equipment and expanding the current force strength.

Today, three years into the process, CF Transformation remains poorly documented and probably not truly understood by most. Some would claim that CF Transformation has achieved as many of its goals as it ever will, and should be declared complete. However, only the first two of the four phases identified have been completed. To date, alignment of enabling functions and organizations is ongoing and force generation re-design has yet to be addressed. There are certainly still problem areas in these aspects and in December 2006 Chief of Review Services (CRS) made the observation “[a] lack of clarity exists regarding the roles and responsibilities of the Chief of Force Development (CFD) and the Environmental Chiefs of Staff (ECS) for force development.”<sup>53</sup> Perhaps even more significantly they also found that an “[a]mbiguity exists related to accountability for the development and provision of communications and information systems support to operations”<sup>54</sup> Thus there remains a possibility for the

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<sup>51</sup> Chris MacLean, “Major General Walt Natynczyk: CF Transformation Assessment 2006,” *Frontline* 3 no. 2 (Mar/Apr 2006): 17 [journal on-line]; [http://www.frontline-canada.com/Defence/articles/06\\_FL2\\_Natynczyk.pdf](http://www.frontline-canada.com/Defence/articles/06_FL2_Natynczyk.pdf); Internet; accessed 1 February 2008.

<sup>52</sup> Kady O’Malley, “Hillier: Rock Star or On the Rocks.” *Macleans Magazine*, 4 October 2007, available from [http://www.macleans.ca/canada/features/article.jsp?content=20071004\\_162448\\_5120](http://www.macleans.ca/canada/features/article.jsp?content=20071004_162448_5120); Internet; accessed 1 February 2008.

<sup>53</sup> Department of National Defence, *Evaluation of Functional Responsibilities in Support of CF Transformation*, (Ottawa: Chief of Review Services, 2006) iv.

<sup>54</sup> *Ibid.*, iv.

ECS to continue their force generation activities in a stovepipe fashion, with little direction on how to move towards a more joint CF.

What the Navy must do to support transformation activities – other than the establishment of Joint Task Force (JTF) Atlantic and Pacific, which look very similar in structure to the old Maritime Pacific (MARPAF) and Maritime Atlantic (MARLANT) – remains open to interpretation. Based on the guiding principles of CF Transformation, the Navy should be moving to a more operations focused, joint concept. How this is to be achieved remains unspecified.

To conclude, after the Cold War ended, western militaries started to transform their forces from organizations designed to fight the Soviet threat to lighter and more strategically responsive forces. This was due in part both the downsizing of forces as a result of the perceived peace dividend expected by western governments, and the transition from industrial age to information age forces. The US has lead the way in transformation and US military transformation is based largely on NCW concepts. The US goal is to “deter and defend against the emerging threats of the 21<sup>st</sup> century.”<sup>55</sup> They have clearly defined and described their transformation activities in official doctrine that is readily available online from the Office of Transformation. The CF is also undergoing transformation. Announced in 2005, CF Transformation remains difficult to define in simple terms. Unlike its US counterpart, there is no single document that outlines the strategy or clearly defines CF Transformation. Direction was primarily promulgated by multiple CANFORGENs in 2006, and to this day, has not been amplified with any follow-on doctrine. As a result, there is a general lack of understanding of CF

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<sup>55</sup> US DoD, *Military Transformation: A Strategic Approach*, i.

Transformation across the CF. Operational effectiveness has been described to be at the heart of CF Transformation and its purpose is to enable the CF to become more relevant, responsible and effective. CF Transformation has been based on six principles: to move from a culture that is Environmental focused to a more joint CF culture; to become less institutional focused and more operationally focused; to transition from a staff-centric to command-centric organization; to empower a chain of command with authority, responsibility and accountability to a higher command; to progress from a risk adverse to empowered mission command organization; and to adopt an integrated structure to better reflect the regular, reserve and civilian components of the CF. The transformation activities remain largely focused on organizational changes, primarily the establishment of the unified national command system which included CANCOM, CEFCOM, CANSOFCOM, and CANOSCOM. In a manner similar to the US, the CF now describes transformation as a journey and not a destination. To date, the ECS have remained the force generators. Thus, for the Navy, the Chief of Maritime Staff (CMS) has retained the majority of duties he held prior to transformation activities. MARLANT and MARPAC have transformed into two of the regional commands, JTF Atlantic and JTF Pacific, but they too have retained similar responsibilities as before. Little strategic guidance has been provided on how the Navy is to evolve post-transformation, specifically in the area of development of communications and information systems and their support to operations.

## NETWORK ENABLED OPERATIONS

The concepts and terminology of NCW originated in the US by Cebrowski are probably still the most commonly used when speaking of this subject today. However, countries such as the United Kingdom, Australia and others<sup>56</sup> “recognize the importance of NCW as a “central concept” for shaping military transformation, and yet all have unique definitions and give varying emphasis to the key components of NCW.”<sup>57</sup> Different terms and concepts have been established by these countries in order to capture the nuances that they feel need to be made to differentiate their concepts from those of the US. Quite often these terms are used synonymously with NCW which can sometimes lead to confusion and error.

The US have adopted the term Network Centric Operations (NCO) to imply that the original concepts of NCW are not limited to warfare and can be applied to much broader operations. Doctrinally, they use the terms NCW and NCO interchangeably with no significant distinction in their definitions.<sup>58</sup>

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<sup>56</sup> “NATO has begun its implementation under the name NATO Network Enabled Capabilities (NNEC). Sweden refers to it as Network Based Defence (NBD) and has made this concept the centre point of its future defence forces. Australia, New Zealand, Singapore, and Germany are other examples of nations that have adopted this concept.” see Sandy Babcock. *DND/CF Network Enabled Operations Working Paper: A DND/CF Concept Paper for Network Enabled Operations*, Defence R&D Canada Technical Report (Ottawa: Defence Research and Development Canada, 2006), 5.

<sup>57</sup> Michael H. Thomson and Barbara D. Adams, *Network Enabled Operations: A Canadian Perspective*, (North York: Defence Research and Development Canada Toronto, 2005), 3.

<sup>58</sup> Evidence Based Research, Inc. *Network Centric Operations Conceptual Framework: Version 1.0*, (Vienna, VA: Evidence Based Research, 2003), 2.

The term Network Enabled Capabilities (NEC) is used by the United Kingdom and its concept is defined thus:

Network Enabled Capability offers decisive advantage through the timely provision and exploitation of information and intelligence to enable effective decision-making and agile actions. NEC will be implemented through the coherent and progressive development of Defence equipment software, processes, structures, and individual and collective training, underpinned by the development of a secure, robust and extensive network of networks.<sup>59</sup>

NEC diverges from the concepts of NCW in a few key areas. The UK does not place “the network at the centre of capability in the same doctrinal way as NCW”.<sup>60</sup> Instead, they maintain a command-centric rather than network-centric vision with NEC acting as an enabler of mission command. NEC will facilitate “the commander [to] articulate his intent and then allow subordinate commanders to execute that intent in the knowledge that they share the same situational understanding”.<sup>61</sup> The UK has identified NEC as being “at the heart of the way of operating described in Jt HLOC”<sup>62</sup> As such, they have placed NEC as an integral part of their future force construct in much the same way as the US has placed NCW as a cornerstone to US military transformation activities.

Australia on the other hand retained the term NCW. They describe it as “a means of organizing the force by using modern information technology to link sensors, decision

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<sup>59</sup> Great Britain, Ministry of Defence, *Network Enabled Capability (NEC)*, (London: Ministry of Defence, 2005), 2.

<sup>60</sup> Thomson, *NEOps: A Canadian Perspective...*, 3.

<sup>61</sup> Great Britain, *Network Enabled Capability...*, 5.

<sup>62</sup> The Joint High Level Operating Concept (Jt HLOC) is a UK Chief of Staffs endorsed headmark for how the UK should seek to conduct military operations in 2020. See Great Britain, *Network Enabled Capability*, 3.

makers and weapon systems to help people work more effectively together to achieve the commander's intent.”<sup>63</sup> Australia defines its NCW concept in the following manner:

The function of Network Centric Warfare (NCW) is to enable warfighters to employ the future warfighting concept of Multidimensional Manoeuvre. NCW will help warfighters to apply their combat capabilities to greater effect by allowing them to collaborate with each other, their supporting agencies and coalition partners. It will provide for the effective use of information in the conduct of Multidimensional Manoeuvre and enhance the Australian Defence Force's (ADF's) performance in each Future Warfighting Function. It will also contribute to enabling a National Effects Based Approach to national security.<sup>64</sup>

Australia has replaced the four basic NCW tenets with their own five NCW premises: professional mastery, mission command, robust network, shared situational awareness, and self-synchronisation. Thus, in a manner similar to the UK, they have included mission command as a core component and focused their concepts on the human-centric aspects rather than on the technological network-centric issues. Like both the US and UK, Australia also identified NCW as “one of the key enabling concepts that support the Australian Defence Force's (ADF) Future Joint Operations Concept (FJOC).”<sup>65</sup> Doctrinally, Australia is well positioned with regard to NCW and has released detailed documents on the definition, concept, and roadmap to implementation which are readily available online.

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<sup>63</sup> Australia, Department of Defence, *Explaining NCW – Network Centric Warfare* (Canberra: Defence Publishing Service, 2005), 5.

<sup>64</sup> Australia, Department of Defence, *Enabling Future Warfighting – Network Centric Warfare*, (Canberra: Defence Publishing Service, 2004), 1-1.

<sup>65</sup> Australia, Department of Defence, *NCW Roadmap 2007*, (Canberra: Defence Publishing Service, 2007), iii.

The Canadian Forces have adopted the term Network Enabled Operations (NEOps) to capture the concepts of NCW. To date, there is no definitive definition of NEOps but it has been described in the following manners:

A concept that has the potential to generate increased combat power by networking sensors, decision makers and combatants to achieve shared battlespace awareness, increased speed of command, higher operational tempo, greater lethality, increased survivability, and greater adaptability through rapid feedback loops”.”<sup>66</sup>

An evolving concept aimed at improving the planning and execution of operations through the seamless sharing of data, information and communications technology to link people, processes and ad hoc networks in order to facilitate effective and timely interaction between sensors, leaders and effects.<sup>67</sup>

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>68</sup>

This Canadian concept is more in line with the UK and Australia than the US, as it attempts to emphasize the “human elements and the need for cooperation and collaboration”.”<sup>69</sup> Although there is a general lack of documentation on the subject of NEOps, a common theme in Canadian discussion is the concern that the US approach to NCW and transformation is to a large extent technically driven. Canadian authors tend to downplay the technology and attempt to emphasize that the human aspect plays a

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<sup>66</sup> Thomson, *NEOps: A Canadian Perspective...*, 5.

<sup>67</sup> Babcock, *DND/CF NEOps Working Paper...*, 1.

<sup>68</sup> Sandy Babcock, *Canadian Network Enable Operations Initiatives*, Conference Paper with briefing notes, 4; available from <http://stinet.dtic.mil/oai/oai?&verb=getRecord&metadataPrefix=html&identifier=ADA466127>; Internet; accessed 27 March 2008.

