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The Revolution in Military Affairs and Defence Policy Revision: A Viable Contributor or Overstated Concept?

By/par

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Abstract

A major defence review is expected as a result of the changing security environment, the events of 11 September 2001 and the government's desire to reduce the debt. The proposition is that any analysis, review and/or re-write of Canadian defence policy must take into consideration the impact that advanced information based technologies will have on the future of warfare. By understanding and utilizing the Information RMA as a major element of defence policy, the government and DND will be able to ensure Canada has a sustainable and credible armed forces to meet the challenges of the 21st century. A revised policy enabling the exploitation of modern and projected elements of the Information RMA can enhance the quest for an appropriate, achievable and affordable defence capability.

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Chapter One – The Future Security Environment

"There's always a war … somewhere!"[1]

Introduction

The conclusion that can be drawn from the above quote is that conflict in some form or other will continue to threaten international peace and security well into the future. The challenge for political and military leaders is to develop an understanding of the evolving nature of conflict in order to articulate a national security policy, which correctly serves national objectives and interests. It is essential that our understanding of these complex issues be as accurate as possible, because if it is wrong, all the plans and preparations that follow will be for naught.

British military doctrine defines conflict as a "situation in which violence is either manifest or threatened."[2] The reasons for such violence are many, but revolve around "emotion – fear, greed, hatred and ambition – coupled with political, economic, religious, ethnic, nationalistic and environmental interests."[3] Additionally, change itself is a cause of war. "One of the major paradoxes of human existence is that whereas change is normally a positive force, people vigorously resist it. In this respect, resistance to change remains a leading cause of conflict and war."[4] Regardless of the cause, modern conflict can span the spectrum from high tempo conventional warfare between established military forces at one end, to low intensity conflict characterized by asymmetric attacks at

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[1] This rather profound statement is the motto of the US Air Force Wargaming Institute from Maxwell Air Force Base in Alabama.

[2] UK Ministry of Defence, Design for Operations (British Military Doctrine (Army Code 7145), 1996) 3-1.

[3] National Defence, The Future Security Environment (Kingston, DLSC Report 99-2, August 1999) 57.

[4] Sean Henry et al. "A Strategic Assessment: Canada's Response to the New Challenges of International Security." Conference of Defence Associations Institute (CDAI), Ottawa: 1999. (Taken from the CDAI website at www.cda-cdai.ca)

the other end. There are numerous predictions as to what the future security environment will look like; some "dooms day" in nature and others boding well for the future. It is impossible to say which is correct. Suffice it to say that the future will be complex and uncertain.

The 1990s saw the Cold War bipolar construct transform itself into a unipolar one, leaving the US as the reigning superpower.[5] The effect is that the end of the Cold War has expanded DND's strategic mandate from a traditional European focus to a broader view of Canada's role throughout the world. In general, the Cold War provided western defence planners with a relatively straightforward enemy around which to develop the doctrine and force structures needed to defeat a Soviet attack through Europe. However, with the demise of the Soviet Union and the threat of war in Europe significantly reduced, defence planning has become a much more challenging task. Defence planning is no longer based on the *threat* posed by the Warsaw Pact, but rather on the various *capabilities* that may be needed to conduct operations throughout the spectrum of conflict against a less clearly defined enemy in an unknown and far-off battlespace.[6]

In light of the changing security environment, the events of 11 September 2001 and the government's inability to adequately resource DND, there have been a number of calls by various concerned groups and organizations for the government to review the *1994 Defence White Paper* to ensure it is still appropriate, and more importantly, affordable.[7] On the whole, these groups are not questioning the policy of a multi-purpose combat

[5] Many analysts predict that in ten to 20 years China will be able to challenge US dominance as the sole global superpower. Bill Keller, "The Fighting Next Time," New York Times Magazine 10 March 2002: Section 6, 37.

[6] Lieutenant-General M.K. Jeffery, Chief of the Land Staff made this point during the question and answer period following an address to the Army CSC 28 students in Toronto on 14 January 2002. Also, David Pratt, Chairman of the Standing Committee on National Defence and Veterans Affairs made the same comment in his address to at the Conference of Defence Associations annual seminar in Ottawa on 21 February 2002.

[7] These groups include: the Conference of Defence Associations Institute (*Caught in the Middle: An Assessment of the Operational Readiness of the Canadian Forces*) a number of Standing Committee on National Defence and Veterans Affairs (SCONDVA) reports, the Council for Canadian Security in the 21st Century (*To Secure a Nation: The Case for a New Defence White Paper*) and the Royal Canadian Military Institute (*A Wake Up Call for Canada: The Need for a New Military*).

capable force as laid out in the *1994 White Paper on Defence*; what they are questioning is the government's resolve toward actually achieving this capability.

An area not considered in the various calls for a defence review is the impact that emerging technologies, in particular information based technologies, will have on future military operations. Likewise, the revolutionary impact of emerging technologies was not addressed in the *1994 Defence White Paper*. For there to be a so-called Revolution in Military Affairs (RMA), there has to be a "paradigm shift in the nature and conduct of military operations which either renders obsolete or irrelevant one or more core competencies or creates one or more new core competencies, in some dimension of warfare, or both."[8] There is an on going debate as to the actual existence of the current RMA, which, for all intents and purposes, is based on the ability to rapidly gather, process and act upon huge volumes of battlespace related information.[9] When this technology is combined with the appropriate doctrine and force structure, future armies are expected to be able to completely dominate the battlespace with fewer, more combat capable forces. Conceivably, a new CF incorporating the advantages of the Information RMA could indeed be smaller in size yet more lethal for a lower cost. In effect, making it possible for the CF to maintain its role as Canada's force of last resort. The other argument is that for a similar size CF, Information RMA technologies are capable of significantly improving battlefield effectiveness.

There is little argument that the world continues to evolve and become more complicated and interdependent. As one of the advanced nations, Canada is in a unique position to take advantage of emerging technologies that could revolutionize the way future conflicts are fought and provide solutions to capability and funding deficiencies that up to now

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[8] Richard Hundley, "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" National Defense Research Institute, RAND, 1999, xiii.

[9] In order to distinguish the current RMA from past revolutions in military affairs, the term "Information RMA" was selected by the author. This helps to focus the reader's attention toward the impressive array of "information age" technologies being developed for the conduct of warfare.

appeared unsolvable. Regrettably, unlike the armed forces of many of its allies, the CF have been slow to acknowledge the existence of the Information RMA and as a result lags behind the work being done by other nations, in particular the US. Therefore, any new defence policy[10] will need to fully evaluate the potential impact of the Information RMA to ensure the CF have the correct equipment, doctrine and force structure to confront the future security environment.

Thesis

A major defence review is expected as a result of the changing security environment, the events of 11 September 2001 and the government's desire to reduce the debt.[11] The proposition is that any analysis, review and/or re-write of Canadian defence policy must take into consideration the impact that advanced information based technologies will have on the future of warfare. By understanding and utilizing the Information RMA as a major element of defence policy, the government and DND will be able to ensure Canada has a sustainable and credible armed forces to meet the challenges of the 21st century. A revised policy enabling the exploitation of modern and projected elements of the Information RMA can enhance the quest for an appropriate, achievable and affordable defence capability.

Methodology

This journey begins with an evaluation of the global strategic environment and the nature of future warfare. Chapter Two examines the current defence policy and DND's ability to function in the evolving post Cold War environment. The third chapter explores the impact that the Information RMA is expected to have on the conduct of warfare in the

[10] Defence policy must be closely linked to foreign policy, which are both based on the national security policy in order to ensure synergy and a common approach.

[11] The Honourable Art Eggleton, Minister of National Defence recently announced a defence policy review at the annual seminar of the Conference of Defence Associations on 21 February 2002 in Ottawa. He added some further clarification in his Introduction to the National Defence, 2002-2003 Estimates: Part III – Report on Plans and Priorities, (PWGSC, Ottawa: 2002) i to iv. (Taken from the DND website at www.dnd.ca) However, specific details of the review process are unknown at this time.

21st century. Chapter Four will tie the Information RMA and defence policy together in order to highlight the benefits of incorporating the Information RMA as part of the defence policy review. What follows will tend to be somewhat army centric in nature. This is done knowingly because it is the Army that stands to gain the most from the Information RMA. This approach is not meant to minimise the concern and attention that must be paid to the joint (and combined) nature of operations.

The Changing Global Environment

The aim of this chapter is to develop an appreciation of the evolving geo-strategic situation and where Canada fits into this from a political, economic and military perspective. To provide a common framework for this analysis, most experts have concentrated on the 2020 to 2025 timeframe.

Geo-Political

As information, ideas, goods and services flow more easily between countries, international boundaries are becoming less relevant. Global issues that once would not have troubled Canadians, now have the potential of becoming areas of concern as images of distant war and suffering prompt the public to force politicians to "do something." Depending on the situation, that "something" usually involves and will most probably continue to involve the CF in some capacity.

In developing areas of the world, over population, government mismanagement and changes to global weather patterns are seriously affecting the viability of significant portions of arable land, fish stocks, natural resources and potable water. Over time, these commodities may become strategic in nature and the root cause of regional conflict between "have and have not nations."[12] The spread of infectious human, animal and crop diseases such as HIV-AIDS, mad cow disease and Dutch elm disease (to name a few) are showing signs of threatening fragile natural balances on a global scale. Currently, almost

[12] The Future Security Environment 11.

a billion people suffer from food shortages and a significant percentage of the world population is experiencing a water shortage. These problems are expected to get worse as the global population continues to grow by approximately 80 million people each year,[13] mostly in areas already severely stressed. For Canada, this means the increased likelihood that the CF will be involved with humanitarian assistance, intervention in a regional conflict and ultimately, the protection of Canada's own resource base.

The combined effect of war, the depletion of natural resources, and population growth results in an increase in global population migration, especially into urban areas. Currently, approximately half of the world's population are city dwellers and it is anticipated that by 2025 that number will grow to more than two thirds.[14] In the last 25 years, the number of refugees has increased nine fold.[15] This population movement puts great strain on the affected nation's infrastructure and often that of its neighbours. As pressure increases, it can be anticipated that the government and state services of less stable states (for examples, parts of Africa and Central America) may begin to fail, greatly threatening regional security.[16] For many, the decline into anarchy is very easy, with the consequence being an increase in the number of refugees and displaced persons. Many of the refugees from these areas hope to end up in the West, in particular Western Europe or North America. From a Canadian perspective, increased immigration may impact on internal security and foreign policy as foreign conflicts and prejudices are brought to Canada, usually into the various ethnic communities found in larger urban

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[13] National Defence, VCDS Military Assessment 2000, Part 2, page 2. (Taken from the VCDS website at www.vcds.dnd.ca/dgsp/dda/milassess/intro_e.asp)

[14] At the present time the world's cities are growing by approximately one million people each week. (Taken from the Department of Foreign Affairs and International Trade (DFAIT) website at http://www.dfait-maeci.gc.ca/english/foreignp/social/hab-conf.htm)

[15] The Future Security Environment 11.

[16] For example, many of the newer/weaker states that emerged from the decolonisation process may be unable to liberate themselves from the grip of poverty and violence and end up a "failed state" or worse "rouge state." National Defence, VCDS Military Assessment 2000, Part 2, page 4. (Taken from the VCDS website at www.vcds.dnd.ca/dgsp/dda/milassess/intro_e.asp)

areas.[17] For example, if left unchecked these "gang wars" could, over time, escalate into more serious forms of civil unrest and conflict that could undermine national security.

The failure of traditional state power mechanisms to maintain sovereignty in some of the world's weaker nations is allowing non-state centres of power to become more influential in dominating the local political scene. These non-state centres of power include "religious movements, multinational corporations, ecological organizations, international criminal syndicates, illegal arms consortiums, drug cartels and international terrorist organizations"[18] "as well as the agents of those governments which choose to pursue their ends by terror."[19] For example, the Taliban and Al-Qaeda completely corrupted the government of Afghanistan and ultimately led to the terrorist attacks of 11 September 2001. Multinational corporations can either add to regional stability by dissipating conflicts or exploit weaker states, all in the name of profit. For instance, in Sierra Leone a civil war was extended by up to two years in order to ensure control of the titanium, bauxite and diamond mines.[20] Out of desperation to curb the corruption and turf wars, the Columbian government has granted the Revolutionary Armed Forces of Colombia (FARC) a demilitarized zone of approximately 42,000 square kilometres and the National Liberation Army (ELN) an area of 4,800 square kilometres where they have complete autonomy to run their international drug operations.

Through the use of media outlets and the Internet, these various non-state centres of power have easy access to international publicity for their local disputes, which further

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[17] It should be noted that some of these immigrant groups can be expected to bring valuable skills to Canada, many of which the military may be able to exploit to its advantage. An interesting study of Canada's recent immigration patterns can be found in a Department of Citizenship and Immigration Canada report entitled Canada's Recent Immigrants – A Comparative Portrait Based on the 1996 Census which was taken from the Citizenship and Immigration Canada Strategic Research and Review website.

[18] The Future Security Environment 11.

[19] Brian Holden Reid, ed., Military Power: Land Warfare in Theory and Practice, (Frank Cass and Company Ltd., 1993). (Specific article by Major-General Alistair Irwin. "The Buffalo Thorn: The Nature of the Future Battlefield." 229)

[20] D. Shearer, "Private Armies and Military Intervention," Adelphi Papers (Oxford University Press, Oxford, 1998) 49-53.

exacerbates the breakdown in international law and order. Also, the growing electronic banking system has made the laundering of money and the transfer of illegal funds much easier, which in turn allows dissident groups to purchase weapons to further their cause. These weapons do not only include conventional weapons, but also weapons of mass destruction and other highly classified and sophisticated military technologies. With the demise of the Warsaw Pact, there has been an increase in the supply of weapons of every description available to those who can afford it. This means that states that were once small or bit players are now able to easily acquire weapons, and with the help of the mass media, transform regional disputes into global ones. Examples include, India and Pakistan, China and Taiwan or President Bush's "axis of evil." Therefore, the possibility of the CF encountering a well-equipped and determined foe when deployed on an overseas mission is very likely.

There are regions of the globe that remain politically unstable and the possibility of conflict is very real. The threat of a conventional war spreading to Canada is low. However, whatever happens beyond the border may have a direct effect on global peace and security, which in turn may ultimately impact on Canada. Therefore the CF, as the government's force of last resort, must have the capability to defend national interests, goals and values, both at home and abroad, in order to protect the nation's physical and economic well being. Although a national priority in the eyes of the average citizen, defence continues to fall significantly behind health, education and other social interests. Nonetheless, a sensible defence policy and the means to implement it cannot be understated.

Economic

As a mature nation and a member of the G7, the World Monetary Fund and a number of other international economic treaties and organizations, Canada has a responsibility and vested interest in maintaining harmony in the world. In particular, Canada's economic future depends on the continuing ability to freely trade ideas, goods and services with other nations. This is best done in an environment of international stability and

prosperity. Canada is a wealthy nation with the world's seventh largest Gross Domestic Product (GDP) and is rich in energy, fresh water, minerals, agriculture, fishery and forestry, and ranks seventh in world trade.[21] Based on Canada's global status, the argument for a more appropriate defence policy and its financial support is very evident.

The vast majority of Canadians live within 160 km of the Canada/US border, making the US Canada's closest and most important trading partner. In many respects, it is easier for regions of Canada to ship goods and services south to the US than east/west to the rest of the nation. Over $1.9 billion in trade flows between the US and Canada every day. Canada exports 87 percent of its GDP to the US. Exports to Canada account for 25 percent of US exports.[22] As can be seen, Canada is heavily dependant on trade with the US and should therefore seek opportunities to diversify and trade with other nations. One way the government can make this possible is to help maintain global stability.

Despite the size of Canada's economy, its productivity and investment in research and development lags behind many other Western nations. Of the G7 nations, Canada ranks last in terms of research and development spending as a percentage of the GDP, that is, approximately 1.5 percent compared with the US at 3 percent and the UK at 3.2 percent.[23] The implication is that Canada is more likely to conduct low risk evolutionary based research and development instead of higher-risk revolutionary research and development. The relative pecking order of technological ambition may affect the desire and ability to exploit the Information RMA through the future defence policy and programme implementation.

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[21] It is estimated that one in three Canadian jobs depends on trade. "Caught in the Middle: An Assessment of the Operational Readiness of the Canadian Forces" 2 to 3

[22] 2002-2003 Estimates: Part III – Report on Plans and Priorities.

[23] Andrew Richter, "The Revolution in Military Affairs and Its Impact on Canada: The Challenge and the Consequences." Working Paper No. 28, Institute of International Relations, University of British Columbia, March 1999, 33.

It is predicted that Canada's debt will increase to $2 trillion in the next two decades,[24] increasing the taxation burden on an already heavily taxed population. Also, an aging population, declining birth rate and insufficient immigration will affect the labour market, productivity and taxation base.[25] At some point, the Canadian government will have to decide if it is better to put defence ahead of social programs, because without a secure and stable economic environment there cannot be an effective social assistance framework. Prosperity comes with a price, namely the expectation that Canada assumes its share of the international defence burden.[26]

As a prosperous nation that depends on global trade for its economic well being, Canada needs to stay engaged internationally and where possible play a leadership role, especially in terms of enforcing and keeping the peace. To accomplish and maintain this capability, Canada will require a credible force that is able to perform a variety of operations anywhere in the world. Without it, national prestige and influence (at the bargaining table and on the battlefield) is in jeopardy.

Future Threat Environment

A review of military capability shows that there are three basic types of militaries in existence today. Each is based on the degree to which the "parent" nation has progressed in terms of the agricultural age, industrial age and information age.[27] Arguably, the US is in the best position to actively pursue an information age based military, because of its ability to bear the costs involved. Generally, developing and/or developed nations like Canada have industrial based militaries. Finally, third world nations attempting to move

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[24] David Pugliese, "Forces Adviser Predicts Merger with U.S. Military: Burgeoning Debt will Force Profound Changes, Report Concludes," Ottawa Citizen 24 January 2001: A1.

[25] Canadians are among the most taxed in the world. Joseph T. Jockel, The Canadian Forces: Hard Choices, Soft Power (The Canadian Institute of Strategic Studies, Brown Book Company, 1999) 5.

[26] Sean Henry et al., "Caught in the Middle: An Assessment of the Operational Readiness of the Canadian Forces," (Conference of Defence Associations Institute (CDAI), Ottawa, 2001) 3. (Taken from the CDAI website at www.cda-cdai.ca)

[27] Toffler, Alvin and Heidi, War and Anti-War (Toronto. Little, Brown and Company, 1993).

from the agricultural age into the industrial age tend to rely on "terrorism, insurgency and subversion"[28] and other forms of low intensity conflict as their basis for conflict. To better define and visualise the future security environment, Canada has adopted the NATO definition of View 1 (high tempo conventional conflict) and View 2 (low intensity asymmetric) warfare. See Annex A for a complete description of View 1 and View 2 warfare.

Throughout the Cold War, NATO aggressively prepared for a defensive View 1 battle against the Warsaw Pact, which was expected to take place on the northwest German plain, centred on the Fulda Gap. With the dismantling of the Warsaw Pact, many Western governments sought options to cash-in on the so-called peace dividend by reducing their defence budgets and the size of their militaries. However, instead of a peace dividend there has been a call for more active participation in various conflicts around the globe.[29] Since 1989, Canada has been involved in more than 70 operations and deployments compared to 24 for the entire period from 1948 to 1989.[30] From 1950 to 1990, the US Army was involved in 55 operational deployments to include the Korean Conflict and the Vietnam War. However, "since 1989, the [US] Army has had 53 operational deployments with a majority being small-scale contingency operations such as Somalia, Bosnia, and Kosovo."[31] A recent study determined that there are approximately 24 intra-state wars, each involving over 1000 deaths taking place at any one time around the globe. Of these, 95 percent are in the developing world and 80 percent have ethnic or religious origins.[32]

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[28] Military Power: Land Warfare in Theory and Practice 229.

[29] The Canadian Forces: Hard Choices, Soft Power 9 to 26.

[30] 2002-2003 Estimates: Part III – Report on Plans and Priorities iii.

[31] United States General Accounting Office, "Defense Acquisition: Army Transformation Faces Weapon System Challenges," (GAO-01-311, Washington: May 2001) 3.

[32] Shaye K. Friesen, "Some Recent Trends in Major Armed Conflicts," ORA, Directorate of Land Strategic Concepts (DLSC) Research Note 9802, Department of National Defence, Kingston, 1998.

The increase in the number of View 2 conflicts can be attributed to the end of European colonial rule over countries in Africa and Asia in the 1970s and the failure of the Soviet Union in 1990. The result has been a "loosening of constraints on ethnic, religious and nationalist rivalries, within artificial boundaries imposed by outsiders."[33] Certainly from a European perspective, the Cold War kept things in check while the world's two superpowers faced off along the Iron Curtain. Since the early 1990s, "nationalism and tribalism have replaced ideology as the leading causes of regional and local disputes."[34] The result has been a number of violent and unpredictable wars in places such as the Balkans, Haiti, Middle East and parts of Africa. Care must be taken not to assume that View 2 conflict "implies low technology weapons and equipment; in some areas, particularly in electronics, this form of warfare is as highly technical as any other."[35]

There is no evidence that conventional View 1 conflict will be completely replaced by View 2 conflict. Aurel Braun, a professor at the University of Toronto, recently stated that "despite the end of the Cold War, it is a very dangerous international system out there and the democracies, including Canada, remain targets. Consequently, [Canada will] need to have real military capability."[36] This military capability is needed to deter, and if need be, counter the threat posed by other similarly equipped forces. The problem is that once a form of warfare, such as industrial, information or nuclear, has been developed, it cannot be undone – in other words, you cannot put the genie back in the bottle. To deter would-be aggressors and protect the nation and its citizens should deterrence fail, a nation needs to at least match the threat posed by a potential adversary.[37]

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[33] The Future Security Environment 10.

[34] VCDS Military Assessment 2000 Part 1, page 8.

[35] By attacking civilian and military computers, View 2 combatants may be able to achieve their purposes by paralysing the electronic nervous system of information age societies This makes information infrastructure a critical vulnerability in need of protection. Military Power: Land Warfare in Theory and Practice 232.

[36] Nicolaas van Rijn, "Beef Up Defence, Canada Warned," Toronto Star 4 February 2002. (Taken from the Toronto Star website at www.thestar.com)

[37] VCDS Military Assessment 2000 Part 2, page 1.

At present, there is no direct or immediate military threat to Canada and the risk of an "off-shore" conflict expanding into Canada is "assessed to be very low."[38] However, the possibility of an asymmetric attack against Canada is somewhat more difficult to assess. An asymmetric attack avoids strength and exploits vulnerabilities by attacking an opponent's political support and will to fight through "acts of terrorism, disinformation, psychological operations, the use of weapons of mass destruction and information system attacks."[39] In simple terms, it is a surprise attack that negates an opponent's advantages. The events of 11 September 2001 provide a clear indication of the destructive power of such an attack. "Canadians can no longer take solace in a belief that these threats are directed solely against the US and its interests. Canadians were killed in the September 11, 2001 attacks on Washington and New York and Canadian commerce and transportation was paralysed as a result."[40] The deduction from this is that Canada needs a viable and realistic military capability.

The exact nature of the next conflict cannot be predicted with any certainty. Few if any future conflicts will neatly fall into either the View 1 or View 2 category, but rather at some point between the two extremes and most likely continually shift along the spectrum. Recognising this continuum, current CF policy is to position itself where it can best fulfill the broadest possible range of operations. In other words, be able to routinely operate in the most probable environment (CF Vital Ground) yet, with some risk and additional preparation at the national level, function in the most dangerous/difficult environment (extremes of either the View 1 or View 2 sphere). Figure 1 shows where the CF would like to position itself for the future.[41]

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[38] VCDS Military Assessment 2000 Part 2, page 6.

[39] The Future Security Environment 13.

[40] Fred Fergusson et al., "Canadian Defence and Security in the 21st Century – To Secure a Nation," Centre for Military and Strategic Studies, University of Calgary.

[41] The Future Security Environment 38.

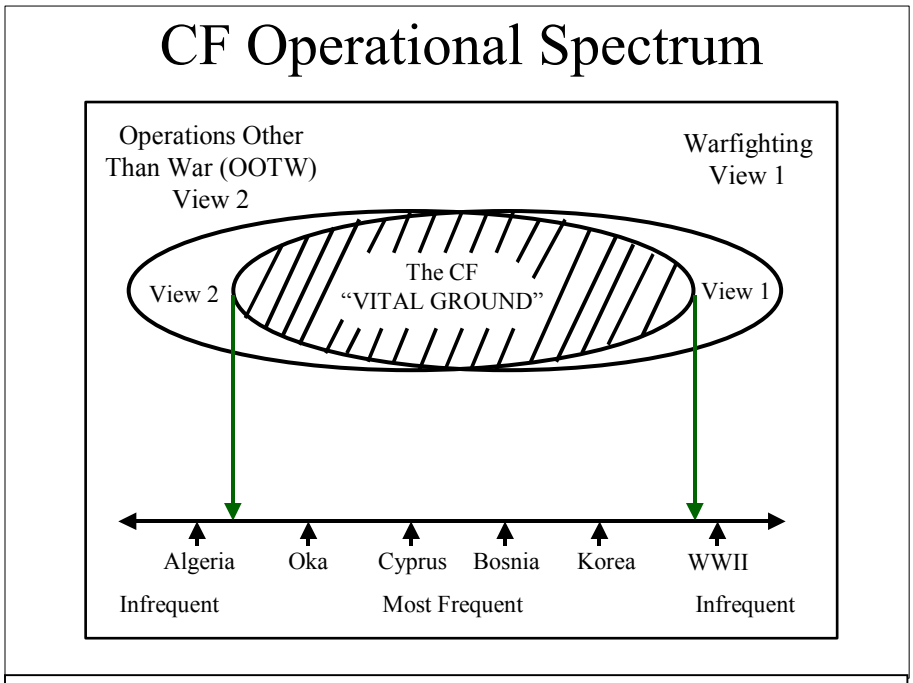

Figure 1 – CF Vital Ground

Future Battlespace

Equally difficult to anticipate is the nature of the future battlespace. Conventional wisdom anticipates that future operations will be both combined and joint, conducted at an increased pace in a multi-directional, complex battlespace that will be larger in size and less dense than today. Additionally, manoeuvre will be conducted to support firepower as opposed to the other way around.