<sup>69</sup> Thomson, *NEOps: A Canadian Perspective...*, 6.

significant role in the concepts of NEOps.<sup>70</sup> Although it is the technical network that forms the backbone, how people use this technology in a manner to better carry out more efficient operations is paramount. NEOps endeavours to provide a broad spectrum of information from a wide range of sources to the lowest level of user possible; which in turn will contribute to a shared situational awareness, and a common understanding and the improved performance.<sup>71</sup>

The concepts of NEOps will promote information sharing across the CF and should improve the way people work together. This Canadian concept offers more emphasis on cooperation and collaboration than the US NCW concept does.<sup>72</sup> It is less about the technical nature of the networks, and more about how the networks and their users will support operations in a more effective manner.<sup>73</sup>

In the *DND/CF Network Enabled Operations Working Paper*, NEOps is specified as being “central to ongoing [CF] transformation efforts.”<sup>74</sup> However, unlike the US the CF has a distinct lack of any mention of NEOps in its description of CF Transformation. Therefore, there is a possibility that future differences in approach could lead to

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<sup>70</sup> Sandy Babcock, Michael Thomson, and Alan English, all make the point that NCW concepts concentrate on the technology of the network whereas the Canadian concept should be more focused on the human aspects or the social networks and not the technology. See Alan English, Richard Gimblett and Howard Coombs, *Beware of Putting the Cart Before the Horse: Network Enabled Operations as a Canadian Approach to Transformation*, (North York, ON: Defence Research and Development Canada – Toronto, 2005); Babcock, *DND/CF NEOps Working Paper*; and Thomson, *NEOps: A Canadian Perspective*.

<sup>71</sup> Babcock, *DND/CF NEOps Working Paper*..., 8-10.

<sup>72</sup> Thomson, *NEOps: A Canadian Perspective*..., 5.

<sup>73</sup> Babcock, *DND/CF NEOps Working Paper*..., i.

<sup>74</sup> *Ibid.*, i.



difficulties for the Navy as they continue to pursue both CF Transformation activities and interoperability with USN.

The Army, Air Force and Navy, have all implemented, to one degree or another, some level of NEOps capabilities.<sup>75</sup> To date, the efforts have been rather ad hoc in nature with little to no coordination or outlook to future joint operations. The decisions on what aspects of NEOps to implement have largely been decided by the individual Environments depending on the need at the time of the decision, and with little strategic oversight. It is difficult to determine if the efforts to date are in line with CF Transformation efforts, or if they will eventually assist in the perceived shared situational awareness required by the new joint commands.

To finish, the concepts and terminology for NCW as developed by the US are still the most commonly used when speaking of it today. Other countries have recognized the importance of NCW as a central concept of transformation, and have developed their own versions of the concept using different terms. The US has adopted the term NCO to reflect that NCW is not limited to warfighting, but is applicable to all operations that the military can be involved in. The definition however, remains the same as NCW and the terms can and are frequently used interchangeably. The UK has adopted NEC, which diverges from NCW in that it focuses on a command-centric vice a network-centric vision. NEC is an enabler of mission command and has been identified as an integral part of the future UK military force construct, in a similar manner to the way the US has made NCW integral to their military transformation. Australia retained the term NCW, but redefined the basic tenets to include professional mastery and mission command. Thus like the

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<sup>75</sup> *Ibid.*, 17.

UK, they have made mission command a core component of their concept of NCW. Both the UK and Australia have incorporated the human element as a central theme to their versions of NCO. The US, UK and Australia all have well documented and relevant doctrine. The Canadian concept is NEOps, but there is limited literature available on the subject to date. No NEOps doctrine has yet been promulgated and multiple definitions exist. A common theme in what has been written emphasizes that NCW is too technically driven and NEOps needs to emphasize the human aspect. Although the technology provides the means, how the humans use this technology is key to NEOps. NEOps embraces the concepts of NCW in that it will rely on a robust network; promote info sharing across the CF and provide a broad range of info from a wide range of sources to the lowest levels of the organization possible; contribute to a shared situational awareness; and improve performance through common understanding. Thus, the Canadian concept offers more emphasis on cooperation and collaboration. The Army, Air Force and Navy have independently implemented to varying levels of NEOps capabilities determined by their Environmental requirements, but they have done so in an ad hoc manner with little to no strategic guidance. Hence, there is no guarantee that these efforts will result in the requirements that CF Transformation and the operational commands will necessarily need. Unlike the US, UK and Australia, “NEOps has not yet been formally accepted as a principle supporting the transformation of DND ...”<sup>76</sup> This could possibly cause potential problems for the Navy in the future as they pursue both CF Transformation and maritime interoperability.

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<sup>76</sup> Alan English, Richard Gimblett and Howard G. Coombs, *Network Operations and Transformation: Context and Canadian Contributions*, (Montreal: McGill-Queens University Press, 2007), 138.

## CURRENT BUSINESS CONCEPTS AND DEVELOPMENTS

Although it is not the purpose of this paper to discuss whether NCW is an emerging theory of warfare, or even to discuss whether we are in the midst of a revolution of military affairs – or simply undergoing the normal evolutionary processes that militaries have experienced since time began; it is enlightening to look back to the origins of NCW, the private sector, to see if they have abandoned their concepts concerning the efficacy of networks.

One might argue that in the military there may be less of an urgency to adopt new practices and cutting edge technology (when it comes to these practices) as there is no true financial bottom line to be held accountable for. Therefore, if the cost of implementing new technology is expensive and its relevance being questioned, while there is no business case to be applied against a profit margin, it may be too difficult to justify wholesale implementation of something along the lines of NCW, NEOps and transformation. Similarly, since measuring the effectiveness of the military is not as tangible as looking at the bottom line to see how much profit there was in any given year, it is difficult to implement new procedures and ways of doing business rapidly in an attempt to achieve greater responsiveness and better efficiency in operations.

However, in business this is not the case. In business, the bottom line is paramount and competition will not allow prolonged or drastic mistakes. If your changes to business processes do not work almost immediately, they will be abandoned for something else. In light of this, it is useful to look back to business now, some ten years

after the concepts of NCW were introduced, to see if business has continued down the path observed by Cebrowski.

In the 1990s businesses were quality oriented and essentially approached production in a stovepipe fashion where the financial departments operated somewhat independently from the marketing department which in turn operated in isolation from the production department, and so on. Technology was embraced to improve efficiencies by reengineering business processes to capture all aspects of the business. This was achieved by implementing a client service architecture which linked their departments, and in many cases their suppliers as well, together through software to improve operational productivity.<sup>77</sup> Since then, the result has been the move of the majority of major business to an enterprise architecture<sup>78</sup> employing enterprise resource planning (ERP)<sup>79</sup> software in their day to day activities. What once gave business the competitive

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<sup>77</sup> Philip Lay, "Business Network Transformation to Create Competitive Advantage, SAPPHIRE 07 Atlanta Webcast; available from <http://www.sap.com/community/showdetail.epx?itemID=9183>; Internet; accessed 15 April 2008.

<sup>78</sup> ADM(IM) describes Enterprise Architecture as "both a practice and a product. The practice may be viewed as the art and science of planning, designing, and executing change in enterprise activities. As a product, it provides a formal description of the structure and function of the components of an enterprise, their relationships, and the guidelines governing their design. EA, in its simplest form, can be used to communicate a roadmap for the change needed to achieve enterprise objectives. Enterprise Architecture provides positive support to the enterprise by establishing a common communication platform to systematically define the current (as-is) and desired target (to-be) environments. To achieve this, EA aims to incorporate systems, control the configuration of components, identify redundancy, ensure compliance with standards, and ensure efficient processes. The successful implementation and maintenance of enterprise architecture requires that it be managed as a formal practice." ADM(IM) then goes on to define EA as "A strategic information asset base, which defines the business, the information necessary to operate the business, the technologies necessary to support the business operations, and the transitional processes necessary for implementing new technologies in response to the changing business needs. It is represented through a set of integrated blueprints." see Department of National Defence, *Department of Defence and Canadian Forces Architecture Framework (DNDAF)* (Ottawa: ADM(IM) Director Enterprise Architecture, 2007), 8.

<sup>79</sup> "Enterprise Resource Planning (ERP) is actually a process or approach which attempts to consolidate all of a company's departments and functions into a single computer system that services each department's specific needs. It is, in a sense, a convergence of people, hardware and software into an efficient production, service and delivery system that creates profit for the company." See The Tech FAQ,

edge, the use of ERPs and having business processes in order, are essential core requirements today.

While the CF persist in the struggle with their definitions and concepts of NEOps and transformation, the private sector in which the original observations were made, continue to evolve. In order to maintain the competitive edge in today's global economy, business networks are undergoing significant transformations. Global competition is causing an erosion of profit margins and as a result businesses are looking at how to create new value in their current networks, and not just the technical but the human networks as well.<sup>80</sup> Referred to as Business Network Transformation or the Value Network Approach, it is described as “the transition from a company's internal network to an external network among multiple companies”<sup>81</sup> where “different economic actors – supplier, partners, allies, and customers – work together to co-produce value.”<sup>82</sup> It describes an almost joint or interoperable premise amongst companies “[w]here once individual firm[s] battled against each other, today the war is waged between networks of interconnected organisations.”<sup>83</sup> As business becomes increasingly connected, and moves to a service oriented architecture (SOA)<sup>84</sup>, the ability to conduct business across

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“What is Enterprise Resource Planning or ERP,” <http://www.tech-faq.com/enterprise-resource-planning-erp.shtml>; Internet; accessed 9 April 2008.

<sup>80</sup> Philip Lay, “Business Network Transformation ...,” webcast.

<sup>81</sup> Ferri Abolhassan, “Profiting from the Knowledge of Others,” *SAP Info: The SAP Magazine*, Issue 149 (January/February 2008): 15.

<sup>82</sup> Joel Peppard and Anna Rylander, “From Value Chain to Value Network,” *European Management Journal* 24 no. 2 (April 2006): 6-7; available from [http://www.som.cranfield.ac.uk/som/research/centres/isrc/documents/EMJ\\_Peppard\\_Rylander\\_April06FromValueChainToValueNetwork.pdf](http://www.som.cranfield.ac.uk/som/research/centres/isrc/documents/EMJ_Peppard_Rylander_April06FromValueChainToValueNetwork.pdf); Internet; accessed 21 April 2008.

<sup>83</sup> *Ibid.*, 7.

this new business network can be turned into a competitive advantage.<sup>85</sup> To survive in today's business world, companies must cooperate, collaborate and be co-dependent. They must stop focusing on internal cost cutting and look to outsourcing and partnering. Companies in the future will concentrate on their successful areas or differentiated work and will offload their non-differentiated work, to other companies to whom it is the differentiated work.<sup>86</sup> It is in this manner, by transforming into dynamic business networks, in which each entity focuses on their key differentiated work while collaborating with networked partners, that they will gain the competitive edge.<sup>87</sup>

Today's private sector continues to develop ideas that are closely aligned with the concepts of NCW. "While CEOs and CIOs once saw IT primarily as a tool for reducing costs . . . today they see it as a fundamental part of their business strategy."<sup>88</sup> Similarly, the CF originally saw information technology as a way to maximize its business processes, reduce costs and resources. Today, it is much more than simply a tool for increasing efficiencies. It has become an integral component of the way the CF does

<sup>84</sup> Service Oriented Architecture (SOA) is defined as "an application architecture in which all functions, or services, are defined using a description language and have invocable interfaces that are called to perform business processes. Each interaction is independent of each and every other interaction and the interconnect protocols of the communicating devices (i.e., the infrastructure components that determine the communication system do not affect the interfaces). Because interfaces are platform-independent, a client from any device using any operating system in any language can use the service. See Webopedia, "Service-Oriented Architecture," [http://www.webopedia.com/TERM/S/Service\\_Oriented\\_Architecture.html](http://www.webopedia.com/TERM/S/Service_Oriented_Architecture.html); Internet; accessed 21 April 2008.

<sup>85</sup> Amit Sinha, "The Business Case for Service Oriented Architecture - Business Network Transformation," podcast; available from <http://www.soa-consortium.org/podcast-CA2007-as.htm>; Internet; accessed 23 March 08.

<sup>86</sup> Philip Lay, "Business Network Transformation . . .," webcast.

<sup>87</sup> Amit Sinha, "The Business Case for Service Oriented Architecture . . .," podcast.