The increasing complexity of warfare requires that all available resources be brought to bear against the enemy. The advent of new technologies will cause the operational tempo to compress the time to decide and act, resulting in simultaneous rather than sequentially phased operations.[42] This implies the concurrent application of the combat power of all three services. "Without air support, land and sea forces are fatally vulnerable to enemy air attack; without air support land and naval operations are unlikely to prosper. Air

[42] Michael Evans, "From Kadesh to Kosovo: Military Theory and Future Land Warfare." Speaking Notes for the 2001 Australian Chief of Army's Land Warfare Conference.

operations are valueless unless they are conducted in concert with land operations and achieve nothing unless they are consolidated by land forces."[43] With the end of the Cold War and the movement toward smaller standing militaries, future conflicts will almost always be fought as part of an alliance or coalition. This will on one hand ensure sufficient combat power, provide access to territory and add "legitimacy" to the campaign, while on the other hand complicate interoperability.[44]

Due to cost considerations and the generally accepted need to fulfill as many roles as possible, future militaries are expected to be smaller in size and equipped with highly functional multi-purpose combat capable equipment that will be able to sense, manoeuvre and engage over a larger area. The result will be an increase in battlespace dispersion, or a "less dense battlefield"[45] where there will be more room to manoeuvre and less clearly defined boundaries between opposing forces. However, even with a less dense battlefield, there will still be places where a decision is sought and troops will have to concentrate for battle. Figure 2 shows how the size of a brigade group area of operation has increased over the last 100 years yet maintained roughly the same battlefield/combat effectiveness.[46]

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[43] Military Power: Land Warfare in Theory and Practice 236.

[44] Michael A. O'Halloran, "The Vulnerability of Coalitions." United States Naval Institute Proceedings, Vol. 126, Issue 9, September 2000: 62.

[45] The Future Security Environment 60.

[46] Lieutenant-General M.K. Jeffery, Chief of the Land Staff. Speaking Notes for an Address to the Army Students of CSC 28, Toronto, 14 January 2002.

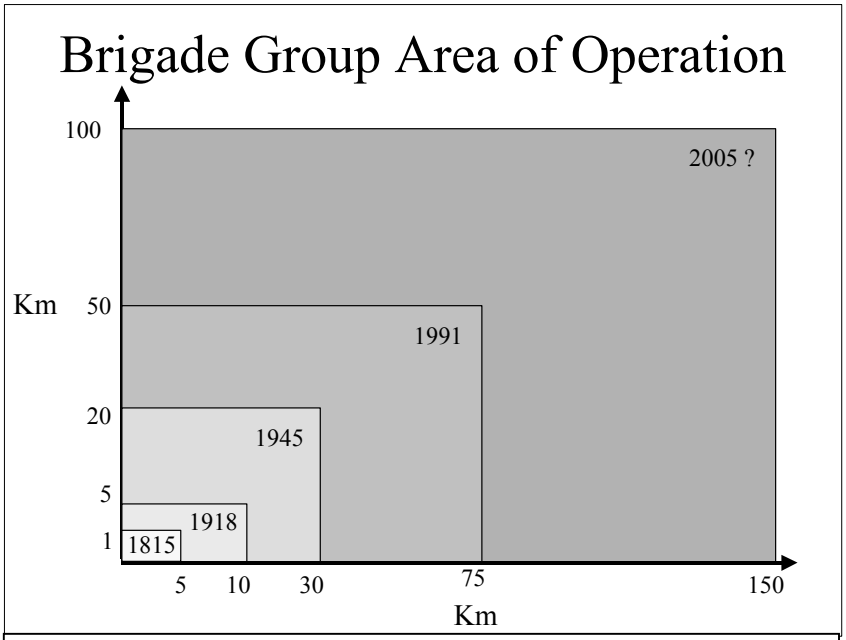

Figure 2 – Brigade Group Area of Operation

A key feature of this new battlespace is that manoeuvre can now be conducted to support firepower as opposed to the current construct where firepower is used to set the conditions for manoeuvre.[47] This shift in doctrine is the result of technological advances in battlespace visualization and long-range weapon lethality. In the end, it is the application of firepower and not manoeuvre that defeats an opponent. Therefore, the force that is able to apply its firepower before the enemy is most likely to be victorious.

Certainly from an army, and to some extent an air force and navy perspective, many experts anticipate that urban areas will assume greater importance in future conflicts and in some campaigns may become the decisive terrain.[48] It is predicted that 80 percent of future conflicts will take place in complex terrain where ranges will be approximately

[47] Results of a Directorate of Land Strategic Concepts (DLSC) Future Security Environment (June 2001) experiment found that forces, which used manoeuvre to support firepower, were very successful. The superior situational awareness provided by an improved command and control network facilitated dispersion over an expanded battlespace, which in turn enhanced security and survivability through negating enemy counter fire while allowing the massing of friendly weapons effects.

[48] National Defence, Future Army Capabilities (Directorate of Land Strategic Concepts (DLSC) Report 01/01, Kingston: January 2001) 8.

200 meters or less.[49] Less sophisticated opponents may be forced into urban areas simply to hide from the increased capability of information/knowledge-based armies. As a conflict moves into an urban area it takes on a whole new dimension and becomes very manpower intensive and defensive in nature, in direct opposition to manoeuvre warfare doctrine.[50] What this will mean to defence planning in the future is still to be determined.

Urban operations provide a good example of the multi-directional aspect of combat in that deep, close and rear operations will simultaneously be taking place above, on and below ground (and/or water) level. Depending on the location, littoral operations could also be taking place. Overarching it all will be the electromagnetic spectrum. Due to the need for interconnectivity between the diverse aspects of this new expanded battlespace, it will become increasingly more important "to fight future battles as a single entity under a single commander, and not, as so often in the past, as a series of separate and imperfectly coordinated operations under dispersed and sometimes rival commands."[51] This blending of the command structure will have a significant impact on the design of future force structures.[52]

Not only is the nature of future conflict difficult to predict but also the battlespace in which it will occur. War has always included concurrent operations from throughout the spectrum of conflict occurring at various points in the area of operations. What will be different about the future will be the speed and size of the area in which these operations take place. Compounding this future security environment will be the need to conduct

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[49] Colonel H.J. Marsh, "Thoughts on Artillery 2001-2020: ISTAR and Technology," (NDHQ, Ottawa, 10 December 2001) 5.

[50] Manoeuvre warfare, unlike attrition warfare, is based on defeating the enemy through manoeuvre and guile, as opposed to fighting for, and the holding of, "ground." However attrition battles will still occur at places where a decision is sought and ground will continue to be fought for and held, usually in the context of how that ground can be used as an anchor for further manoeuvre rather than for its own intrinsic value. Robert Leonhard, The Art of Maneuvre – Maneuvre-Warfare Theory and AirLand Battle. (Presidio, 1991) 18 to 20.

[51] Military Power: Land Warfare in Theory and Practice 239 to 240.

[52] For a RMA to occur there has to be the insertion of a new technology or capability in addition to doctrine and force structure changes. The flattening of the command structure, although critical to the doctrine and force structure design process, it is beyond the scope of this discussion.

peace support operations, which by all accounts will be increasingly more dangerous and the "need to use, or threaten to use, force"[53] will be ever present. The challenge for defence planners will be to design a credible and affordable force structure that encompasses all these war fighting and peace support requirements into one force.

Conclusion

With the end of the Cold War and the emergence of the US as the reigning superpower, the world has entered a period of turbulence and confusion. This new construct has destabilized regions of the globe as evidenced by the dramatic increase in the number of operational deployments involving the CF during the 1990s. Contributing to this rise in political and economic volatility has been globalization, rapid population growth, government mismanagement, the spread of disease and famine, and the significant increase in population migration. In some regions, the failure of the state has allowed non-state centres of power to become more influential. Through the use of global media outlets, these entities have easy access to worldwide publicity for their disputes, further exacerbating the breakdown in law and order. In short, the world is and will likely remain marked by instability and uncertainty.

As a mature nation, Canada has a responsibility and vested interest to maintain harmony in the world. In particular, Canada's economic future depends on the ability to freely trade ideas, goods and services with other nations and this is best done in an environment of international stability and prosperity. Therefore, it is in Canada's best interest to have the ability to stay engaged internationally and play a credible role in keeping the peace in order to protect its economic well-being. This implies having a military force that is able to perform a variety of operations anywhere in the world.

Most experts agree that conflict will be around for the foreseeable future and democracies, like Canada, are possible targets, either directly or indirectly. The exact

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[53] Military Power: Land Warfare in Theory and Practice 241 to 242.

nature of the next conflict or battlespace in which it will be fought cannot be predicted with any accuracy. Therefore, in order to be ready for any possibility, future militaries will need to be equipped with highly functional multi-purpose combat capable forces that are capable of global-wide deployment and sustainment on a distant, less dense, and possibly complex battlespace. The challenge is to design a credible and sustainable military that encompasses all the necessary war fighting and peace support requirements into one force. In particular, the CF have identified the need to structure, equip and train for routine operations identified by the CF Vital Ground, while positioning itself for missions across the broadest range of View 1 and View 2 conflicts.

Interestingly, as important as this endstate is for the nation, the Canadian government, mainly through the lack of resources, has hampered DND's ability to "defend Canada and Canadian interests and values while contributing to international peace and security."[54] Canada's decision to withdraw its troops from Afghanistan stands as evidence that the nation is now paying the price of long term neglect in that the CF are unable to sustain a minimal combat ground force with our main ally engaged in the war on terrorism. For that reason, a defence policy review is needed to ensure Canada has an appropriate, achievable and affordable military to meet the challenges of the 21st century.

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[54] National Defence, 1994 Defence White Paper (Ottawa: 1994) 2.

Chapter Two – In Search of a Suitable Policy for an Effective Military

Canada needs armed forces that are able to operate with the modern forces maintained by our allies and like-minded nations against a capable opponent – this is, able to fight "alongside the best, against the best." [55]

Canada's military circumstances have changed enormously over the past seven years. For these reasons "business as usual" is no longer an acceptable approach to defence policy.[56]

Predicting the future of modern warfare is a notoriously unreliable process. Armies must, however, plan and train for future conflict on the basis of some indication of the likely nature of war. A middle course must be steered between experience (armies are often accused of training for the war they fought last) and projections of futuristic weapons (whose technology may be unproven and whose cost may be prohibitive).[57]

Introduction

To protect its place in the future security environment, and to play its appropriate role on the world stage, the essential assumption is that Canada needs to maintain a credible military force to counter threats to its security, and that of its allies. The credibility need must also reflect a societal responsibility to those who serve. Any member of the CF may, at any time and without notice, be placed in harm's way and be expected to give his/her life in the service of his/her country. Because of this *unlimited liability*, the government has an *unlimited responsibility* to ensure that the CF have the tools and training necessary to execute their mission with the lowest possible risk to life and limb.[58]

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[55] 1994 Defence White Paper 14.

[56] Even though this statement was written in 1994, it is as relevant today as it was then. 1994 Defence White Paper 40.

[57] Design for Operations 3-1.

[58] "Caught in the Middle: An Assessment of the Operational Readiness of the Canadian Forces" ix.

However, the ability and intent of the government to fulfill that responsibility has been called into question since the last defence policy was articulated in 1994.

The *1994 Defence White Paper* is a credible document, reflecting a sensible, albeit perhaps dated, defence policy. It accurately foresaw an unpredictable and fragmented world in which "the primary obligation of the Department of National Defence and the Canadian Forces is to protect the country and its citizens from challenges to their security." To achieve this, the White Paper "concluded that the maintenance of multi-purpose, combat capable forces is in the national interest. It is only through the maintenance of such forces that Canada will be able to retain the necessary degree of flexibility and freedom of action when it comes to the defence of its interests and the projection of its values abroad."[59] During the 1990s, the Canadian government attempted to take advantage of the end of the Cold War by reducing the defence budget by approximately 30 percent. However, this reduction combined with the increase in operational tempo prevented DND from fully realizing the policy-based objective of a multi-purpose combat capable force.

Defence is important to Canada's status in the world and as such ought to form a critical aspect of national policy. In acknowledging this, the government must detail the various components of its national security policy to include defence and provide the resources necessary to ensure it is achievable. In 1994, the government last outlined its defence policy but, since then, has not provided the resources necessary to reach the desired endstate. The aim of this chapter is to briefly examine the current defence policy and DND's ability to effectively function within the evolving post Cold War environment. In light of this changing security environment, the time has come for the *1994 Defence White Paper* to be reviewed and replaced with a new defence policy that is more appropriate, achievable and affordable for warfare in the 21st century.

[59] 1994 Defence White Paper 13.

The Defence Resource Envelope

Canada has never had a large defence budget, except in times of conflict. Despite having the seventh best economy in the world, Canada ranks 56th in defence manpower, 133rd in defence spending as a percentage of GDP and 112th as a percentage of population in the military.[60] Canada spends only $265 per capita on defence as compared to the NATO average of $589 and the G7 average of $504.[61] Regrettably, these disappointing statistics are indicative of the emphasis the Canadian government puts on defence and national security. Therefore, an increase above the current $12 billion defence budget is unlikely to occur. In fact, during the 1990s it was hoped that the post Cold War peace dividend would justify the government's decision to reduce defence spending by 30 percent. However, instead of a peace dividend, the CF have seen its involvement in domestic and overseas deployments increase considerably. In order to stay within budget, DND has been forced to undertake a number of radical cost cutting initiatives in an attempt to meet both the requirements of the *1994 Defence White Paper* and the increased operational tempo. These initiatives have included reducing the CF personnel strength from 76,000 to 60,000,[62] cancelling and/or delaying a number of capital equipment projects, curtailing training, and delaying the life extension of aging equipment and infrastructure. In the final analysis, the cost of the commitments and tasks emerging for the *1994 Defence White Paper* and the increased operational tempo over the last decade have exceeded the funds allocated by the government to execute them. Estimates vary, but they generally

[60] S.K. Friesen, ed., In the Arena – the Army and the Future Environment. Directorate of Land Strategic Concepts, Kingston: 1999. (Specific article by Brigadier-General (Retired) Don MacNamara, "The Army and the Future Security Environment: A Domestic Outlook." 89 to 95.)

[61] "Caught in the Middle: An Assessment of the Operational Readiness of the Canadian Forces" ix.

[62] However, as a result of mandated reductions (Force Reduction Program (FRP)), various reorganizations and budget cuts during the 1990s combined with ongoing recruiting and retention problems, the CF trained effective strength is approximately only 52,500 personnel (and dropping). PARRA, OSR, PSR, SPR, SIP (amongst other things), NDHQ/DGMHRPP and DGPPRHM, PowerPoint presentation given to 1 CAD Staff, DMHRR Brief 2001.ppt, 4 December 2001.

agree that DND needs an additional $1 billion per annum to check the decline of the CF.[63]

The long-term impact that the events of 11 September 2001 will have on the CF's overall warfighting ability is unknown at this time. The immediate concern is that funding to maintain a multi-purpose combat capable force may be diverted to pay for emerging homeland defence initiatives. This is especially true considering homeland defence will include several other government departments and agencies, such as the Solicitor General of Canada, the Department of Transport, the Department of Health, the Department of Citizenship and Immigration, the Royal Canadian Mounted Police (RCMP), the Canadian Intelligence and Security Service (CSIS), and the Office of Critical Infrastructure Protection and Emergency Preparedness (OCIPEP). Despite identified resource shortfalls, DND should not expect a significant increase in funding, if at all. Therefore, it appears that DND will have to resolve its "problems" within a fixed funding envelope. Figure 3 shows how the defence budget has remained relatively constant over time, compared to other social programs.[64, 65]

[63] Recent budget increases account for "only some 50% of what would be required simply to stabilize the situation of the CF, and arrest the downward slope of capabilities." This assessment from "Caught in the Middle: An Assessment of the Operational Readiness of the Canadian Forces," page 11 is consistent with a number of other reports on defence funding to include the February 2001 Report of the Auditor General.

[64] Taken from the Statistics Canada website (http://www.dnd.ca/admfincs/financial_docs/Msood/images/graph15_b.jpg)

[65] Since the end of World War II, Canadian defence spending has always been less than 2 percent of the GDP compared to approximately 4.5 to 5 percent invested by other NATO countries. The Canadian Forces: Hard Choices, Soft Power 14.

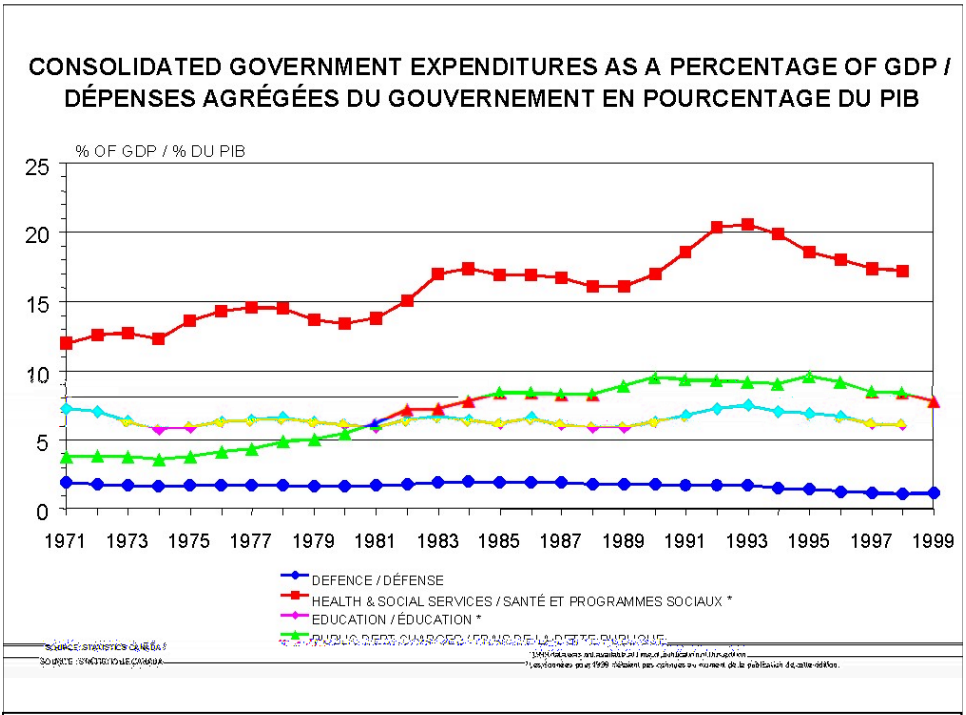

Figure 3 – Consolidated Government Expenditures as a Percentage of GDP

The results of Budget 2001 indicate the following: the operational readiness of the CF will continue to decline, mainly as a result of under funding, which leads to a lack of trained manpower and progressive 'rust-out' of equipment, and inadequate logistics support. The government does not intend to raise defence expenditures above the level of 1.1% of GDP, and therefore the policy stated in *1994 White Paper on Defence* will remain largely unaffordable in the context of government priorities."[66]

Collective Defence

The size of its land mass and corresponding low population density, combined with the small size of its military has forced Canada to protect its interests and values collectively,

[66] Sean Henry, An Analysis of Federal Budget 2001, (The Conference of Defence Associations, 16 December 2001) 5.

as a member of either a coalition or alliance with another nation, in particular the US.[67] In fact, collective security has historically always been a cornerstone of Canadian defence policy and if this is to continue, Canada must stress interoperability with potential allies.[68] Canada is a member of four main military related international associations: the United Nations (UN), the North Atlantic Treaty Organization (NATO), the quadripartite America, Britain, Canada, Australia (ABCA) program and the Organization of American States (OAS) Conference of American Armies (CAA). Canada also has the bilateral North American Aerospace Defence (NORAD) agreement with the US.[69] Membership in these various collective security agreements and/or coalitions require a collective will by all members to act within an environment of equitable burden and risk sharing, both in terms of cost and combat.[70] However, there has been a steady decline in the defence budgets of the usual alliance members (including Canada) over the last ten to 15 years and this has stressed many nations ability to respond when called upon. It is here that Canada will have to be careful that the critical mass of its military does not fall below the level required to be recognized as a member in good standing of these various alliances. Without a credible military capability, national prestige and influence is at stake.

Many of Canada's allies want to see Canada assume a greater share of the collective security burden. NATO Secretary-General, Lord George Robertson pointed out during the 2002 conference of the Organization for Security and Cooperation in Europe that Canada must carry more of the alliance burden by boosting its defence budget.[71] This external pressure may force the government to spend more on defence, however DND

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[67] At the present time, "Canada has more than 80 treaty level defence agreements and 250 Memoranda of Understanding (MOU) with the US." 2002-2003 Estimates: Part III – Report on Plans and Priorities 4.

[68] 1994 Defence White Paper 12 to 14.

[69] "The Revolution in Military Affairs and Its Impact on Canada: The Challenge and the Consequences" 36.

[70] Major L.J. Hammond. "Tank: The Canadian Army's Four-Letter Word," The Army Doctrine and Training Bulletin, Vol. 4, No. 4, Winter 2001-2002: 78.

[71] Nicolaas van Rijn, "Beef Up Defence, Canada Warned," Toronto Star 4 February 2002. (Taken from the Toronto Star website at www.thestar.com)

must be prepared for only marginal increases. Due to the reduced defence budget and the increased operational tempo, "the Army is considered to be in the toughest financial situation of the three military services. Its needs about $300 million a year more than it receives and has dealt with such a shortfall by cutting back on training and the purchase of spare parts and new equipment. To add to its woes, the army is facing a severe rust-out problem of everything from buildings to water systems on bases."[72] Since taking office, the Chief of the Land Staff, Lieutenant-General M.K. Jeffery has said on many occasions that the army continues to live beyond its means in resource terms, has a demand for people that exceeds capacity and can no longer sustain its current force structure.[73] Lieutenant-General Jeffery's comment exemplifies the mixed message that the government continues to send. On one hand, DND is expected to fit within a constrained fiscal envelope (mainly by reducing capability), yet on the other hand the CF are expected to participate in an ever increasing number of domestic and international operations (as shown by the significant increase in the number of deployments since 1989). Without a proper investment in defence, capability will decline putting stress on the CF's ability to meets its commitments, which in turn contributes to further decline until such a point that the CF are rendered virtually ineffective.

Key senior members of DND have stated that the current fleet of in-service and about to be delivered equipment, is a significant improvement over that of a decade ago. They contend that the CF are more capable now, thanks in part to the acquisition of the Victoria class submarines, the Coyote reconnaissance vehicle, the Light Armoured Vehicle (LAV) III armoured personnel carrier and precision guided munitions for the air force. It could be argued that despite the new equipment entering service, it is only bringing the CF up to a steady state after many years of neglect. In fact, many of these programs have been poorly conceived and all are based on Cold War industrial age technology. For example, the Coyote reconnaissance vehicle is regarded as one of the

[72] David Pugliese, "Fighting a Losing Battle: A Senior Military Officer Uses Blunt Language to Decry the Army's Precarious Finances," Ottawa Citizen 27 January 2001: A3.

[73] Lieutenant-General M.K. Jeffery, Chief of the Land Staff. Speaking Notes for the Conference of Defence Associations Annual Seminar. Ottawa, 22 February 2002.

best ground based reconnaissance platforms in the world. However, due to the lack of an integrated, high speed, high capacity command and control system linking it to the rest of the formation, the information the Coyote gathers must be passed using a slow process of voice radio messages or hand carried videocassettes. From a navy perspective, the acquisition of the Maritime Coastal Defence Vessel in the mid 1990s represents a breakdown between the acquisition process, doctrine and force structure development. Due to the fiscal realities of the 1990s, a number of compromises were made that render the Maritime Coastal Defence Vessel poorly suited for some of its stated functions such as coastal defence, mine sweeping or operating as part of a Canadian naval task group.[74] In summary, although there are serious equipment deficiencies, the CF does have some very capable systems. However, without the proper doctrine and force structure for the future, backed up by realistic warfighting training,[75] all these new pieces of stand-alone equipment do not make the CF more capable.

A Constabulary Force

Under the umbrella of the changing global political landscape, the end of the Cold War, and an aggressive debt reduction campaign by the government, there have been disturbing calls to reduce the CF's war fighting capability and in its place create a force structure better suited for peace support operations. In other words, turn the CF into some form of global constabulary.[76] If this were to occur, Canada's ability to provide the minimum level of defence to defend itself and its interests would be seriously jeopardised, most likely to the point where national sovereignty could be in peril, not to mention a reduced role globally and critical marginalization by the US. As the Minister

[74] The top speed of the Maritime Coastal Defence Vessel is only 15 knots limiting its ability to pursue possible threats or even operate with the remainder of the Canadian fleet. Also, the command and control suite is not fully interoperable with the remainder of the fleet. Interestingly, the hull of the MCDV is steel as opposed to a non-metallic material making it hazardous for minesweeping duty.

[75] The last Rendez Vous exercise was in 1992 and since that time, training has primarily focused on the sub-unit as part of mission specific pre-deployment training and not warfighting.

[76] Martin Shadwick, "White Paper Blues," Canadian Military Journal Vol. 2, No.4, Winter 2001-2002: 65.

of Defence at the time stated in the introduction to the *1994 Defence White Paper*, "[i]n the final analysis, it may be said that a nation not worth defending is a nation not worth preserving."[77]

As politicians and defence planners struggle with how 11 September 2001 and the US initiative to establish a "Northern Command" impact on DND, they will have to be careful not to "redesign" the CF to deal solely with asymmetric threats and neglect the need to "make a broader contribution to both collective security and international stability."[78] Notions of a neutral Canada or a nation of peacekeepers cannot assure Canadian sovereignty. The only way to ensure national sovereignty is "by being active and full participants on the world stage, by contributing to collective security and by providing adequate protection and surveillance of [Canadian] territory"[79] – in other words a warfighting capability.

Those who foresee the end of View 1 type conflicts must be careful in their assertion that all future conflicts will be View 2 (low intensity) because this "new form of war may not replace old-fashioned [conventional] warfare, but simply add to it."[80] Therefore, defence planners should not exclude the possibility of another conventional war and base Canada's force structure solely on View 2 conflict. In the end, Canada must remain ready for war throughout the broadest range of the spectrum of conflict as possible and not just constabulary duties.

Lieutenant-General Jeffery recently explained at the February 2002 meeting of the Conference of Defence Associations that since World War II Western armies, including Canada's, have been organized and equipped using an open terrain manoeuvre model.

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[77] 1994 Defence White Paper 2.

[78] David Pratt, Chairman Standing Committee on National Defence and Veterans Affairs. Speaking Notes for the Conference of Defence Associations Annual Seminar. Ottawa, 22 February 2002.

[79] Pratt.

[80] Review of The Transformation of War, by Martin van Creveld, Orbis, 35 no. 4, Fall 1991: 614.