<sup>88</sup> Jeff Reich, "Networked for the Future," *SAP Info: The SAP Magazine*, Issue 149 (January/February 2008): 12.

business, and has become embedded in its strategy. Where the CF is now attempting to harness innovation to gain the competitive edge, leading business is “accelerating innovation for competitive advantage”<sup>89</sup> through business network transformation.

It would appear that business has overcome the stagnation that the CF finds itself in, and continues to implement concepts that are very similar to those expressed in NCW and NEOps. Although an overly simplistic approach, it would appear that if we do conduct war in the same manner that we conduct business, the concepts of NCW, its Canadian equivalent NEOps, and transformation remain a valid concept for today’s CF.

To conclude, a quick look to the private sector confirms that the concepts associated with NCW first observed in business are still in use today. Since in business, profit is paramount, and competition will not allow prolonged problems or drastic mistakes, if the original observations Cebrowski made had failed, business would have abandoned them for more profitable practices. In the military, there is less urgency to adopt cutting edge business technology and its associated business practices as there is no profit margin or bottom line to measure against. Hence, it is understandable if the NEOps efforts in the CF have lagged behind business practices. Business in the 1990s was organizationally stovepiped and quality oriented. Business processes were reengineered to improve efficiencies across these stovepiped departments. This resulted in a network-centric approach where the majority of business adopted client server based Enterprise Architecture using ERP software. In this way, a competitive advantage was achieved. What gave companies the competitive edge in the 1990s has become core business practice today. In order to regain the competitive advantage, a new concept is

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<sup>89</sup> *Ibid.*, 13.

emerging called Business Network Transformation in which businesses are moving towards service oriented architecture and networking externally across multiple companies. The concept has business focusing on their successful or differentiated work and outsourcing their non-differentiated work to other companies that excel in these areas. In this manner they increase productivity, reduce costs and maximize profits; thus once again gaining the competitive edge. Today business has moved beyond the original ideas observed by Cebrowski in an approach similar to the current concepts of NCW and transformation. Thus, it would appear that the concepts of NCW, its Canadian equivalent NEOps, and transformation remain valid for today's CF.



## **NETWORK ENABLED OPERATIONS IN TODAY'S CANADIAN FORCES**

To date, each of the CF Environments has independently implemented the changes required to generate the forces they think needed to reach the goals of CF transformation. Unfortunately, in these regards the goals are not necessarily defined well enough to guarantee that the Environments are working in synchronization, specifically in matters relating to NEOps capabilities. As a result, the Army, Air Force, and Navy, find themselves in varying stages of the development and implementation of NEOps capability. As a consequence, there is no guarantee that the NEOps capability required for the Navy's pursuit of interoperability with the USN will develop the tools and skill-sets required to function effectively in a joint environment with the Army and Air Force. This chapter will examine the current situation with regard to NEOps of each Environment in order to clarify whether the continued pursuit of maritime interoperability will position the Navy favourably for future NEOps requirements associated with CF Transformation activities.

### **NAVY**

The Canadian Navy is currently well positioned with regard to NEOps and it has been at the leading edge of the development and implementation of the concepts of NCW into the CF. During the years of the Cold War, as a member of NATO, the Canadian Navy specialized in Anti Submarine Warfare (ASW) and was already becoming well entrenched with the concepts and practice of the exchange of tactical data at sea, and well acquainted in working with the other navies of NATO. During the 1970s, systems such

as Link-11<sup>90</sup> were introduced in order to automate this data sharing requirement. In the 1980s, improvement of Link-11, the introduction of satellite communications (SATCOM), the improvement of command and control systems through TRUMP<sup>91</sup> and the design and build of the Canadian Patrol Frigate, further ingrained the idea of tactical data information exchange among ships within the mindset and procedures of the Navy.

This positioned the Navy well for its part in the 1991 Gulf War where it was initially employed as part of the Multinational Interception Force (MIF) imposing the United Nations embargo against Iraq. During hostilities, because of this ability in tactical data information exchange, the skill-sets developed as part of NATO, and the capabilities of its warships, the Canadian Task Group Commander was assigned the role of Coalition Logistics Forces Commander; the only non-US officer assigned a significant naval warfare command during this endeavour.<sup>92</sup>

After the 1991 Gulf War, Canada continued to send individual warships on a regular basis to operate with US led task forces in and around the Arabian Gulf in support

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<sup>90</sup> “Link-11 provides high speed computer-to-computer digital radio communications in the high frequency (HF) and ultra-high frequency (UHF) bands among Tactical Data System (TDS) equipped ships, aircraft and shore sites.” see FAS Intelligence Resource Program, “Tactical Digital Information Links (TADIL),” <http://www.fas.org/irp/program/disseminate/tadil.htm>; Internet; accessed 2 April 2008.

<sup>91</sup> The Tribal Upgrade and Modernization Program (TRUMP) “updated the four IROQUOIS Class destroyers originally constructed and delivered to the Navy in the early 1970s. The introduction of the HALIFAX Class frigates left the Canadian Task Group (CTG) deficient in two critical areas: the capability to defend escorted vessels against air attack (area air defence) and a Task Group command and control capability. To address these deficiencies, the TRUMP project delivered four modernized IROQUOIS Class

of United Nation sanctions against Iraq. It was here that the Canadian Navy began its efforts in earnest to become more interoperable with the USN with the specific goal of being able to integrate into US naval formations. Integration of single ships into the US led Maritime Interdiction Operations (MIO) continued through the 1990s and by the mid-1990s, Canadian warships were beginning to go beyond simply operating alongside US warships, and actually began to integrate into US formations for extended deployments. Over the years, what started out as integrating a Canadian Pacific Fleet warship into a USN Surface Action Group (SAG) for deployment to the Gulf, evolved into the successful integration of Canadian warships into USN Carrier Battle Groups (CVBGs) for extended deployments well before the attacks of September 11, 2001 occurred.<sup>93</sup>

As a result, since the concepts of NCW were evolving largely from the developments and activities of the US Pacific Fleet in the mid-1990s, the Canadian Navy found itself uniquely positioned to be deeply involved in the development and implementation of NCW from the beginning.<sup>94</sup> “Canada [had] thus become a member of a select club, enjoying special access to the command and control concepts developed by the U.S. Navy as it travel[ed] down the road of network-centric warfare”.<sup>95</sup>

It is interesting to note however, that the development and fitting of Canadian warships with the equipment necessary to become network enabled, and interoperable with USN formations, was not as easy as some today would contend. There is a general misconception that the Canadian Navy operates as a homogeneous entity on both the east

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<sup>93</sup> Paul T. Mitchell "Small Navies and Network-Centric Warfare: Is there a Role." *Naval War College Review* 56, no. 2 (Spring, 2003): 92.

<sup>94</sup> English, *The Cart Before the Horse...*, 29.

<sup>95</sup> Mitchell "Small Navies and NCW...", 92.

and west coasts. In fact, the two coasts operate quite differently and almost independent of one and other. In terms of interoperability the west coast (Maritime Pacific or MARPAC) concentrates solely on working with the USN. In this fashion they find themselves being also highly interoperable with the Australian Navy, who to a certain extent follows the same path as the Canadians, and to a somewhat lesser extent, with other Pacific Rim countries such as Japan, Chile and South Korea.<sup>96</sup> The east coast (Maritime Atlantic or MARLANT) on the other hand must strive to be interoperable with both the USN and NATO forces. Due to the ongoing commitment to Standing NATO Response Force Maritime Group 1 (SNMG-1)<sup>97</sup>, and resource constraints, MARLANT often finds themselves tending to focus on NATO issues. Thus the Canadian Navy is divided into two arenas or areas of concentration with MARPAC being more USN-centric and MARLANT being more NATO-centric.

In an attempt to achieve better interoperability to be able to fully integrate with the USN, MARPAC was constantly pushing the envelope in matters concerning connectivity and NCW. This was normally done against both the wishes and direction of the naval engineering establishment, with both the east coast and NDHQ generally

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<sup>96</sup> “The Rim of the Pacific (RIMPAC) Exercise held sporadically at Pearl Harbour since 1971, is the world’s largest international maritime exercise.” “RIMPAC aims to improve participating units’ success rates in a wide array of combined operations at sea. By enhancing interoperability, RIMPAC helps to promote stability in the Pacific Rim region, to the benefit of all participating nations.” “It is hosted by the United States Navy and in 2006 involved other Pacific nations including Canada, Australia, Chile, Japan, Peru, the Republic of Korea, and the United States. Though not a Pacific nation, the United Kingdom also participated. 2006 observer nations included Ecuador, Malaysia, Mexico, the Philippines, Russia, Singapore and Thailand.” See National Defence: Canadian Navy, “Operations and Exercises,” [http://www.navy.forces.gc.ca/cms\\_operations/operations\\_e.asp?category=43&id=514](http://www.navy.forces.gc.ca/cms_operations/operations_e.asp?category=43&id=514); Internet, accessed 16 April 2008.

<sup>97</sup> As a consequence of integration into the NATO Response Force (NRF), on 1 January 2005 the standing NATO naval groups were renamed. STANAVFORLANT was renamed Standing NRF Maritime Group 1.

questioning the validity and legitimacy (in terms of established naval engineering regulations) of the varying network enabled fits. The result was a break from the traditional process of implementing new equipment changes and upgrades in the Navy;<sup>98</sup> to a more ad hoc nature in modifications to the existing equipment and installation of new equipment on a case-by-case basis. To do this, MARPAC resorted to ‘Mission Fits’ or Temporary Engineering Changes that were to be used for specific events, and then removed on completion. As it turned out, this ‘Mission Fit’ mentality fit quite well into the evolutionary nature of NCW concepts. In fact, it was discovered (quite by accident) that using this methodology allowed MARPAC to fit its entire fleet “in a steady and fiscally manageable way.”<sup>99</sup> This methodology did not sit well with central authorities however, and in the spring of 2001 a situation developed where an early version of COWAN (later to become CENTRIXS),<sup>100</sup> fitted on the CANFLTPAC command ship HMCS ALGONQUIN, being evaluated during an exercise with the USN and Royal Australian Navy (RAN) was order to be removed by central authorities because established engineering regulations had not been adhered to. Ironically, later that year the events of 9/11 triggered the rapid deployment of the MARLANT Task Group to support the War on Terror and MARLANT “had to scramble to fit the ships with

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<sup>98</sup> The Canadian Navy uses a formal method to control the installation, modification and removal of all fitted equipment on a warship. This process is the Engineering Change (EC) Process, which consists of identifying, approving, designing, funding, scheduling, and fitting of common equipment across classes of ships throughout the fleet. It is normally time intensive and does not have the flexibility to allow unique fits for individual ships. This process is normally rigidly adhered to and controlled by the Director General Maritime Equipment Program Management (DGMEPM) in NDHQ.

<sup>99</sup> English, *The Cart Before the Horse...*, 29.

<sup>100</sup> COWAN (Coalition Wide Area Network) was the precursor to CENTRIXS (Combined Enterprise Regional Information Exchange System), a global multinational network maintained by the US, which is now the primary network for coalition interoperability.

COWAN, and train their operators prior to arriving in theatre.”<sup>101</sup> Since the relevance of these fits was quickly realized during the following operations, little is made of these issues now. However, at the time, there was a general malaise in the Navy to push the envelope in matters concerning NCW and associated fits. Since then, the will to become fully network enabled in order to interoperate effectively with the USN has been solidified. The end result was the Navy becoming fully committed to the concepts of NCW and NEOps.