When required to conduct anything other than open terrain operations, such as peace support or complex terrain operations, the unit involved had to restructure and train for those specific operations. For the most part, this construct worked well provided the peace support and/or complex terrain operations occurred infrequently. However, if these operations became more frequent, which for the most part they have over the last ten to 12 years, it is a problem. The concept now being considered is to move toward a permanent complex terrain centric model, but still able to adapt to the other operations – in essence reversing the roles. Lieutenant-General Jeffery acknowledges that the Canadian Army "may be small but the objective is to ensure that it is as technologically capable as we can and well trained with that equipment so that it can win. No army ever has every had all the capability it desired or in some cases needed and with the explosion in technology, the battle to stay current will be a difficult one."[81] Therefore "[w]e must use our scarce equipment dollars to build future army systems and not just incremental improvements for the army of today and tomorrow."[82] As will be shown, by accepting the Information RMA as a major element of defence policy, the government and DND will be able to ensure Canada has a sustainable and credible armed forces to meet the challenges of the 21st century.

Call for a Defence Review

Ultimately, more money may ease the pressure on DND and allow it to focus on its primary job of defending the nation. However, what actually is needed is a comprehensive defence policy review to provide the framework around which a sustainable force structure for the future security environment can be formed. To that end, there have been a growing number of recommendations from concerned groups and organizations on how to rescue and/or replace the *1994 Defence White Paper* within an appropriate, achievable and affordable defence policy. For the most part, these groups all

[81] Lieutenant-General M.K. Jeffery, Chief of the Land Staff. Speaking Notes for the Conference of Defence Associations Annual Seminar. Ottawa, 22 February 2002.

[82] Brigadier-General G.W. Nordick, Commandant CLFCSC and Director General Futures. "Thoughts On The Future Of The Canadian Army Working Paper," Kingston, 23 November 2001.

tend to agree with the White Paper's assertion that the maintenance of a multi-purpose combat capable force will allow Canada to retain the flexibility and freedom of action to the defend its interests and project its values abroad. Where these groups disagree is on how to achieve that endstate.

The most recent study by the Conference of Defence Associations Institute entitled *Caught in the Middle: An Assessment of the Operational Readiness of the Canadian Forces* recommends the government provides the funds necessary to implement the defence policy as outlined in the *1994 Defence White Paper*. The authors of the report conclude that Canada needs a force commensurate with emerging geopolitical realities that extend beyond peacekeeping. In addition to a call for increased funding, a number of Standing Committee on National Defence and Veterans Affairs (SCONDVA) reports also urge the government to conduct a defence review. Likewise the Council for Canadian Security in the 21st Century released a report entitled, *To Secure a Nation: The Case for a New Defence White Paper* which also strongly recommends a defence policy review and a substantial increase to defence spending, as recommended in the June 2001, SCONDVA *Report on Plans and Priorities*. While not formally calling for a defence review, a paper by the Royal Canadian Military Institute entitled *A Wake Up Call for Canada: The Need for a New Military* suggests a structural and attitudinal change is needed to rejuvenate the Canadian military. A 1999 Conference of Defence Associations Institute report summarized the plight of DND as such; "the Canadian Forces will need to be rehabilitated in terms of funding, manpower and equipment to keep up with rapid advances in technology."[83, 84]

Most of these various reports make reference to the advances in information related technologies, but none fully endorse it as a significant contributor to preparing DND for the challenges of the 21st century. As the world moves from the industrial age into the information age, the value of information will become critical to the success of military

[83] "A Strategic Assessment: Canada's Response to the New Challenges of International Security" 29.

[84] Shadwick 65.

operations and as such, the Information RMA must form the basis of any defence review. The full impact of the RMA is still not understood and DND, in conjunction with its allies, will need to fully appreciate the influence it will have. Within Canadian defence circles there has been a lack of analysis and debate on the merits of an information based force structure. Therefore, to prepare for the future the government will have to determine how to best achieve current and future requirement in light of the Information RMA and the evolving world order.

MND Defence Review

In its defence, the government has recently come to the realization that a defence review is required in order to deal with the challenges of the emerging security environment. On 21 February 2001, the Minister of National Defence, Art Eggleton, announced at the annual meeting of the Conference of Defence Associations in Ottawa that, "[i]n the coming months, the Government of Canada will review its defence policy in order to ensure that it provides the right framework for protecting and promoting Canadian interests."[85] The Minister has not indicated the nature of the defence review only to say it will be completed by December 2002 and that it will focus on "interoperability, deployability, intelligence, the protection of Canada's critical infrastructure and people."[86] Underpinning the government's call for a defence review are the events of 11 September 2001. However, as tragic as those events were, this must not be allowed to exclusively dictate defence (and/or foreign) policy. As Senator Colin Kenny, Chairman of the Senate Committee on National Security and Defence recently said, "the security of Canadians, their institutions and their values are at risk because [Canadians] do not have the military capacity to defend against and deter military and terrorist threats."[87] As

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[85] National Defence, 2002-2003 Estimates: Part III – Report on Plans and Priorities, PWGSC 2002. iii.

[86] National Defence, 2002-2003 Estimates: Part III – Report on Plans and Priorities, PWGSC 2002. iii.

[87] Brian Underhill (The Canadian Press). *Canadian security at risk; Military needs $4 billion, 15,000 people to defend country, committee say*. The Chronicle Herald. Saturday, March 2, 2002. page A1.

previously stated, the defence review is a necessary step but it must not exclude the possibility of another View 1 conventional war. Therefore, Canada must remain ready for war throughout the spectrum of conflict and not just View 2 conflict.

Conclusion

History has shown that the methods of war may change, however the nature of war will not; it will always be a violent and chaotic instrument in the conduct of international relations.[88] In 1994, the Canadian government laid out what is still considered by many to be a sound national defence policy based on a multi-purpose combat capable force. However, during the last decade, the government so severely reduced funding to DND that the CF can no longer be considered such a force, if it ever was.

In an attempt to restore the integrity of the CF, there have been a number of studies by concerned groups and associations calling for the government to conduct a defence review in order to balance capability against resources. The majority of the requests revolve around allocating more money to DND and only a few endorse the possible impact that the Information RMA could have on 21st century warfare. In light of the government's desire to reduce the national debt, it must be assumed that additional funding for warfighting will not be forthcoming. Therefore, DND will have to solve its problems from within the current resource envelope.

There is concern that a defence review will reconsider the need for a multi-purpose combat capable force and replace it with something that is less robust or combat capable, such as a constabulary type force. This would certainly be unacceptable because without a capable military, Canada may not be able to maintain sovereignty over its territory or influence international events. Also, since Canada's defence policy relies on collective defence where each nation is expected to share the cost and more importantly the risk of combat, a constabulary type force would likely be unacceptable to Canada's coalition

[88] Pratt.

and/or alliance partners. If the increased operational tempo over the last decade is any indication, the government still needs and wants Canada to play a meaningful role at home and on the world stage. In the end, Canada must remain ready for war throughout the broadest range of the spectrum of conflict, and not just constabulary duties. As a result, the government, in consultation with DND, will need to determine exactly where to focus the CF's efforts to maximize capability and force readiness against national security objectives and fiscal constraints.

The continuance of Canada as a relevant power requires the articulation and implementation of an appropriate, achievable and affordable national security policy. Without such a policy, the future development of the CF will remain haphazard and unfocused, leaving Canada's force of last resort "unable to fight alongside the best, against the best." Canada is at a crossroads where it can either decide to actively pursue advanced information based technologies, combined with force structures and doctrine to give the CF an advantage over an adversary (and thus give Canada international prestige and influence abroad as a post-industrial nation), or it can continue with industrial age evolutionary changes that will lead to marginalization in international affairs.[89]

The Information RMA has every indication of dramatically improving a military's ability to wage modern warfare. Until the impact of the Information RMA is fully understood it must be considered a legitimate option to develop a realistic and credible defence policy. As will be shown in Chapter Three, the US is aggressively pursuing the Information RMA and if the Canadian government wants to remain interoperable with its closest ally, for both homeland defence and expeditionary operations, Canada will have to seriously consider the RMA as part of the defence review.

[89] "A Strategic Assessment: Canada's Response to the New Challenges of International Security" v.

Chapter Three – Technology and the RMA

Heavy forces must be more strategically deployable and more agile with a smaller logistical footprint, and light forces must be more lethal, survivable and tactically mobile. Achieving this paradigm will require innovative thinking about structure, modernization efforts and spending.[90]

Introduction

The basic tenets of the *1994 Defence White Paper* provide sound principles for the future. However, it is clear that this policy document can never be fully implemented in the current fiscal environment. The government intends to revise its defence policy in view of the new and evolving security environment and the emerging information based technologies, to ensure the CF have the equipment, doctrine and force structure to meet its commitments, today and into the future. A critical component of this defence policy review must take into consideration the impact that advanced information based technologies will have on warfare. By understanding and utilizing the Information RMA as a major element of defence policy, the government and DND will be able to ensure Canada has a sustainable and credible armed forces. In the future, the value of information is predicted to become critical to the success of military operations. Therefore, a revised defence policy enabling the exploitation of modern and projected elements of the Information RMA can enhance the quest for an appropriate, achievable and affordable defence capability. The aim of this chapter is to explore the impact that the Information RMA will have on the conduct of warfare in the 21st century.

[90] Quoted from a speech by General Eric Shinseki on 12 October 1999 to the Association of the US Army (AUSA) at their annual meeting in Washington DC where he announced the US Army's Future Combat Systems (FCS) project. The current US Army structure is based on a Cold War scenario using "heavy forces" poised against the Warsaw Pact in Europe. However, with the end of the Cold War and the changing global security environment this construct is no longer viable and is being challenged by General Shinseki. His vision is to eventually replace the US Army's Cold War equipment, doctrine and force structure with information age systems.

Background

Consensus varies, but there have been a number of recognized revolutions in military affairs throughout history.[91] Currently, within many of the world's militaries, there is an ongoing debate as to whether there is, in fact, a revolution in military affairs or simply evolutionary changes to the way war is waged. For a RMA to occur, there typically has to be the introduction of a radically new technology that leads to new doctrine and force structures, which significantly impact on the character and conduct of warfare. The challenge has always been to recognize when there is a RMA and then have the leadership and courage to pursue it.

History has shown that in war "everyone starts wrong, the advantage goes to the side which can most quickly adjust itself to the new and unfamiliar environment and learn from its mistakes. It is this flexibility of mind and organization that needs above all to be developed in peacetime."[92] For example, those armies that were not ready for the start of World War II began their decline during the 1920s by failing to balance "capability with the economic means to sustain it."[93] During the inner war period, France and Italy each hoped to prevent future conflict by maintaining large standing armies equipped with, what amounted to, surplus and obsolete World War I equipment. Unfortunately, this left very few resources to experiment with new concepts and acquire new equipment to wage modern war. In the case of France, all available money was put into building the Maginot Line with the thinking that the next war would be fought like the last. Despite inventing the tank during World War I, Britain failed to see its true value, and rejected it as being "too large a change in the then-existing organizational structure of the British army; it upset too many apple carts and provoked too much opposition from defenders of

[91] Historical examples of a RMA include the development of: aircraft carrier warfare, the intercontinental ballistic missile (ICBM), the machine gun and the longbow. "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" 12. Unification although not equipment based provides a purely Canadian example of a RMA.

[92] M. Howard, "Military Science in an Age of Peace – Chesney Gold Medal Lecture," RUSI Journal 119 (1973): 3 to 11.

[93] The Future Security Environment iii.

traditional regiments."[94] Instead, Britain directed its funds toward social programs and did not begin to rearm until 1937. After World War I, Canada reduced its corps sized Army down to 4,000 soldiers and by 1935 lacked even the basic tools necessary for modern war, to include tanks, aircraft and anti-tank guns.

In contrast, Germany spent the inner war period quietly refining its *Blitzkrieg* doctrine, which was demonstrated to the world in September 1939 when the German military marched across Poland and again in May 1940, when Guderian attacked through France's Maginot Line. In fact, Germany observed a series of 1926 British Army exercises on the Salisbury Plain where new and innovative concepts to employ tanks and infantry working together were being considered. Unlike the British, the Germans learned from what they saw and had the leadership and foresight to make the equipment, doctrine and force structure changes necessary to meet their vision of future conflict. It is important to note that the development of the tank did not, in itself, produce a RMA. "Only when the tank was wedded to supporting technologies (i.e. the radio), organizational changes (combined arms formations and tactical air support), new operational concepts (air superiority and deep, knife like thrusts), and command changes (mission oriented tactics) did the 1940 German *blitzkrieg* mark a RMA."[95] It is not technology alone that produces a RMA but the synergistic affect of combining a new technology with changes to operational concepts and force structure. However, nothing can occur without strong leadership at all levels to bring the various components together into a coherent, comprehensive force.[96] Throughout history, there have been many occasions where a nation's doctrine and force structure did not keep pace with advances in technology and the changing security

[94] "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" 31.

[95] National Defence, The Revolution in Military Affairs (RMA), Vice Chief of Defence Staff (VCDS) Concept Paper, March 1999. (Taken from the VCDS website at http://vcds.mil.ca.dgsp/rma/wayahead/RMASUM_e.asp)

[96] Jacob W. Kipp and Lieutenant-Colonel (Retired) Lester W. Grau, "The Fog and Friction of Technology," Military Review (September/October 2001).

environment. Therefore, instead of championing a RMA they often became the recipient of its effects.[97]

The current post Cold War situation is similar to that which occurred after World War I, in that the West is again trying to cash-in on the so-called peace dividend and downsizing their respective militaries. These nations are at a cross roads where one path leads to stagnation (like Canada and the UK during the inner war period) and the other toward innovation (like Germany). Everyone has the same opportunity; it just depends on who is willing to take the risk to revise their doctrine, equipment and force structures, in preparation for the security challenges of the 21st century.