Canadian warships from both coasts continued to improve and implement NEOps capabilities in their successive deployments to the Arabian Gulf in support of the War on Terror. This in turn enabled Canadian commanders to be assigned the roles of Composite Warfare Commanders (CWC) in the ongoing operations. By 2003, when Commodore Girouard assumed command of Task Force 151, all Canadian warships deployed were fitted with a robust networking capability, which included a designated intranet (DWAN), a CAN-US eyes only secret intranet (MCOIN), a coalition-wide classified intranet (CENTRIXS) – all capable of chat and white-boarding as well as websites and email – extensive satellite communications through multiple communication channels managed by the High Speed Data Connectivity (HSDC) fit, NERA Satellite telephone systems, Inmarsat Mini-M satellite telephones, SATCOM, Video Teleconferencing (VTC) capabilities, Battle Force Email (BFEM), Global Command and Control System – Maritime (GCCS-M) and Link-11. The IROQUOIS class command platforms had the

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<sup>101</sup> For a more detailed description of the implementation of NEOps capabilities in response to the events of 9/11 see Capt(N) Paul Maddison, “The Canadian Navy’s Drive for Trust and Technology in Network-Centric Coalitions: Riding Comfortably Alongside, or Losing Ground in a Stern Chase?” (Toronto: Canadian Forces College Advanced Military Studies Course Paper, 2004)

additional capabilities of HaveQuick Frequency Agile Radios for Fast Air control, Link-16 and Super High Frequency (SHF) Satellite Communications. In fact, most Canadian warships deployed in support of the War on Terror had a level of network-enabled capability only matched by that of a USN cruiser.<sup>102</sup>

Doctrinally, the Navy has also embraced the concepts of NEOps. In 2001 *Leadmark* identified “a guiding principle of future force development will be achieving ‘seamless operational integration at short notice,’ with . . . the USN” particularly in the area of C4ISR.<sup>103</sup> This tied the Canadian Navy to a hard requirement to become technically interoperable with the USN, which was proceeding down the path of NCW, in areas of C4ISR. Hence by doctrine, the Canadian Navy was required to advance its own NEOps capability in order to achieve the interoperability identified. *Leadmark* went on to identify Gateway C4ISR as a force multiplier.<sup>104</sup> Consequently, the Navy was further required to develop its NEOps capability to act as the gateway between the USN and less capable coalition navies in the Arabian Gulf. By fitting Canadian warships with the combination of CENTRIXS and systems compatible with older technology such as Link-11 and BFEM, they were enabled to play an important role in passing information to coalition partners that did not enjoy the network-enabled capabilities of others and were not fitted with CENTRIXS.

By 2005, *Securing Canada’s Ocean Frontiers* further identified that the “C4ISR construct requires ‘network enabled’ command and control architecture to facilitate all

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<sup>102</sup> English, *The Cart Before the Horse ...*, 37.

<sup>103</sup> DND, *Leadmark*, 128.

<sup>104</sup> *Ibid.*, 126.

levels of joint, interoperable, interagency and multinational integration”<sup>105</sup> in order to move beyond interoperability with just the USN and achieve similar capabilities within our own forces, OGDs and other agencies. Today, the Navy has embraced this concept whole-heartedly and not limited its efforts to the ships alone. Integrated C4ISR activities are ongoing in both a joint and interagency manner. The compilation of information from the employment of unmanned aerial vehicles on coastal patrols, maritime patrol aircraft, satellite imagery, surface vessels and submarines, into a common operating picture (COP) to maintain maritime security is a high priority in the Navy.

The recent establishment of Maritime Security Operations Centres (MSOC) in both Halifax and Esquimalt manned by personnel from the five core partner agencies – Canadian Border Services Agency, Canadian Coast Guard, Department of National Defence, Royal Canadian Mounted Police and Transport Canada – are enabling information exchange and identifying the technology requirements for future operations.<sup>106</sup> Once fully operational, the MSOCs will enable the Navy to act as regional centres to collate, fuse and maintain a maritime picture which in turn will be passed to Canada Command, where a National Recognized Maritime Picture (NRMP) will be compiled, and then passed to Northern Command in Colorado to provide the Canadian component to an integrated North American maritime COP. At the same time, this

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<sup>105</sup> Department of National Defence, *Securing Canada's Oceans Frontiers: Charting a Course from Leadmark*, (Ottawa: Directorate of Maritime Strategy, 2005), 35.

<sup>106</sup> Canada, “Maritime Security Operations Centre Project - Communiqué 001,” <http://msoc-cosm.gc.ca/com/com/29032006-eng.asp>; Internet; accessed 2 April 2008.



information will be shared in a horizontal fashion to the other core partner agencies in the region.<sup>107</sup>

To summarize, the Navy started viewing tactical data exchange as an integral component in ASW in the early 1970s and as a member of NATO developed the ability to work closely with other navies. Equipment upgrades of the 1980s enabled the Navy to be an active participant in the 1991 Gulf War and allowed Canadian Naval Commanders to assume the position of Coalition Logistics Force Commander. This participation with US led operations continued after the war, and fostered more interoperability with the USN, culminating in the ability of Canadian warships to fully integrate into USN Carrier Battle Groups. This uniquely positioned the Canadian Navy to be deeply involved in the development and implementation of NCW concepts. The events of 9/11 consolidated the requirements for NCW and resulted in the Navy being fully committed to furthering its NEOps capability. Navy doctrine further supported this position and amplified the requirements to include capabilities such as gateway C4ISR and better integration of joint, inter-department, and multi-agency operations. Gateway C4ISR objectives were realized during the deployments in support of the War on Terror and enabled the Canadian Navy to play an important role in effectively passing information within the coalition. This combination of NEOps and Gateway C4ISR capabilities once again placed Canadian Naval Commanders well positioned to assume significant operational command positions. Today, the MSOC project is an example of the Navy's continued pursuit of NEOps capabilities in its attempts to meet CF Transformational goals. The

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<sup>107</sup> Gary L. Garnett, "Making Waves: The Coastal Regime and Marine Security Operations Centres," *Canadian Naval Review* 1, no. 3 (Fall 2005): 27.

Navy finds itself currently well positioned to continue NEOps activities in regard to CF Transformation efforts.

## **AIR FORCE**

Although the modern concepts of NCW originated with the USN in the late 1990s, the Royal Air Force (RAF) was arguably employing the same basic tenets and concepts in their air defence efforts of both World Wars. The concept of an effective, integrated defence against bombers was put in place by the British in World War I and by 1918 they had developed a rather sophisticated network of forward observers connected to a central command by telephone. It provided London with early detection, the command and control of fighter interceptor aircraft and air defence artillery, in direct response to an attack.<sup>108</sup> A similar system, with the addition of an array of radar stations, in World War II proved even more effective. This elementary network of sensors, an information grid, and the ability to command and control weapons against the threat is an early example of the basic tenets of NCW; a robustly networked force that shared information effectively, enhancing the situational awareness of the British, and dramatically increasing the effectiveness of their air defence forces. While there tends to be a focus on the technological and web-enabled software applications when talking about NCW, the fact that the networks do not necessarily reside on an intranet or internet is often overlooked. The Air Force has a long history of networking its various sensors – whether radar, visual sighting, intelligence information – into a common operating

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<sup>108</sup> Electronic Encyclopaedia of Civil Defense and Emergency Management, “British Air Defence in World War I,” <http://encyclopedia.disastertimes.com/ECDairdefl.html>; Internet; accessed 2 April 2008.

picture to enable air defence. The Canadian Air Force continues this networking concept to this day in the form of Canada's participation in NORAD and the Air Force facilities for Canadian NORAD region at North Bay and Winnipeg. NORAD uses a network of ground based radars, satellites, Identification Friend or Foe (IFF), and fighter jets to detect, identify and engage any threats to North American air space. NORAD command, located at Cheyenne Mountain, Colorado, acts as the central clearing house for this networked data, where it is collated, analysed and fused, then directs the appropriate response as necessary.

During the 1990s the Canadian Air Force had already started to move towards adaptation of more NEOps capability. During the 1991 Gulf War, while the Navy was fully integrated into the coalition forces, the CF-18 fighter jets deployed were limited to a second line defensive counter air role over the Arabian Gulf because they were deficient in two significant network-centric areas. The deployed CF-18s were not equipped with secure, frequency agile HaveQuick radios, and they were incapable of delivering precision guided munitions (PGM). However, by the 1999 Balkan air campaign the Air Force had addressed one of these NCW deficiencies and upgraded its CF-18s with a limited PGM capability. This modest upgrade put the Canadian fighters on an even playing field with the other NATO participants and allowed them to be a full contributor in the air campaign, delivering laser-guided bombs both day and night.<sup>109</sup>

Although not specifically identified in doctrine, the Canadian Air Force generally adheres to the concept of Effects Based Operations (EBO) in a manner similar to the US

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<sup>109</sup> LCol J.A. McLean, "Network-Centric Warfare and the Canadian Forces," (Toronto: Canadian Forces College Command Staff Course New Horizons Paper, 2004), 8-10.

Air Force (USAF). The concept of EBO fits well with NCW or NEOps, and in *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War*, Edward Smith contends that “EBO and NCW form a synergistic treatment of military transformation.”<sup>110</sup> Proponents of EBO tend to think of NCW and as an enabler, focusing on the effect that is to be achieved and not on how, or with what tools it is to be accomplished. Accordingly, the general attitude of the Air Force is that NEOps are required to enable air operations, but it is not the primary consideration.<sup>111</sup>

In *Canadian Forces Aerospace Doctrine*, the Air Force further contends that centralized control and decentralized execution is one of its essential tenets. This tenet expounds the requirement of a single commander with the authority to assign assets and delegate authority to lower level commanders in order to most effectively achieve the required effects.<sup>112</sup> In order to realize centralized command, the Canadian Air Force has established an Air Operations Centre (AOC) in Winnipeg, which has networked its forces in order to be able to effectively task subordinate commanders.<sup>113</sup> Clearly, the concepts of NCW are at play in this structure as the AOC will use a robustly networked force to gather all the relevant data from its geographically dispersed air assets in order to exercise its command authority effectively. In fact, doctrine states unequivocally that the Air Force is becoming a “expeditionary, network-enabled, capability-based and results

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focused aerospace force...”<sup>114</sup> and the Air Force “foresees NEOps as a means of improving collaboration, synchronization and speed of command in order to dramatically increase mission effectiveness. Thus, the Air Force has included the concepts of NEOps in its own ongoing transformation activities.”<sup>115</sup>

Today, the Canadian Air Force continues their adoption of NEOp capabilities. The addition of Unmanned Aerial Vehicles (UAVs), global positioning technology, PGMs, more sophisticated communications systems and Link capable aircraft all demonstrate a trend towards a NEOp enabled force. By the very nature of their participation in NORAD and past deployments as part of NATO or coalition efforts, where the minimum technological requirement to effectively contribute is primarily determined by the USAF, the Canadian Air Force has become highly interoperable with its US counterpart. It is not unreasonable to expect future Air Force activities to be similar in nature, and therefore it is only prudent to continue to implement further NEOps capabilities in order to be able to participate effectively when required. The USAF, like all other US military forces, is already well down this path of implementation as part of their transformation efforts and have recently established an Air Combat Command<sup>116</sup> which employs reachback<sup>117</sup> to bring “theatre ISR information from sources such as the

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<sup>114</sup> *Ibid.*, 30.

<sup>115</sup> Babcock. *DND/CF NEOps Working Paper...*, 19-20.

<sup>116</sup> The Air Combat Command is located at Langley Air Force Base, Virginia - The mission is to support global implementation of national security strategy. Air Combat Command operates fighter, bomber, reconnaissance, battle-management, and electronic-combat aircraft. It also provides command, control, communications and intelligence systems, and conducts global information operations. See Air Combat Command, <http://www.acc.af.mil/>; Internet; accessed 2 April 2008.

<sup>117</sup> “Reachback refers to the ability of commanders and other force elements to access valuable resources relevant to military operations (e.g. databank, intelligence, imagery) despite being physically far removed from the information source.” See Thomson, “NEOps: A Canadian Perspective...,” 11.