What is the Information RMA?

In the late 1970s and early 1980s, a few forward thinking Soviet military strategists, led by Marshall Nikolai V. Ogarkov, Chief of the Soviet General Staff, first predicted that a new type of warfare was approaching. According to the Soviets, this RMA would allow conventional forces to have the same combat effectiveness as nuclear forces due, in large part, to the use of advanced information gathering and processing technologies. The Soviets also anticipated that this new type of warfare would favour the West because of its greater technological advantage.[98]

The Information RMA is based on the concept that the ability to collect, analyze, disseminate, and ultimately act upon battlespace information, will be the dominant feature of future warfare. During the last ten to 20 years, the ability to visualize the battlespace has improved dramatically. Through the use of real time surveillance,

[97] There are a number of interesting books on the subject of past revolutions in military affairs. Richard Hundley, "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" National Defense Research Institute, RAND, 1999 or Colin S. Gray, Strategy for Chaos: RMA and the Evidence of History (Frank Cass London and Portland, OR: 2001) or David C, Gompert et al., Mind the Gap: Promoting a Trans-Atlantic Revolution in Military Affairs (National Defense University Press, Washington, DC: 1999).

[98] "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" 7 to 8.

battlefield management, and targeting/engagement systems, future commanders will be better able to gather and evaluate enormous quantities of battlespace data and then concentrate their forces at the exact time and location where the enemy is weakest. In effect, get inside the enemy's decision cycle and provide commanders with the ultimate manoeuvre warfare combat multiplier. With this capability, information superiority will have the potential of becoming more critical than air and/or naval superiority.[99, 100] The key determinant of success in the 21st century will likely be the effective use of information, rather than brute combat power.[101]

Digitization is a key component of the Information RMA and will create a new form of warfare called "network-centric warfare"[102] or simply, netcentric warfare. Netcentric warfare requires three cooperative "grids" in order to function: an overarching information grid, an all-seeing sensor grid and an engagement grid. The information grid provides the computer based command and control backbone for the other two grids. The sensor grid uses a system of overlapping sensors to find and locate possible targets that the various land, sea and air platforms of the engagement grid can then "prosecute"[103] to shape the battlespace.

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[99] "The Revolution in Military Affairs and Its Impact on Canada: The Challenge and the Consequences" 3 to 7.

[100] It will be interesting to see if the effect of the global mass media will undermine the ability to gain information dominance/superiority. The media is now able to conduct "real time reporting" from remote locations, as opposed to "recent event reporting" of only a few years ago. For a less sophisticated opponent "the media will become "the poor man's intelligence service"." Charles J. Dunlap Jr., "21st-Century Land Warfare: Four Dangerous Myths," Parameters Autumn (1997): 27 to 37.

[101] Commander Josh Barber, "An Intelligence, Surveillance and Reconnaissance (ISR) Vision for the Canadian Forces," Canadian Military Journal Vol. 2, No.4 Winter 2001-2002: 41.

[102] Vice Admiral Arthur K. Cebrowski initially proposed the concept of network centric warfare while working as the head of the US Armed Forces Transformation. "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" 78.

[103] "The Revolution in Military Affairs and Its Impact on Canada: The Challenge and the Consequences" 78 to 79.

During the Gulf War, the linkages between the three grids lacked full integration, yet the emerging possibilities of netcentric warfare were obvious. The devastating effect of the so-called "smart weapons" dramatically changed the perception of how future wars can, and for some should be fought, especially with regard to friendly casualties and collateral damage. These last two points have become particularly important to the politicians and the public. However, it must be remembered that war is a chaotic and violent activity and casualties will occur.[104] The US is currently taking full advantage of their position as the global superpower, and applying their superior economic means and world leading high technology sector to build on the lessons of the Gulf War. They hope to develop and integrate the technologies needed to gain and maintain "full spectrum dominance"[105] over an adversary.

However, it can not be overstated that it is not technology alone that produces a RMA but the synergistic effect of combining a new technology with changes to operational concepts and force structure. A new technology that has not been thought through and fully incorporated into a military's doctrine and force structure is not a RMA and doomed to failure. These elements, along with strong leadership to guide the process, must be addressed together if the new technology is to have a positive effect on the conduct of future conflicts. For example, despite inventing the tank toward the end of World War I, the British did not realize or understand it's full potential until after Germany swept through France in 1940.

To date, DND has been slow to acknowledge the existence of the Information RMA. The *1994 Defence White Paper* does not specifically mention the RMA and it was not until

[104] A time will come when robots will be able to conduct war by proxy. However, care must be taken not to believe that technology will make future warfare more humane, if not bloodless. "If humans believe in a cause sufficiently to fight for it they will not concede victory until either they are killed or their mental resolve is destroyed; the destruction of their machines will not achieve this. Unmanned warfare may one day be possible, but it would have no point." Military Power: Land Warfare in Theory and Practice 240 to 241. It is even possible that "bloodless war" may lead to more wars, since governments may be more willing to accept war if casualties are minimized.

[105] United States Government, Joint Vision 2020 (Joint Chiefs of Staff, Washington DC) (As taken from the Internet).

the late 1990s before members of the CF and Canadian defence experts began to actively debate its merits. In December 1998, DND took the first steps toward acknowledging the existence of the RMA by sponsoring a RMA related symposium entitled *Canadian Defence Beyond 2010*. This led to *The Revolution in Military Affairs (RMA)* Vice Chief of Defence Staff (VCDS) Concept Paper in March 1999.[106] Since that time, there has been increased articulation and study on the subject of the Information RMA, as indicted by the number of articles appearing in various defence journal and publications.[107] To help investigate the impact that the RMA will have on doctrine and operational concepts, DND recently created the Canadian Forces' Joint Experimentation Centre in Ottawa. Specifically within the Army, the Directorate of Land Strategic Concepts (DLSC) was established in the mid 1990s to look at concepts for the Army of the Future.[108] Under this mandate, DLSC has begun evaluating the impact of technology, doctrine and force structures for warfare in the future. Over time, these various initiatives will contribute to the CF's better understanding of the Information RMA.

The Pace of Conflict

With a network centric equipped force, time and space will be less significant. Units will have the ability to engage targets over great distances with pinpoint accuracy without putting weapons platforms or soldiers[109] at risk. The area of operation and area of

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[106] National Defence, The Revolution in Military Affairs (RMA), Vice Chief of Defence Staff (VCDS) Concept Paper, March 1999. (Taken from the VCDS website at http://vcds.mil.ca.dgsp/rma/wayahead/RMASUM_e.asp)

[107] As an introduction to the RMA, CSC 28 included a one-day RMA Briefing Note writing exercise. In addition, the Army students had a one period future technology discussion and a one-day visit to Defence Research Centre Valcartier. However, it is very interesting to note the general reluctance by the majority of the CSC student body to recognize the RMA. For the most part, the group rejects the idea of a RMA as simply an evolutionary development to waging war. If this is any indication of the support for the RMA, there is still a lot of work to be done. Unlike Canada's main allies who appear to be actively pursuing the Information RMA with vigour.

[108] The three army model looks at the Army of Today (current year to year 4), the Army of Tomorrow (years 5 to 10) and the Army of the Future (years 11 to 25 and beyond). National Defence, The Future Security Environment (Kingston, DLSC Report 99-2, August 1999) 1.

[109] The term "soldier" is used in its generic sense and is meant to incorporate all members (both men and women) of the military, including sailors and airman.

interest will become virtually synonymous, in other words, whatever can be seen can (and will) be engaged. As such, multiple targets will not need to be attacked in order of priority, but rather immediately and simultaneously, if required.[110] By having more complete situational awareness and the ability to engage before threatened, units and individual platforms will, in theory, require less inherent self-protection. This improved capability is equally relevant throughout the spectrum of conflict, to include operations in complex terrain. Stealth technologies will decrease equipment signatures and may also play a role in reducing the need for heavy bulky protection systems.

To be successful in a fast paced, information dominant environment, militaries will need to streamline their ability to rapidly apply combat power at decisive points within the battlespace. Combat will occur by day and night in all weather conditions. The unknown quantity in this new environment will be if the equipment, and more importantly if the soldier, can cope with continuous operations. As machines become more capable, the human in the loop will need to be fully evaluated. In particular, selection criteria, training requirements and career progression for an information age military will likely change considerably; how is still to be determined.[111]

Less Dense Battlespace

Conventional industrial age ground wars have typically been fought using various single function platforms, such as direct fire weapons, indirect fire weapons, air defence systems, and command and control platforms, all working in unison to defeat an enemy. However, advances in information related technologies and weapon lethality are making it possible for these various single function capabilities to be combined onto a single platform, such as the Multi Mission Effects Vehicle.[112] The navy and air force have had

[110] "The Revolution in Military Affairs and Its Impact on Canada: The Challenge and the Consequences" 9.

[111] Also, future platforms will likely require technology to compensate for anatomical and physiological deficiencies in humans. The Future Security Environment 28.

[112] The Directorate of Land Strategic Concepts (DLSC) coined the term Multi Mission Effects Vehicle (MMEV) to describe a multi role platform capable of the direct fire, indirect fire and air defence

this multi role capability for some time and have been able to fine-tune it to their advantage. For example, a Navy destroyer is able to engage sub-surface, surface, land and air targets from a single platform, or the F-15 Eagle can engage other aircraft and/or surface targets. Within the Army there are few, less integrated, examples of this multi-functionality, which include the Air Defence Anti Tank System (ADATS) capable of engaging ground targets and low flying aircraft, and the C7 rifle equipped with the M203 grenade launcher.[113] It is the potential to incorporate various single function platforms with an all-seeing command and control system that will revolutionize the way future wars will be fought. Vice-Admiral Garnett, the last VCDS, stated that technology "may be able to provide [the CF] with weapon platforms and information systems that are capable of performing more than one primary mission. This could result in considerable savings, and ensure that … future weapons platforms and C^4ISR systems are relevant."[114]

Improved sensor/shooter technology will allow forces to decisively engage targets to the extent of their area of operation and "exercise an effect out of proportion to their size within the future battlespace."[115] With fewer, more situational aware platforms spread throughout a larger area of operation, forces will be more dispersed and thus create a "less dense" battlespace. In such an environment, a force can be smaller, more mobile and easier to sustain than a conventional industrial age force. Figure 4 illustrates how the number of rounds needed to destroy an enemy tank has decreased over time, which means an armour unit of a given size can now cover a larger area of operation.[116]

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role. This technology does not currently exist but is under development and expected to ready in the next ten to 15 years.

[113] Brigadier-General G.W. Nordick, Commandant CLFCSC and Director General Futures. "Thoughts On The Future Of The Canadian Army Working Paper," Kingston, 23 November 2001.

[114] Vice Admiral Gary Garnett, Vice Chief of Defence Staff, *The Canadian Forces and the Revolution in Military Affairs: A Time for Change*, Canadian Military Journal, Vol. 2 No. 1, Spring 2001.

[115] The Future Security Environment 43.

[116] Colonel Christian Rousseau, Director Land Strategic Concepts. Speaking Notes for an Address to the Army Students of CSC 28 in Toronto, 5 March 2002. Also, improved situational awareness and increased weapon accuracy will compensate for the inaccurate nature of artillery fire. In the future, the ability to rely on "quality" instead of "quantity" will mean less ammunition usage. This implies less logistic support, which in turn suggests forces will be easier to deploy and sustain in a distant theatre of operations. However the inverse could also be true, enhanced situational awareness may increase the

Therefore, it is possible that the savings in personnel, equipment, and logistics could be used to fund the cost of the transformation, in effect pay for itself. There are those that feel such an approach is unrealistic. However, what is often forgotten is that "new forces … must be developed based on major changes in *technology*, *doctrine*, *organizational structure* and training – not building upon what exists, but replacing it."[117]

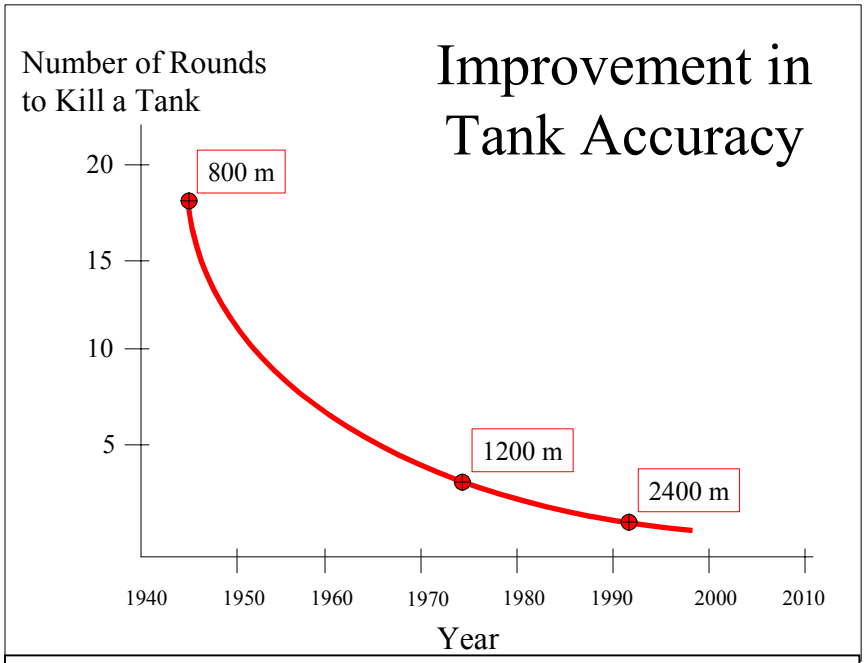

Figure 4 – Improvement in Tank Accuracy over Time

The need for fewer soldiers to crew fewer platforms may address the demographic challenge that Canada will face in the next 15 to 20 years.[118] The less dense battlespace,

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number of targets to be engaged and thereby increase the need for more (expensive?) smart munitions. An interesting cost benefit analysis question – use more unsophisticated and inexpensive ammunition or less highly sophisticated and expensive ammunition?