Predator, the Global Hawk and the Army's Hunter unmanned aerial vehicles."<sup>118</sup> It is therefore realistic to expect the Canadian Air Force, in support of the deployment of future expeditionary forces, to be looking for similar capabilities in relation to its AOC in Winnipeg. Although not vocal proponents of NCW or NEOps as cornerstone of achieving transformation, the Canadian Air Force have demonstrated that NEOps are a key enabler in their operations.

To conclude, the RAF was arguably practicing an early version of NCW in its sophisticated bomber air defences of both World Wars. This concept is continued today by the Canadian Air Force in its NORAD activities. Experience in both the 1991 Gulf War and the 1999 Balkan War demonstrated to the Air Force the hard requirement for a more network-enabled capability in order to be a relevant participant in coalition operations. The Air Force generally adheres to the concepts of EBO which fits well with NCW. Canadian Air Force doctrine emphasizes centralized command and decentralized control but employs the tenets of NCW and many NEOps capabilities to achieve this. Air Force doctrine accepts NEOps as an enabler to their activities but does not necessarily enlist in its wholehearted adoption to the extent of the Canadian Navy. This NEOps capability will enable the Air Force to be an effective participant in any future expeditionary ventures they may undertake. To date, the Air Force continues to increase their adoption of NEOps capabilities in support of their transformation activities, and have positioned themselves favourably with regards to any future NEOps activities of the CF.

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<sup>118</sup> Robert Ackerman, "Information Adds Lift to Air Force Wings," *Signal* 59, no. 3 (Nov, 2004): 17.

## ARMY

At first glance, the Canadian Army is perhaps the most tentative Environment in terms of accepting the concepts of NCW and readily adopting NEOps capabilities into their operations. In general, the Army sees NEOps as a notion more suited to warships operating in a battlespace of medium complexity with a network of warships widely dispersed across hundreds of square miles of sea, or even well positioned for the low complexity battlespace of air operations. But in the highly complex land battle, the Army is concerned that the sheer number of soldiers and equipment in the battlespace, and the magnitude involved in networking these forces, brings with it more problems than can be overcome at this time. This view presupposes that a NEOps capable army will have the look of something akin to the soldiers of a science fiction novel, each being fully wired, complete with broadband access, a heads-up display capable of real time feeds of friendly and enemy disposition, secure satellite communications, and instantaneous access to streaming video and immense databases. Thus, a common criticism of NEOps is that it will never work because the CF cannot afford to outfit every soldier with all the equipment needed to make him a node of the network, and even if they did, the bandwidth requirements could not be met.

Canadian Army doctrine however, does not necessarily correspond to this line of thinking. *Beware of Putting the Cart Before the Horse* contends that “Canada’s army sees itself as a doctrine-based organization that uses technology to increase its capability to practice manoeuvre warfare.”<sup>119</sup> Whereas the focus of *DND/CF Network Enabled*

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<sup>119</sup> English, *The Cart Before the Horse* ..., 96.

*Operations Working Paper* is on the requirement of Army transformation “to exploit command-centric warfare”<sup>120</sup> while tending to downplay the underlying doctrine. Both documents argue however, that the Canadian Army tends to view NCW not as a theory of warfare, but rather as an enabler to the way the Army conducts warfare;<sup>121</sup> and that the Army’s position on NEOps tends “to focus on the human networks first, then on the enabling capabilities provided by affordable technological networks.”<sup>122</sup>

Examination of the Canadian Army’s 2004 document *Purpose Defined: The Force Employment Concept for the Army: One Army, One Team, One Vision* clarifies the situation by linking the concepts discussed above. *The Force Employment Concept* recognizes manoeuvre warfare and mission command as “the pillars that form the bedrock”<sup>123</sup> of army doctrine. It identifies manoeuvre warfare as “a way of thinking that stresses positive thought and proactive action”<sup>124</sup> and states its “essential companion ... is decentralized decision-making, more popularly known as mission command.”<sup>125</sup> This would suggest that there is a need to change the Army command organization from its current hierarchical, centralized structure to one more aligned with the information age, a

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<sup>120</sup> Babcock. *DND/CF NEOps Working Paper ...*, 19.

<sup>121</sup> English, *Cart Before the Horse...*, 60, 65, 96; and Babcock. *DND/CF NEOps Working Paper...*, 19.

<sup>122</sup> Babcock. *DND/CF NEOps Working Paper...*, 19.

<sup>123</sup> Department of National Defence, *Purpose Defined: The Force Employment Concept for the Army: One Army, One Team, One Vision*, (Ottawa: Department of National Defence, 2004), 9.

<sup>124</sup> *Ibid.*, 9.

<sup>125</sup> *Ibid.*, 9.



vertically and horizontally networked structure<sup>126</sup> – very similar to some of the latest NCW proposals put forward by Alberts and Hayes in *Power to the Edge*.

*The Force Employment Concept* further asserts that war fighting is “evolving into network-enabled and effects-based operations”<sup>127</sup> that will shift the focus from platform-centric to network-centric operations. However, even in these network-centric operations the focus will remain on the human aspect of these concepts. It stresses that success will hinge not on technology but rather “upon soldiers who are capable of adapting the technology to the existing conditions to achieve tactical success.”<sup>128</sup> It also states that “[t]he Army must develop soldiers, leaders and units that can deal with this level of complexity by combining the advantages of network-enabled warfare with actual “boots on the ground” and the skills to separate combatants from non-combatants.”<sup>129</sup> All of these concepts are consistent with those identified in today’s limited literature on NEOps.

So, while it is common to hear Army officers contend that NEOps is a concept that won’t work well with the Army way of doing business, the reality is that they are increasingly relying on NEOps capabilities to achieve the concepts laid down in their doctrine. In current operations they are using means such as reachback and digitization<sup>130</sup> with increasingly networked systems to achieve effects-based operations.

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<sup>126</sup> English, *The Cart Before the Horse...*, 60.

<sup>127</sup> DND, *The Force Employment Concept for the Army...*, 4.

<sup>128</sup> *Ibid.*, 11.

<sup>129</sup> *Ibid.*, 15.

<sup>130</sup> “Digitization permits a network enabled focus, allowing for a great improvement in the decision-action cycle at all levels of command. Digitization will enable the automation of many processes and will allow a vast amount of data and information to be entered into the system to be processed in a timely manner. The challenge of achieving such a level of sophistication becomes obvious as we begin to

The ability to exercise reachback is a particularly effective way for Canadian commanders to obtain specialist and strategic advice from forward positions.<sup>131</sup> *The Force Employment Concept* goes on to identify that the Army will increasingly be a digitized force and that “[i]nterconnectivity, achieved through headquarters that are linked to an array of sensors, surveillance, reconnaissance and strike platforms, units and individual soldiers will provide commanders and staffs at all levels and echelons with an increasingly near real-time common operating picture.”<sup>132</sup> The goal will be the reduction of the sensors-to-effects time and a result of “expanded visibility and comprehension of the battlespace and the capability to act within it.”<sup>133</sup> Again, these concepts are in line with NCW and an increased adoption of NEOps capability.

Today the Army is realizing some of these concepts. In Afghanistan the soldier is equipped with personal role radios (PRR), monocular night vision goggles (MNVG) and the Army is looking to provide something akin to the US Land Warrior Integrated Modular Fighting System<sup>134</sup> or the German Warrior 21<sup>135</sup> in the future.<sup>136</sup> Operational

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appreciate that every soldier is a potential sensor system.” See DND, *The Force Employment Concept for the Army...*, 16-17.

<sup>131</sup> DND, *The Force Employment Concept for the Army...*, 16.

<sup>132</sup> *Ibid.*, 39.

<sup>133</sup> *Ibid.*, 39.

<sup>134</sup> “The US Land Warrior is an integrated fighting system for individual infantry soldiers which gives the soldier enhanced tactical awareness, lethality and survivability. The systems integrated into Land Warrior are the weapon system, helmet, computer, digital and voice communications, positional and navigation system, protective clothing and individual equipment.” See Army Technology.com, “Land Warrior,” [http://www.army-technology.com/projects/land\\_warrior/](http://www.army-technology.com/projects/land_warrior/); Internet; accessed 13 April 2008.

<sup>135</sup> “EADS Defence Electronics is ... working with the Bundeswehr to define the Infanterist der Zukunft (IdZ) Infantryman of the Future [EADS warrior 21] system. The individual infantryman is equipped with a bullet-proof vest, nuclear, biological and chemical (NBC) protection, night vision equipment, digital navigation and communication, tactical speech and data communication and a new range of weapons.” See Army Technology.com, “IdZ (Infanterist der Zukunft) - Infantryman of the Future,” <http://www.army-technology.com/projects/idz/>; Internet; accessed 13 April 2008.

commanders, and to a lesser extent tactical commanders, increasingly have access to secure voice communications, data links that include secure chat rooms, GPS equipped vehicles, video teleconferencing capabilities, and real-time video from both manned aerial reconnaissance and UAVs. With these capabilities and the introduction of the ISTAR project<sup>137</sup> in theatre, the Canadian Army is fast becoming one of the most NEOps capable forces operating in Afghanistan.

In spite of this, the common opinion in the Army persists to be that NEOps is a concept to adopt with caution. Perhaps part of this caution is based on the limited success that the US Army had with initial initiatives such as deployment of the highly digitized Stryker Brigade Combat Teams to Iraq, which resulted in many outspoken criticisms of the system and NCW in general.<sup>138</sup> Perhaps another part is since the concepts of NCW and NEOps have an underlying principle that fewer networked forces can achieve the results of larger non-networked forces, this could be interpreted by some as justification to do more with less, leading to the distinct possibility that some may

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<sup>136</sup> Murray Brewster, "Canadian soldiers to go even higher tech," *The Star*, 12 April 2008; available from <http://www.thestar.com/News/Canada/article/413848>; Internet; accessed 13 April

<sup>137</sup> The Intelligence Surveillance, Target Acquisition and Reconnaissance (ISTAR) project is an omnibus project whose purpose "is to develop, deliver and evolve an integrated, interoperable, ISTAR capability that will improve the ability of commanders to visualize the operational area, manage sensors and information collection resources, and to plan and implement actions to successfully complete operational missions. The project will provide enhancements to existing capabilities and include the acquisition of new capabilities in the areas of communications, command and control and sensors. The project includes the acquisition of Unmanned Aerial Vehicles (UAV), Weapon Locating Sensors (WLS) and transformation or enhancement of existing sensor platforms to include Electronic Warfare (EW), Light Armoured Vehicle III, Coyote Reconnaissance Vehicle, Ground Based Air Defence, Geomatic support and Tactical Meteorology Systems." See Treasury Board of Canada Secretariat, "Status Report on Major Crown Projects for the fiscal year 2006/2007", [http://www.tbs-sct.gc.ca/dpr-rmr/2006-2007/inst/dnd/dnd07-eng.asp#\\_Toc173761615](http://www.tbs-sct.gc.ca/dpr-rmr/2006-2007/inst/dnd/dnd07-eng.asp#_Toc173761615); Internet; accessed 9 April 2008.

<sup>138</sup> Christopher J. Toomey, "Army Digitization: Making it Ready for Prime Time," *Parameters* 33, no. 4 (Winter 2003): 40-46.

suggest force reductions in the Army. In this manner, NEOps could be seen as the precursor to downsizing, with fewer soldiers, a smaller Army, and a less “boots on the ground” capability. This does not sit well with the Army who at this time feel that more “boots on the ground” are required to maintain the current ops tempo, and are currently attempting to grow their force strength.