[117] Emphasis added to highlight the key terms used to define a RMA. Brigadier-General Steven Irwin, "A Multi-Purpose Capability and Advanced Technology," Canadian Military Journal Vol. 2, No. 4, Winter 2001-2002: 56.

[118] The latest Canadian census found that the birthrate is below the level needed to maintain a viable workforce for the Canadian economy. For the military this will mean fewer (skilled) recruits, which in time will influence the force design process. For an excellent article on the recruiting challenges facing DND refer to an article by Major Jeff Tasseron, "Military Manning and the Revolution in Social Affairs," (Canadian Military Journal, Vol. 2, No. 3 Autumn 2001) or Chapter 5 to the April 2002 Auditor General "Report, National Defence: Recruitment and Retention of Military Personnel" (Taken from the Auditor General website at http://www.oag-bvg.gc.ca/domino/reports.nsf/html/0205ce.html).

combined with replacing soldiers with technology, may help compensate for the reduced number of recruits available for military service now, and in the coming years. However, it must be noted that technology comes with a cost, namely the need for highly skilled soldiers to operate and maintain the technologically advanced equipment. The need for highly skilled soldiers will be in direct competition for workers needed to run Canada's economy. As an aside, there is a school of thought that suggests "new, user friendly software may enable soldiers with little formal education to operate complex weaponry."[119] Regardless, this does not eliminate the need for soldiers; it only addresses their skill level. Refer to Figure 5 for an interesting comparison of how the data transfer rate and soldier density per 10 km^2 has changed since the US Civil War.[120]

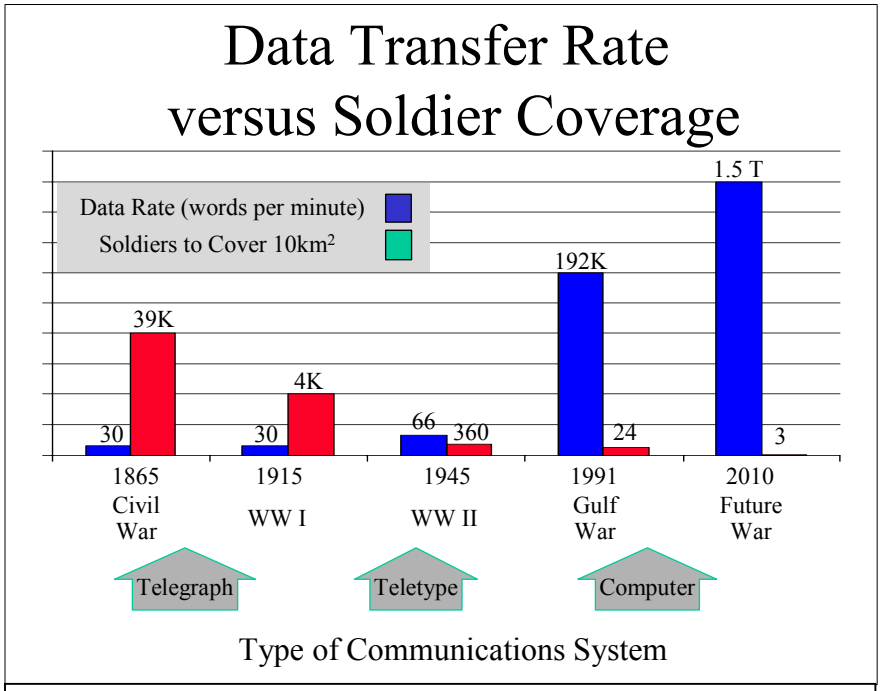

Figure 5 – Data Transfer Rate versus Soldier Coverage

[119] "21st-Century Land Warfare: Four Dangerous Myths" 27 to 37.

[120] General (Retired) John J. Sheehan. United States Marine Corps. Speaking Notes and Slides for the Chief of Defence Staff General Officer Seminar, Ottawa, 19 February 2002.

Technology Versus Soldiers

In a recent article, Dr. Doug Bland suggested, "replacing people with technology provides little escape from [DND's] funding dilemma and it is a questionable policy from a foreign policy perspective given that, as the SCONDVA emphasized, "peacekeeping is done by individuals on the ground." In other words, foreign policy based on coalitions demands both high technical capabilities and more people, not trade-offs between these two critical components of a modern military capability."[121] This may be true for peacekeeping missions but it neglects the more robust nature of peace enforcement and peace making missions, which have the distinct possibility of combat operations. If the last ten years are any indication, the CF will continue to be tasked by the government to participate in the full range of operations, to include peace support operations. Therefore, it behoves the government and DND to ensure the CF have the best equipment available for the task, and that means going beyond peacekeeping to being able to protect Canadian interests. As the *1994 Defence White Paper* points out, "[i]t would be misguided to invest in very specific forces and capabilities, whether at the higher end of the scale (aircraft designed for anti-tank warfare, for example) or at the lower end (forces limited to minimal-risk peacekeeping operations). To opt for either approach would forego the capability and flexibility that are inherent in a multi-purpose force."[122]

Global politics are such that "operational influence, which in turn translates into international influence, demands that Canada continues to contribute a relevant force where it chooses to make a military commitment. Recognizing that [Canada] cannot deploy numerically large forces, [Canada] must guarantee salience through providing relevant forces that have a high level of training, professional competence and equipment

[121] Douglas Bland, "Canada and Military Coalitions: Where, How and with Whom?" Policy Matters Vol. 3, No.3, February 2002: 28. There were other authors, most notably Martin van Creveld and Andrew Richter, who also expounded slight variations on this same view.

[122] 1994 Defence White Paper 14.

that is equal to or better than Canada's coalition partners."[123] To suggest that Canada provides manpower or less technically advanced forces, while someone else provides more technically advanced units, would violate NATO's fundamental principle of "indivisibility of risk"[124] and undermine Canada's international credibility and reputation.

"[I]t is useful to dispel the myth that technologies developed for high-intensity warfare and those targeting low-intensity conflict are mutually exclusive. On the contrary, many of the advances in military technology are very relevant to the efficient conduct of peace support operations."[125] Any technology that can provide accurate, real-time situational awareness has utility regardless of the level of conflict. "It would seem that systems involving advanced command, control, surveillance and intelligence, as well as specialized weapons would be very useful" [126] in peace keeping and peace enforcement operations as in full-scale combat. For example, when precision munitions are linked to better situational awareness systems, even individual soldiers on a check point will have instant access to firepower that would not only provide them greater security, but would also convince belligerents that an attack would bring an immediate and devastating response.[127]

Interoperability

If Canada, for whatever reason, does not pursue (the minimum levels of) the Information RMA, or simply stay abreast of emerging doctrine and technologies, there may come a

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[123] National Defence, The Revolution in Military Affairs (RMA), Vice Chief of Defence Staff (VCDS) Concept Paper, March 1999. (Taken from the VCDS website at http://vcds.mil.ca.dgsp/rma/wayahead/RMASUM_e.asp)

[124] James P. Thomas, "The Military Challenges of Transatlantic Coalitions," Adelphi Paper 333 Oxford University Press, London (May 2000): 72.

[125] Roman Jakubow et al., Strategic Overview 1999 (NDHQ Directorate of Strategic Analysis, September 1999) 10.

[126] "A Strategic Assessment: Canada's Response to the New Challenges of International Security" 17.

[127] Brigadier-General Steven Irwin, "A Multi-Purpose Capability and Advanced Technology." Canadian Military Journal Vol. 2, No. 4, Winter 2001-2002: 55.

time when interoperability with allies will no longer be possible, in particular with the US.[128] Interoperability with the US is a key tenet of the *1994 Defence White Paper* and virtually every internal policy document since then. It must also be kept in mind that interoperability, especially in the area of doctrine, command and control must also occur between the three components of the CF in addition to allies.[129]

This is a critical time for Canada and the other allies of the US, because the US is actively pursuing the Information RMA and if Canada does not participate, it may find that it can only provide the manpower suggested by Dr. Bland. Or worse yet, the lack of interoperability may either cause future alliances to be less effective or prevent them from forming in the first place.[130] A further worry is that "the Americans may decide "to go it alone" [and] unilateralism may well become the order of the day."[131]

The Cost of Change

The full cost of implementing the Information RMA may be very high and preclude anyone but the US from participating. Therefore, due to the possible national implications of pursuing the current RMA, the decision to participate should involve not only DND but also other government departments, such as the Department of Foreign Affairs and International Trade (DFAIT), the Department of Industry Canada and the Department of Finance. The formulation of a national security policy is an essential aspect of defining a nation and as Canada moves into the 21st century it will have to

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[128] Elinor Sloan, "The United States and the Revolution in Military Affairs," DND, DSTRAT Project Report No. 9801 (Ottawa: February 1998). Lieutenant-General Michael C. Short, Combined Force Air Component Commander for Operation ALLIED FORCE, also made this point when he addressed Command and Staff Course 28 on 20 December 2001.

[129] Despite being a unified military, the degree of "jointness" between the three services is questionable and would make for an interesting discussion, which is beyond the scope of this paper.

[130] Brigadier-General Steven Irwin, "A Multi-Purpose Capability and Advanced Technology," Canadian Military Journal Vol. 2, No. 4, Winter 2001-2002: 57.

[131] Pratt.

determine how to integrate the Information RMA into not only its defence policy but also its national security policy.

The difficulty for many nations hoping to take advantage of the Information RMA, in particular nations with large militaries like the US, will be the constant pressure to maintain "legacy" weapon systems while waiting for the new advanced systems to be introduced. The requirement to maintain legacy systems usually involves costly, evolutionary improvements to existing systems that make it much more difficult to focus on, and properly fund, the transformation being presented by the Information RMA. "Given their smaller equipment stocks and fewer defence demands, and by taking advantage of the economies afforded by advanced technologies, Canada and other allies may well be able to modernize their forces at a rate comparable to the US for less relative cost."[132]

Similar to industrial age military equipment, information age equipment can expect to remain in service for 20 to 30 years and during that time adversaries will take every opportunity to develop counter measures to overcome the advantage posed by the Information RMA. At present, both civilian and military information based systems are susceptible to multiple forms of "attack" and as such, constitute a weakness with information age technologies. This weakness creates a critical vulnerability that must be protected and have built-in redundancies. The value of deception in an environment of information dominance will have to be assessed and new methods of "electronic camouflage" and deception found. Also, the in-service life of a given high technology capability will undoubtedly exceed the length of time it remains militarily relevant.[133] To counter these concerns, equipment procurement programs will need to emphasize

[132] "A Multi-Purpose Capability and Advanced Technology" 56 to 57.

[133] In 1965, Gordon Moore, one of the founders of Intel, stated that the number of transistors on a microchip would double every 18 months. This is now known as "Moore's Law" and accounts for the rapid rate at which computer based systems become obsolete. It is estimated that every ten years, computing performance improves by approximately 100 times. Some predict that in the next 20 years science will offer the same quantity of advancements as the last 100 years. Gary Stix, "Getting More from Moore's," Scientific American April 2001. (Taken from the Scientific American: Innovations website)

adaptable designs that promote continuous pre-planned product improvements throughout the life of the system.[134]

"The Fog of War"

Throughout history, military commanders have been plagued by a lack of timely and accurate information on the enemy, the battlefield and their own troops. The Information RMA promises to reduce, if not eliminate, this "fog of war" by providing the commander with the information he so desperately craves.[135] In fact, it is predicted that, "improvements in information processing and communications technology will gradually blur the line between tactical, operational, and strategic activity."[136] If this occurs, strategic weapons will be able to achieve tactical objectives and conversely tactical operations may have strategic implications.[137] This has the potential of returning conventional military theory back to a time when the commander, instead of sitting on his white horse surveying the entire battlefield, will now be sitting behind a computer screen in his highly mobile, globally connected command post surveying the entire battlespace.[138] However, despite an increased degree of battlespace visualization "the general's view of the battlefield will never be as comprehensive as a grand master's view of the chessboard; and even the chess player cannot read his opponent's mind with the

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[134] National Defence, VCDS Military Assessment 2000, Part 4, page 4 to 5. (Taken from the VCDS website at www.vcds.dnd.ca/dgsp/dda/milassess/intro_e.asp)

[135] However, the deluge of information may have the opposite effect of overwhelming the commander with too much information, which in turn may create a technically induced, information overload "fog of war." This is a legitimate criticism of the Information RMA that has been the subject of countless studies, reports and articles and has literally become an industry unto itself.

[136] "The Revolution in Military Affairs and Its Impact on Canada: The Challenge and the Consequences" 21.