In conclusion, the Army seems cautious in its approach to NEOps. They feel the advantages expressed by NCW enthusiasts will not necessarily be achievable in the land battle. The networking of all soldiers in the battlespace is not a practical reality with today’s technology. Army doctrine however espouses manoeuvre warfare accomplished through mission command and sees future warfare evolving from platform-centric to network-centric effects based operations. In practice the Army is increasingly relying on NEOps capability and continues to deploy an increasing amount of NEOps capable equipment to current operations in Afghanistan. Although guarded, it would appear that the Canadian Army, based on its own doctrine, has already embraced NEOps as an enabler, and are in fact moving towards being a more NEOps capable force. Although like the Air Force, the Army has not embraced

the Army, Air Force and Navy find themselves at varying levels of NEOps capability, but there does not appear to be a significant divergence in the overall direction they are taking. All Environments continue to increase their NEOps capabilities, and if a more effective joint organization as part of CF Transformation is to be achieved, coordination of their activities and clear, concise strategic guidance will be required. The Navy, having embraced NCW concepts early, and having been involved in the early development of those concepts, are almost certainly the best positioned Environment for any transformation initiatives involving NEOps in the future. The Army and Air Force, although not as enthusiastic, have already deployed substantial NEOps capability in their forces and could easily adapt to future transformation plans concerning NEOps. Thus, the continued pursuit of interoperability with the USN has situated the Canadian Navy in an advantageous position for possible future NEOps requirements associated with CF Transformation activities. In fact, by virtue of being on the leading edge of CF NEOps activities, the Navy is well positioned to be able to take the lead in matters of this nature in the future.

## THE ROLE OF IM GROUP IN TRANSFORMATION AND NEOps

It has been established that the Navy in particular and the Army and Air Force to a somewhat lesser extent have embraced NEOps capabilities as an integral component of their operations and force generation activities. Since NEOps has not yet been identified as an integral component of CF Transformation there still remains a risk that the Navy will diverge from the overall path the CF is taking. This is amplified by the fact that due to the integral nature of NCW to the US military transformation efforts, the pursuit of Canadian Navy interoperability with the USN would necessarily equate to a Canadian Navy transformation dependant on NEOps. Although it is fully expected that NEOps will be identified as a critical component to CF Transformation at some time in the near future,<sup>139</sup> to date, the strategic vision or statement concerning a NEOps roadmap and how it will fit into CF Transformation is absent. This lack of strategic vision concerning NEOps also increases the potential that the individual Environments will develop independent NEOps capabilities, not necessarily compatible with each other.

At first glance, one would expect the strategic vision for NEOps to be under the purview of the Assistant Deputy Minister, Information Management (ADM(IM)) and her level 1 organization of IM Group. However, this would presuppose that the responsibility for a NEOps strategic vision lies with the technical authority responsible for the CF IM/IT system architecture. Further investigation indicates it is not that simple.

In 2001, Defence Administration Orders and Directives (DAOD) 6000: Information Management, issued by ADM(IM), recognized the importance of

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<sup>139</sup> English, *Networked Operations and Transformation...*, 93, 95.

information management and stated that “information is a strategic resource that must be managed judiciously to achieve information superiority [and] improve decision making ...”<sup>140</sup> This statement is very much in line with the concepts and basic tenets of NCW. IM policy goes on to say “the DND and the CF information management program must include the strategic direction necessary to support the operational and business needs of the Department.”<sup>141</sup> One could expect therefore, that the responsibility for strategic direction on matters related to information management and technology would be promulgated by IM Group. One could also infer that matters pertaining to NEOps, or at least the technical sections of NEOps, would logically be a subset of this strategic guidance and fall within the responsibilities of IM Group. However, DAOD 6000 goes on to state that “IM Group must be responsive to the operational and strategic IM requirements of the Environmental Chiefs of Staff (ECS), Group Principals and, through the chain of command, the formations, bases and wings”.<sup>142</sup> Since the promulgation of this directive in 2001, the importance of networks and the concepts of NEOps in present day operations have increased significantly. It also predates CF Transformation activities, and since the organizational structure has changed, one would presume that due to the increased importance of NEOps, and the changed structures associated with transformation, IM Group would now be receiving strategic direction from the Chief Force Development in order to coordinate activities. This does not appear to be the case.

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<sup>140</sup> Department of National Defence, “DAOD 6000 – Information Management,” available from [http://www.admfincs.forces.gc.ca/admfincs/subjects/daod/6000/0\\_e.asp](http://www.admfincs.forces.gc.ca/admfincs/subjects/daod/6000/0_e.asp); Internet; accessed 25 February 2008.

<sup>141</sup> *Ibid.*

<sup>142</sup> *Ibid.*

A more recent document, the *Defence Information Management Strategy 2020*, released in 2003, states “[t]he availability of accurate, complete, and on-demand information from any global location is a critical requirement for the DND/CF to meet the Defence strategic commitments.”<sup>143</sup> Its key point is that a need for an Enterprise Approach to Information Management in today’s DND/CF “is essential to future mission success.”<sup>144</sup> However, since this document also predates CF Transformation, Level 1 organizations – the ECS and Group Principals – are still identified as being responsible in identifying and determining the operational requirements, while IM Group is responsible for the design and implementation of those stated requirements.

From this point of view the requirement for many IM/IT systems – military command and control systems, sensor systems, enterprise resource planners, modeling and simulation systems and the like – will be determined and sponsored by those who need them: the DCDS and ECSs, and other Level 1 entities. The role of ADM(IM) as functional authority insofar as these systems is concerned is configuration control and functional advice or, in simplistic terms, the Defence community determines the “what” of the IM programme, and ADM(IM) addresses the “how” and the “so what”.<sup>145</sup>

One might assume again that the responsibility for identifying the strategic requirements for NEOps related activities now resides with the Chief Force Development; however, neither *DAOD 6000* nor *IM Strategy 2020* has been updated to reflect who identifies the strategic requirements pertaining to IM under the transformed

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<sup>143</sup> Canada, Department of National Defence, *Defence Information Management Strategy 2020*, (Ottawa: Information Management Group, 2003), 1.

<sup>144</sup> “An enterprise approach starts from the premise that all proposed IM work should satisfy the requirements of a larger integrated information environment (IIE) or system of systems.” see DND, *IM Strategy 2020...*, 2.

<sup>145</sup> DND, *IM Strategy 2020...*, 6.



CF. Thus, until a document outlining a NEOps roadmap becomes available, there is little guidance that the Environments can base their decisions on, and there exists the distinct possibility that the Army, Air Force and Navy will continue to develop NEOps capabilities in response to their independent force generation plans, in a stovepipe fashion.

*IM Strategy 2020* does however provide “a roadmap for the short-, medium- and long-term development of IM capabilities in the DND/CF.”<sup>146</sup> The strategy outlines the departments plan to move to an Enterprise Architecture (EA) with an end-state of a fully integrated system of systems. The strategy is based on a framework of three portfolios: the military, the corporate, and the common. As the names suggest the military portfolio includes all military related IM/IT requirements, the corporate portfolio includes all corporate related IM/IT systems, and the common portfolio includes the systems, security, policy, and doctrine necessary to enable the military and corporate portfolios. Again, however, in this framework the ECS and the former DCDS would define the requirements for the military portfolio. Once more, it would be reasonable to surmise that the commands stood up under transformation would fulfil the function of DCDS designated in this strategy. For the corporate portfolio the VCDS and other Level 1s would define the requirements; and IM Group will define the requirements for the common portfolio.<sup>147</sup> In order to fulfill this strategy three phases will be employed: interconnect, integrate and fuse. In the interconnect phase, the “Defence IM programme will be brought under the umbrella of a coherent management framework, and the basis

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<sup>146</sup> *Ibid.*, 1.

<sup>147</sup> *Ibid.*, 6-7.

for achieving an Enterprise Model will be created.”<sup>148</sup> This first phase is ongoing, and is comprised largely of the current IM consolidation and rationalization efforts. The integrate phase is an intermediate phase and will focus “on the integration of like systems.” Preconditions for the creation of a single fully fused system of systems will be put in place and “selected military command decision support systems and ... selected enterprise resource planners” will be integrated.<sup>149</sup> This second phase is presently in its initial stages. The final phase, fuse, “will focus on the creation of a single fully integrated system of systems ... [and] success ... will have been achieved when the ability of the right users to share the right information at the right time and the right place is unconstrained by artificial or unnecessary limitations.”<sup>150</sup> This phase has not yet commenced. The general timelines for completion of these phases is 2009, 2011 and 2015 respectively.<sup>151</sup>

As part of the first phase, IM Group is finalizing its efforts with regard to IM/IT Rationalization. IM/IT Rationalization includes “consolidating all IM/IT resources and activities under the functional authority of the ADM(IM)”<sup>152</sup> and includes consolidating

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<sup>148</sup> *Ibid.*, 7.

<sup>149</sup> *Ibid.*, 7.

<sup>150</sup> *Ibid.*, 7.

<sup>151</sup> “ADM(IM) Presentation to the 4th Annual PMI-OVOC/DND Project Management Seminar,” available from [http://admmatapp.forces.gc.ca/cosmat/dmasp/downloads/pmi\\_seminar/2004/day1/2101ADMIMOpeningPresentation\\_e.ppt](http://admmatapp.forces.gc.ca/cosmat/dmasp/downloads/pmi_seminar/2004/day1/2101ADMIMOpeningPresentation_e.ppt); Internet; accessed 28 January 2008.

<sup>152</sup> ADM(IM) Strategic Centre, “IM/IT Rationalization,” <http://img.mil.ca/stratctr/IM-IT>; DND Intranet; accessed 11 February 2008.

all IM/IT resources and activities under the functional authority of the ADM(IM) where they can be centrally managed and locally situated where appropriate.”<sup>153</sup>

Most recently, in January 2008, IM Group released two new documents, the *Department of Defence and Canadian Forces Architecture Framework (DNDAF)* and the *Defence Architecture Data Model (DADM)*. The DNDAF states that the “eventual goal of the EA practice within DND/CF is to create a fully integrated enterprise architecture that covers all aspects of DND/CF. At this time, the department does not have an integrated defence enterprise architecture.”<sup>154</sup> The DADM “provides the logical basis for moving architectures from compendiums of documents, spreadsheets, and graphics to architecture data that can be stored in architecture data repositories and manipulated with automated tools.”<sup>155</sup> With these two documents, IM Group has started to document the standards required to move forward with a strategy that will support NEOps on a CF wide basis. This will address the second risk previously identified – that of a potential incompatibility between Environments – as all initiatives must now meet the standards established by IM Group.

IM Group is addressing the investment in network technology and development so that the CF can move forward towards a single integrated system in support of NEOps, but an equal investment in information management is also required. To date there appears to be little evidence of progress on this front.

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<sup>153</sup> *Ibid.*

<sup>154</sup> Department of National Defence, *Department of National Defence and Canadian Forces Architecture Framework (DNDAF)*, (Ottawa: ADM(IM) Director Enterprise Architecture, 2007), 8.

<sup>155</sup> Department of National Defence, *Defence Architecture Data Model (DADM)*, (Ottawa: ADM(IM) Director Enterprise Architecture, 2007), 8.

IM Group views “IM/IT as a horizontal function or as a component of capability”<sup>156</sup> and ADM(IM) as the functional authority of IM/IT and provider of services, but they stress that identifying the requirements for these systems is not their responsibility. “[T]he Defence community determines the “what” of the IM programme, and ADM(IM) addresses the “how” and the “so what”.”<sup>157</sup> At this point, a clear single authority that is providing overarching guiding principles to the entire process is not evident, which leaves the potential for the continuation of a stovepipe philosophy in the identification of operational requirements from the various commands and the Environments. Thus, the Navy is left with a centralized authority determining the equipment and architecture to be used but minimal strategic guidance on what specific NEOps capabilities to pursue. Retired Admiral Roger Girouard “expressed a sense of unease with the growing centralization of the control of communications technology in the CF, and, therefore the potential loss of influence by the operational chain of command on shaping that technology.”<sup>158</sup>

To summarize, while one might expect ADM(IM) to be responsible for strategic direction concerning NEOps, this is not the case. IM Group recognized the importance of both information management and information superiority as early as 2001, but remained responsive to the Environments for the operational and strategic requirements. Strategic guidance of a technical nature was provided in 2003 and IM Group identified the

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<sup>156</sup> *IM Strategy 2020*, 6.

<sup>157</sup> *Ibid.*, 6.

<sup>158</sup> Joe Sharpe and Allan English, *Network Enabled Operations: The Experiences of Senior Canadian Commanders*, (North York, ON: Defence Research and Development Canada – Toronto, 2005), 17.

architecture the CF would take in future to support the global, on-demand, information requirements of the CF and the path necessary to achieve this guidance. IM Group would remain responsive however, to the Environments and DCDS for operational and strategic requirements. An Enterprise Architecture to support future CF requirements has been identified in the strategy and IM Group has adopted a three phased approach to eventually achieve a fully integrated system of systems. IM Group is only now completing the first phase of consolidation and rationalization and has only recently commenced activities designed to integrate the numerous stovepipe IM systems in the CF. The creation of a fully integrated system of systems will not be completed until 2015. The most recent directives issued by IM Group, define the standards of the future CF Enterprise Architecture. These standards will prevent the Army, Air Force and Navy from potential incompatibility issues as a result of independent NEOps development. However, once again IM Group stresses their responsive nature and highlight that identifying operational and strategic requirements is not their responsibility. Changes to the CF command organization as a result of CF Transformation do not appear to have changed the relationships in these regards, and the Environments remain responsible for operational direction concerning NEOps. To date, no clear strategic guidance has been issued concerning the direction that NEOps activities will take in the CF, nor linking NEOps to any ongoing CF Transformation activities. As a result, the Environments are left to determine the extent that NEOps will be employed in force generation efforts. The Navy thus finds itself dealing with a central authority to determine the architecture and equipment required for NEOps but with minimal strategic guidance on how to pursue it.

## INTEROPERABILITY

Interoperability, like many of the other terms discussed, can have varying meanings depending on the context in which it is used. It has been used to describe operations between the Environments, although this is usually referred to as joint. Some talk of interoperability between government departments or interoperability with agencies and non-government organizations. Interoperability is commonly used to describe the interaction between military forces of allied nations, and it is in this context that this chapter will focus; specifically, the maritime interoperability between the USN and the Canadian Navy.

The US Department of Defense defines interoperability as “the conditions achieved among communications-electronics systems or items of equipment when information or services can be exchanged directly and satisfactorily between them and/or their users.”<sup>159</sup> This is similar to the NATO definition of “the ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces, and to use the services so exchanged to enable them to operate effectively together.”<sup>160</sup> The Canadian Navy has adopted this formal NATO definition in *Leadmark*.<sup>161</sup> Interestingly, NATO does offer a somewhat simplified informal definition which perhaps better captures the true nature of interoperability: “the effective sharing of information and

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<sup>159</sup> Joel J. Sokolsky, “Sailing in Concert: The Politics and Strategy of Canada-US Naval Interoperability” *Choices* 8 no. 2 (April 2002): 8.

<sup>160</sup> North Atlantic Treaty Organization, *NATO C3 Technical Architecture Volume 2: Architectural Descriptions and Models*, (Brussels: Information Systems Subcommittee NATO Open Systems Working Group, 2005), 5.

<sup>161</sup> DND, *Leadmark*, GL11.

work processes across system and organizational boundaries.”<sup>162</sup> As implied in the latter definition, interoperability is about more than just the technical aspect of operations which seems to be the focus of the formal definitions. In “U.S. Navy Interoperability with its High-End Allies” Gause *et al* suggest that there are also operational and political/cultural considerations where “operational interoperability considers whether units from different countries operating together can complete a mission [and] political/cultural interoperability examines why and how each country conducts military operations the way it does.”<sup>163</sup> Further, interoperability will “consist of a number of elements including doctrine, tactics, rules of engagement, C4I, and logistics.”<sup>164</sup>

The definition required for Canadian Navy/USN interoperability must be consistent with this approach and recognize that interoperability is not just about the technical connectivity between participants, but “goes beyond integrated infrastructure and encompasses the social psychological bases of interpersonal and inter-group cooperation, fundamental to the ability of individuals to work closely together as a group”.<sup>165</sup> Thus the simple definition put forward by Alberts and Hayes of “the ability to work together”<sup>166</sup> is surprisingly accurate. In “A Transformation Agenda for the Canadian Forces: Full Spectrum Influence”, Paul Mitchell defines interoperability “as the

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<sup>162</sup> *Ibid.*, 5.

<sup>163</sup> Mitchell, “A Transformation Agenda for the Canadian Forces ...,” 60.

<sup>164</sup> *Ibid.*, 60.

<sup>165</sup> Warne *et al* (2004) is quoted by Michael H. Thomson and Barbara D. Adams, *NEOps: A Canadian Perspective*, 9.

<sup>166</sup> David S. Alberts and Richard E. Hayes, *Power to the Edge*, (Washington, DC: CCRP Publication Series, 2003), 107.

ability of systems, units, or forces to provide services and/or accept services from others forces to enable them to operate effectively together.”<sup>167</sup> This definition provides a succinct basis for further discussion of this chapter.

Canadian officers are quick to point out that the “long history of naval cooperation and overall familiarity between the navies”<sup>168</sup> has been vital in achieving current levels of interoperability.<sup>169</sup> In the past, the Canadian Navy rarely operated independently. It has operated alongside traditional allies in both World Wars, the Korean War, the 1991 Gulf War and the War on Terror.<sup>170</sup> In more recent years, this interoperability has been largely focused on the USN. Interoperability between the USN and Canadian Navy has now reached the point where the Navy finds itself more interoperable with the USN than with its CF Environmental counterparts.<sup>171</sup> This once more leads to the question – given CF Transformation goals, is this pursuit of interoperability still valid, or should the Navy focus its efforts on activities more in line with transformation concepts?

The principal requirement for maritime interoperability can be found in the CF’s primary role, the defence of Canada. A leading concern of the government must be one of national security, and in particular the defence of Canada and North America. The Canadian Navy’s responsibility in this regard is “the defence of Canada’s maritime

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<sup>167</sup> Mitchell, “A Transformation Agenda for the Canadian Forces...,” 60.

<sup>168</sup> *Ibid.*, 94.

<sup>169</sup> *Ibid.*, 94.

<sup>170</sup> Sokolsky, “Sailing in Concert...,” 10.

<sup>171</sup> Mitchell, “Small Navies and Network-Centric Warfare...,” 83.



interests.”<sup>172</sup> This aspect of the defence of North America has become more pronounced since the events of 9/11. Interoperability with the USN in this respect provides a better solution than independent operations by the Canadian Navy. American agreement with this opinion was expressed rather succinctly by the former US Under Secretary of Defense John Hamre when he stated that “[t]here is no longer a way to secure the United States without securing the United States and Canada simultaneously.”<sup>173</sup> Interoperability will increase the effectiveness of defence in the event of a direct threat to Canada’s maritime approaches and will be critical in the face of the threat of terrorism both at home and abroad.<sup>174</sup>

An interoperable Navy can also be a useful diplomatic tool available to government. By achieving interoperability Canada can choose to be actively involved in any coalition or US-led operations that it supports; quickly and with minimal coordination efforts and ramp-up times. At the same time, this does not limit Canada’s diplomatic options, as Canada would be under no obligation to continue in these operations, and can exercise its sovereignty at any time by withholding or withdrawing its support if necessary.<sup>175</sup>

Strategic guidance concerning interoperability is provided in *Leadmark* when it amplifies direction of *Strategy 2020* and states that “a guiding principle of future force development will be achieving “seamless operational integration at short notice,” with

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<sup>172</sup> Sokolsky, “Sailing in Concert...,” 21.

<sup>173</sup> *Ibid.*, 15-16.

<sup>174</sup> *Ibid.*, 21-22.

<sup>175</sup> *Ibid.*, 14.

our major allies (and the USN, in particular)”<sup>176</sup> However, this guidance was provided prior to the CF Transformation initiative and may not necessarily be where the primary efforts of the Navy should remain. Specific maritime direction with regard to CF Transformation initiatives was provided in the *Defence Policy Statement 2005*; where interoperability was not specifically mentioned but direction was given to modernize frigates in order “to maintain their ability to participate in Alliance and coalition operations.”<sup>177</sup> Although not clear direction to continue the pursuit of interoperability with the USN, it is an indication that the concepts underlying interoperability are part of overall transformation activities. Clearly, the Navy feels that the principles of *Leadmark* still apply and that “[i]f recent experience is an indication, there will continue to arise any number of situations in which naval forces of medium powers such as Canada can make a difference by working in combination with the USN.”<sup>178</sup> The Navy has thus sought a level of interoperability with its US counterpart unmatched by either the Air Force or Army.<sup>179</sup>

Why then would the USN be interested in interoperability with the Canadian Navy? Gause *et al*, offers the official stance: it allows the USN to operate with its allies during a conflict; it offers the political benefit of shaping foreign navies; and it is a

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<sup>176</sup> DND, *Leadmark*, 128.

<sup>177</sup> Canada, *Defence Policy Statement 2005*, 14.

<sup>178</sup> DND, *Leadmark*, 111.

<sup>179</sup> Sokolsky, “Sailing in Concert...,” 2.

requirement of foreign policy.<sup>180</sup> Another aspect has already been identified from a Canadian perspective, but holds true for the USA as well. The defence of the US is continental in nature, and therefore the security of the US is inescapably linked with the security of Canada. A second aspect is that of US foreign policy. In these terms, “interoperability is a means to an end, the enhancement of American national security through the continued global dominance of the US military.”<sup>181</sup> The USN therefore, has an interest in furthering initiatives concerning interoperability, and is prepared to work with the Canadian Navy in achieving these endeavours. However, in order to achieve interoperability, the USN “encourages [the Canadian Navy] to upgrade their capabilities in order to enhance the ability to collaborate”<sup>182</sup> and for their part, the Canadian Navy is more than willing to oblige.

To be interoperable, there are certain criteria that must be met. The Canadian Navy recognizes that the “standard for technology, organization, and to some degree, doctrine”<sup>183</sup> in these matters will be set by the USN and “in order to remain interoperable . . . [the Canadian Navy] will have to react to these developments rather than attempt to define the standard themselves”<sup>184</sup> For the USN, “[c]ommand, control, communications and intelligence (C4I) are fundamental to the success of an operation”<sup>185</sup> and since these

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<sup>180</sup> Kenneth Gause *et al*, “U.S. Navy Interoperability with its High-End Allies” (Alexandria, VA: Center for Naval Analyses, 2000), 4/43; available from <http://stinet.dtic.mil/oai/oai?&verb=getRecord&metadataPrefix=html&identifier=ADA468332>; Internet; accessed 1 February 2008.

<sup>181</sup> Sokolsky, “Sailing in Concert...,” 10.

<sup>182</sup> *Ibid.*, 10.

<sup>183</sup> Mitchell, “A Transformation Agenda For the Canadian Forces...,” 56.

<sup>184</sup> *Ibid.*, 56.

fundamentals do not necessarily flow efficiently between coalition partners, the USN has identified six critical areas necessary for interoperability. They are: command and control systems, common operational picture, secure voice communications, digital data exchange, approved security devices and approval to release data, and SATCOM connectivity.<sup>186</sup> These critical areas identified are all key components of NCW or NEOps concepts. Considering these critical areas and their close ties to NCW, in order for Canadian warships to achieve the level of interoperability such that they can integrate into a USN Carrier Battle Group, it becomes essential that the Canadian Navy similarly adopt NEOps concepts in its own transformation activities.

As previously noted, Canada has not yet produced substantial doctrine concerning NEOps, however, Michael Thomson observed that “the real potential of NEOps was that it allowed Canada to plug and play in warfighting operations”<sup>187</sup> which in turn would “enhance its international efforts under the 3-D security approach.”<sup>188</sup> Similarly, Sandy Babcock commented that “NEOps will provide the ability to work more effectively with allies, coalition participants and a range of governmental and non-governmental defence and security partners to achieve a common goal”<sup>189</sup> and “will enhance the interconnectivity of CF-specific functions, such as command, intelligence and logistics elements, and will help our military to adopt a fully integrated and unified approach to

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<sup>185</sup> Gause, “USN Interoperability...,” 14/43.

<sup>186</sup> *Ibid.*, 14/43 .

<sup>187</sup> Thomson, *NEOps: A Canadian Perspective...*, 12.

<sup>188</sup> *Ibid.*, 12.

<sup>189</sup> Babcock. *DND/CF NEOps Working Paper...*, 13.

operations.”<sup>190</sup> It appears that “interoperability is an intrinsic characteristic of a NEOps force.”<sup>191</sup> Consequently, the advancement of NEOps concepts within the Canadian Navy as a result of its interoperability capabilities would provide the Navy the ability to plug into coalition operations and would position the Navy well in future requirements to work more effectively with the Army, Air Force, OGDs and other agencies. This fits quite well with the first two of the principles of CF Transformation previously identified – moving the Navy towards a more joint organization and maintaining operational primacy.

To summarize, maritime interoperability is a key enabler for the Canadian Navy to meet its future requirements and maintain its operational primacy.

NEOps capable, which places it in a good position for future joint operations with the Army and Air Force, and to work more effectively with OGDs and agencies.

## CONCLUSION

Throughout the 1990s the Canadian Navy increasingly pursued interoperability with the USN, culminating in the ability to effectively integrate a Canadian warship into USN Carrier Battle Groups on numerous occasions. The Navy has continued this pursuit of interoperability, and today it has been incorporated into defence policy and Canadian naval doctrine. With the advent of CF Transformation in 2005, the Navy must ensure its pursuit of interoperability with the USN is not causing the Navy to diverge from the goals of transformation. This paper began with the assertion that the terms NCW, NEOps, transformation and interoperability were often misunderstood and misused. It stressed that in order to effectively determine if the Navy should continue its pursuit of interoperability with the USN, a sound understanding of the concepts was needed. In order to gain this understanding, the history and concepts of NCW were examined, and it was noted that there is still an ongoing debate on the topic, and although not an agreed upon theory, the basic tenets of NCW were generally accepted. It further noted that the technologies that instigated the concepts of NCW are now firmly imbedded in our daily lives, and perhaps this familiarity has resulted in a general malaise concerning whether NCW and NEOps are still valuable ideas to be embraced.

Transformation of the US military and the CF was investigated in the following chapter. The relationship between NCW and US military transformation was established and it was noted that the US had clear and concise doctrine guiding their transformation activities. Unlike its US counterpart however, CF Transformation activities were not guided by any clear and concise single document. Instead, direction was promulgated

through multiple orders in 2006, and has not been amplified by any follow on doctrine since. The result is a general lack of understanding of most aspects of transformation, and the belief by many that transformation was merely an organizational shuffle coupled with the procurement of new equipment. The Navy, like the other Environments, retained responsibility for force generation through CMS but was provided little strategic guidance on how to evolve in order to best meet transformation goals.

In a manner similar to the US, other western militaries recognized the importance of NCW as a central concept of their own transformation efforts. The UK adopted the term NEC while Australia retained the term NCW. Both however, deviated from the US construct by focusing their concepts on the human aspects of the network vice the technical networks. Both formally acknowledged their versions as a vital component of their future force constructs and integral to their transformation activities in doctrine. Canada has applied the term NEOps, and in a manner similar to the UK and Australia, has focused on the human element instead of the technical. To date there is little documentation on NEOps and no formal definition or doctrine has been promulgated. Unlike other militaries, the CF has not officially recognized NEOps as a principle in support of CF Transformation. As a result, the Army, Air Force and Navy have independently implemented varying levels of NEOps capability determined primarily by their individual Environmental needs. This has been achieved in an ad hoc manner, with little strategic guidance on either NEOps or CF Transformation goals. For this reason, there is no guarantee that these efforts will be complimentary in nature, nor are there any assurances that the goals of CF Transformation will be met.



In order to quickly affirm that the premises the concepts of NCW were originally based upon are still valid, current business practices in the private sector were explored. It was found that not only had business continued with their use of network centric practices, but since most business had now adopted similar practices, new concepts were required in order to maintain a competitive edge. Business today is moving towards networking externally among multiple companies, or Business Network Transformation, to gain the competitive advantage. The private sector has moved beyond the original ideas observed by Cebrowski in an fashion similar to the concepts of transformation. Thus, it would appear that the concepts of NCW, its Canadian equivalent NEOps, and transformation remain valid for today's CF.

Examining each Environment separately determined their current NEOps status in both approach and doctrine. The Navy finds itself currently well positioned to continue NEOps activities in regard to CF Transformation efforts largely because of its long practice of operating with other allied navies, in particular the USN, and it's most recent practice of integrating Frigates into US Carrier Battle Groups. As such, the Navy has been involved with NCW from its beginnings and has grown in NEOps capability in synchronization with the USN and its corresponding NCW implementation. The Navy is fully committed to its ongoing NEOps efforts as reflected in both its growing capabilities and inclusion in doctrine.

Arguably, the Air Force enlisted practices that are similar in concept to NCW since WWII; most notably the network focused nature of NORAD operations, but views NEOps as an enabler to their activities and do not necessarily enlist in its adoption to the extent of the Navy. The Air Force recognizes the hard requirement for a more network

enabled capability in order to be a relevant participant in coalition operations, and its doctrine emphasizes centralized command and decentralized control but employs the tenets of NCW and many NEOps capabilities to achieve this. The Air Force continues to increase their adoption of NEOps capabilities in support of their transformation activities, and have positioned themselves favourably with regards to any future NEOps requirements of the CF.

The Army, like the Air Force, has not embraced NEOps to the extent of the Navy. The Army has taken a cautious approach to NEOps, and believe the advantages expressed by proponents of NCW will not necessarily be realized in ground operations. It remains hesitant in the concepts, but is increasingly relying on NEOps capability and continues to deploy an increasing amount of NEOps capable equipment to current operations in Afghanistan. Army doctrine advocates manoeuvre warfare accomplished through mission command and sees future warfare evolving from platform-centric to network-centric effects based operations. The Army although guarded, has embraced NEOps as an enabler, and are moving towards being a more NEOps capable force. They are positioned well to adapt to any future NEOps requirements that may be identified in CF Transformation activities.

The Army, Air Force and Navy are each at varying levels of NEOps capability. Although each has implemented NEOps to suit their individual force generation requirements, there does not appear to be significant divergence between them at this time. However, if a more effective joint organization is to be realized through CF Transformation, then better coordination and strategic guidance will be required. The Navy is almost certainly the best positioned Environment for any transformation

initiatives involving NEOps in the future. The Army and Air Force, not as enthusiastic in these matters, are none the less also well situated. However, by virtue of being at the leading edge of CF NEOps activities, the Navy is perhaps the best positioned to take the lead in matters of this nature in the future.

IM Group will play a significant role as well. One might expect IM Group to be responsible for strategic guidance concerning NEOps, but they are in fact only the functional authority and as such are responsible for the strategic guidance in technical aspects only. In this respect, they have outlined a three phased roadmap in order to achieve the Enterprise Architecture they have identified the CF will use in the future. IM Group will first consolidate and rationalize the existing CF IM/IT infrastructure, then will effectively integrate the current various legacy systems. Finally, a fully integrated system of systems will be developed to meet the future requirements of the CF. To date, they have promulgated technical guidance on the nature of the architecture and thus have ensured that future technical aspects of NEOps will be consistent with a common framework. However, the issue of operational and strategic guidance on the nature of NEOps remains outstanding. IM Group remains responsive to the ECS, VCDS and operational commands for this guidance. As such, no clear strategic guidance has been issued concerning the direction that NEOps activities will take in the CF, nor linking NEOps to any ongoing CF Transformation activities. As a result, the Environments are left to determine the extent that NEOps will be employed in force generation efforts. Thus the Navy finds itself dealing with a central authority to determine the architecture and equipment required for NEOps but minimal strategic guidance on how to pursue it.

The real driving force behind the development of NEOps capability within the Navy is the pursuit of interoperability with the USN. Interoperability is more than technical in nature and involves training, doctrine, tactics, communications, command, control, intelligence and logistics. The Navy has recognized that the USN will set the standard for the technology and organization for this interoperability. As such, since the USN has implemented NCW as a basis of their operations, so must the Canadian Navy implement NEOps capability. This interoperability and its accompanying NEOps capability have served the Navy well. It has allowed unique operational command opportunities for Canadian naval commanders and enabled the Navy to make a significant contribution to collation operations with its Gateway C4ISR capacity. It has situated the Navy to further its CF Transformation objectives of remaining operationally focused and moving towards a more joint CF. It has aided the Navy in meeting its national security maritime objective of the defence of Canada and North America, and has allowed the Navy to contribute as a diplomatic tool for the government. It has also placed the Navy in a favourable position for future joint operations with the Army and Air Force, and to work more effectively with OGDs and agencies.

In summary, the Navy currently pursues interoperability with the USN for practical reasons as well as a matter of doctrine. In doing so, it fulfills national security requirements in the defence of Canada and North America. However, in order to achieve interoperability, since the USN has adopted the concepts of NCW in its development, the Navy has out of necessity become a highly NEOps capable force. By becoming highly NEOps capable, the Navy has been able to integrate into either US led or coalition operations. Further, by being able to effectively interoperate with both the USN and less

enabled coalition partners, the Navy has been able to provide valuable Gateway C4ISR capabilities to coalition operations. The opportunity for Canadian Naval Commanders to exercise operational command is also attributable to both the NEOps capability of Canadian warships and the ability to seamlessly integrate with the USN. The Navy has not developed NEOps capability in isolation. The Army and Air Force have also become more NEOps capable and although the efforts between Environments remains largely uncoordinated, there is no indication that the Navy is diverging significantly in practice or doctrine, but rather appear to be well positioned to lead NEOps efforts in the future. IM Group is now controlling the technical aspects of NEOps which ensures that future developments in these regards are at least technically compatible across the forces. Thus, in spite of a lack of strategic guidance in both NEOps and CF Transformation, the Navy is succeeding in meeting transformation goals by pursuing interoperability. They are maintaining an operational focus, as demonstrated by their ability to integrate with the USN and deploy as part of coalition or US led operation; and they are moving towards the ability to be more joint, by using their NEOps capability to provide a foundation for working more effectively with the Army, Air Force, OGDs and agencies. Although NCW, and by extension the Canadian equivalent NEOps, is still largely disputed as an operational theory of warfare, the underlying concepts and tenets are still a valid concept in today's CF. Current business practices confirm that the underlying principles originally observed are still valid in today's private sector. While not formally identified as a key principle in CF Transformation, NEOps provides the Navy a sound basis to

Thus, the Canadian Navy should continue its ongoing practice of maritime interoperability with the USN, and the associated development and implementation of NCW concepts in order to become a more NEOps capable force, as a means to meet its requirements for CF Transformation. By achieving and maintaining a high level of interoperability and the associated NEOps capability that comes with it, the Navy will be better situated to operate jointly with the Army and Air Force, as well as OGDs and agencies. This in turn will assist the CF as it moves towards more Joint, Interagency, Multinational, and public (JIMP) operations.

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