[137] This is due, in part, to the pervasive nature of the global media and their ability to influence government pol

certainty that brings absolute confidence (and that of course, is the whole point of the game and the whole risk of battle)."[139]

US Army Future Combat Systems

The entire US military is undergoing a comprehensive transformation to ensure it maintains full spectrum dominance over any opponent, regardless of the environment. The most far-reaching component of this transformation, which could have the largest impact on the CF, is the US Army's Future Combat Systems (FCS) program. The FCS project is a "system of systems"[140] concept, which if successful, will allow the US Army to, as President George W. Bush once stated, skip a generation of weapons.[141] These systems will "rely on technology advances to make them lighter, but just as lethal and survivable as today's heavy force systems."[142] "FCS will be a networked combined-arms team made up of manned and unmanned [robotic] ground systems as well as unmanned aerial vehicles (UAVs)"[143] that "will have networked communications links … to allow for the rapid and decisive engagement of targets at significantly longer distances."[144] For a more complete description of the FCS program see Annex B. Figure 6 graphically illustrates Full Spectrum Dominance.[145]

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[139] Military Power: Land Warfare in Theory and Practice 236.

[140] In the mid 1990s US Admiral William Owens, then Vice Chairman of the Joint Chiefs of Staff, developed the idea of a "systems of systems" that would allow a military user the ability to employ numerous sensors in concert to expeditiously find, fix and finish military targets. National Defence, The Revolution in Military Affairs (RMA), Vice Chief of Defence Staff (VCDS) Concept Paper, March 1999. (Taken from the VCDS website at http://vcds.mil.ca.dgsp/rma/wayahead/RMASUM_e.asp)

[141] "Satellites and Horsemen," The Economist 9 March 2002: 34

[142] United States General Accounting Office, "Defense Acquisition: Army Transformation Faces Weapon System Challenges," (GAO-01-311, Washington: May 2001) 2.

[143] Glenn W. Goodman, "Futuristic Army Vision: The Service's Future Combat System Is A True Leap-Ahead Program," Armed Forces Journal May 2001: 26.

[144] "Defense Acquisition: Army Transformation Faces Weapon System Challenges" 2.

[145] General (Retired) John J. Sheehan. United States Marine Corps. Speaking Notes and Slides for the Chief of Defence Staff General Officer Seminar, Ottawa, 19 February 2002.

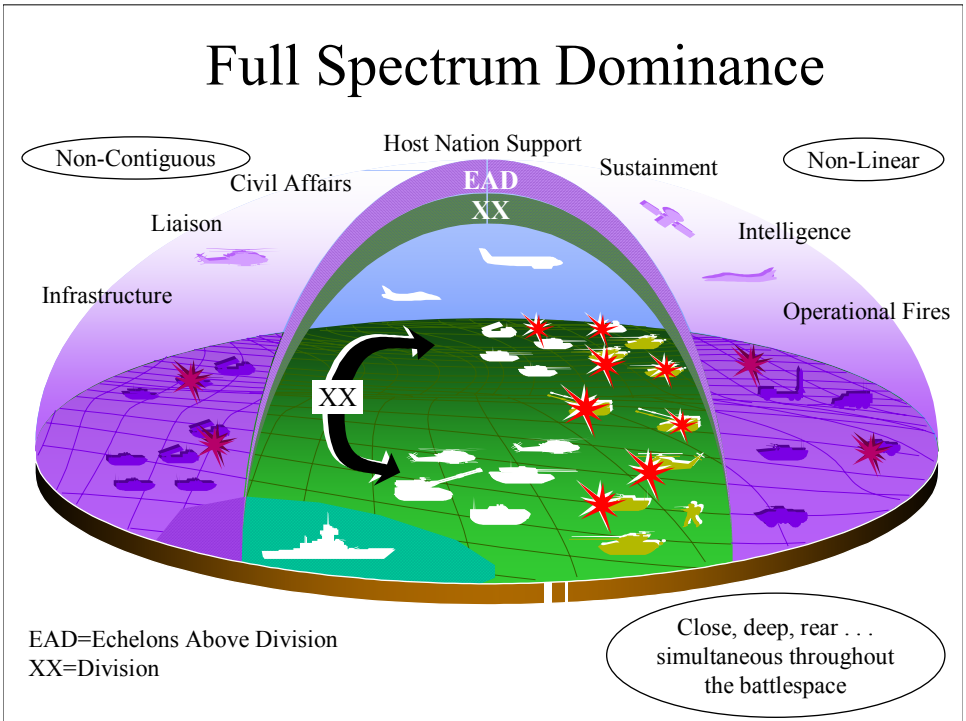

Figure 6 – Full Spectrum Dominance

Figure 7 shows how the US Army transformation will follow three similar but distinct paths.[146] One path will ensure legacy systems remain relevant during the transformation, while another will immediately procure military off-the-shelf systems to establish a number of Interim Brigade Combat Teams. The aim of the Interim Brigade Combat Teams is to fill the gap between the Legacy Force and the eventual endstate or Objective Force. The intent is for the Objective Force to have the same lethality, mobility and survivability, as the current Legacy Force but be more deployable and less reliant on logistic support. The vehicle suite selected for the Interim Brigade Combat Teams is based on the Canadian produced LAV family of vehicles. It is interesting to observe senior Canadian political and military officials using the fact that the US Army is just "discovering" the LAV, as justification for Canada having used it for the last 25 years.[147]

[146] "Defense Acquisition: Army Transformation Faces Weapon System Challenges" 2.

[147] Canada began acquiring its current fleet of Armour Vehicle General Purpose/Light Armoured Vehicles in 1975 with the Grizzly and Husky, Cougar 1978-82, Bison 1990-92, Coyote 1997-98 and LAV III 1998-2003.

However, it must be noted that the US is only interested in the LAV as an interim vehicle as they transition to their Objective Force, the step that Canada is currently neglecting.

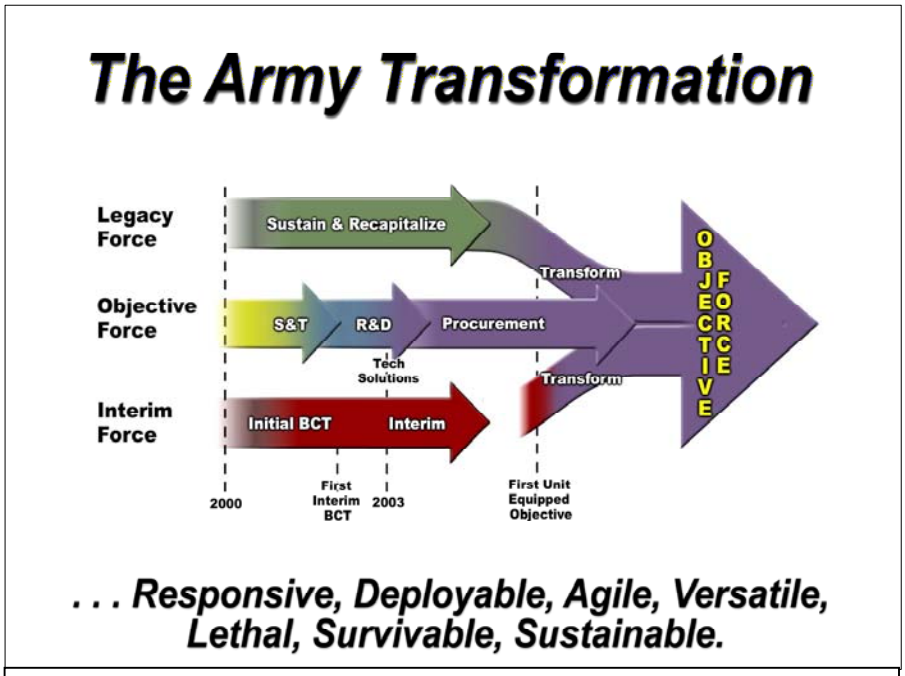

Figure 7 – The US Army Transformation

Due to the far reaching impact of the FCS program, the CF as part of the defence review would be well advised to closely monitor the potential influence that advanced information based technologies will have on the future of warfare. In addition to the US, some of Canada's other allies, such as France, Germany, Australia, and the United Kingdom are pursuing less aggressive, yet important RMA related programmes. DND should continue to monitor these efforts as pioneering breakthroughs often come from those who are fiscally constrained and forced to make cost effective and innovative choices. Canada also needs to maintain a technology watch on the developments taking place in other regional powers such as Russia, China, and India. By understanding and utilizing these various initiatives as an element of the defence policy review, the government and DND will be able to ensure Canada has a sustainable and credible armed forces to meet the challenges of the 21st century.

Conclusion

A RMA requires a paradigm shift that renders obsolete or irrelevant at least one or more core competencies. History has shown that the advantage will go to the first nation to develop not only the technology, but also the corresponding doctrine and force structure. For example, Germany was able to tie together the invention of the tank with the correct doctrine and force structures to develop their Blitzkrieg doctrine. Fundamentally, if any event significantly changes the structure, doctrine, tactics or equipment of a military force, then there can be little doubt that a RMA is taking place. In the case of the Information RMA, there is no denying that the growing importance of information and the ability to pass that knowledge throughout the force is having a profound impact on the way military might is applied. The ultimate endstate is unknown and likely years away.

Through the use of real time surveillance, battlefield management, and targeting/ engagement systems, the Information RMA will allow future commanders the ability to gather and evaluate enormous quantities of battlespace data in order to better visualize the enemy, the battlespace and their own troops. This information dominance will then permit a military force to get inside the enemy's decision cycle in order to take decisive action from a position of knowledge and security. All of this will be possible on a less dense multi-dimensional battlespace.

Canada was somewhat late in accepting the existence of the Information RMA and therefore lags behind the work being done by other nations; in particular its closest and most important ally, the US. As momentum and understanding grows, DND has an opportunity to prepare for the 21st century by creating a force that is both credible and interoperable. This opportunity is even more important in light of the events of September 11 and the subsequent defence of North America initiatives.

Of concern, from a Canadian perspective, is unwillingness by government and/or military leaders to accept the Information RMA.[148] "It takes a brave organization to make a part of itself obsolete. Historically, this has been rare in the military world."[149] For innovation to occur, senior military officers, with established traditional credentials, need to be convinced that a change is needed and champion its cause. Otherwise, without strong leadership, it is doomed to failure.[150] The true value of the Information RMA will likely remain suspect until proven in battle. Such was the case with the following systems during the Gulf War; the airborne Joint Surveillance, Target Acquisition, Reconnaissance System (JSTARS), the Patriot missile, the F-117 Stealth Fighter and the various precision-guided munitions.

In the end, Dr. Denis Faubert, Director General Defence Research and Development Centre Valcartier summed up the debate on whether the Information RMA is in fact a true RMA when he said, "Revolution or evolution in military affairs, who cares, as long as it works!"[151]

[148] As mentioned earlier, it is very interesting to note the reluctance by the CSC 28 student body to recognize the Information RMA. It is almost as though people have become so accustomed to the regular occurrence of ground breaking scientific discoveries that they are no longer able to appreciate their significance.

[149] "The Revolution in Military Affairs and Its Impact on Canada: The Challenge and the Consequences" 65.

[150] Stephen Peter Rosen, Winning the Next War: Innovation and the Modern Military (Cornell University Press, Ithaca, New York: 1991) 76.

[151] Dr. Denis Faubert made this very profound comment during a panel discussion following a visit by the CSC 28 Army students to the Defence Research and Development Centre Valcartier on 27 March 2002.

Chapter Four – To Change Or Not to Change?

Much that the professional defense planner would like to know is unknowable … the challenge is to plan intelligently in the face of massive uncertainties.[152]

There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things.

Machiavelli, the Prince

Introduction

Despite its age, the *1994 Defence White Paper* is Canada's current official defence policy and as such the primary source document to guide defence planning. However, the changing global and domestic political and security environment, along with a lack of government support, has rendered parts of this critical policy document unachievable. It is unlikely the government will significantly increase funding to DND and allow it to achieve the *1994 Defence White Paper* endstate. Even if the government did allocate more money to DND, without a coherent plan based on the new security environment and emerging information technologies this would be irresponsible on the part of the government.[153] Therefore, the logical step is to replace the current policy with one that can be achieved within a relatively fixed resource envelope and still provide a credible military to meet the challenges of the 21st century. The defence review cannot be a cosmetic rewrite of the *1994 Defence White Paper*. It must be a complete revision based on Canadian values, future defence needs, and emerging geopolitical, technological and military trends.[154]

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[152] Colin S. Gray, Weapons Don't Make War: Policy, Strategy, and Military Technology (Lawerence: University Press of Kansas, 1993) 113.

[153] Standing Committee on National Defence and Veterans Affairs (SCONDVA), *Facing Our Responsibilities – The State of Readiness of the Canadian Forces*, (May 2002) Chapter 2, Section C.

[154] National Defence, Shaping the Future of the Canadian Forces: A Strategy for 2020, (Ottawa: June 1999) 2.

The cornerstone of Canadian identity is represented by the values of democracy, the rule of law, individual rights and freedom, peace, order and good government, and a sustainable economic well-being. These values form the basis of Canadian foreign and defence policy.[155] The articulation of foreign policy is outside the scope of this discussion. However, a defence review must "not be undertaken in the absence of a settled foreign policy,"[156] otherwise there is a strong likelihood that everything which follows will be for naught. It should be noted that foreign policy is often amended because of changing circumstances such as a new government or minister, a shift in national interest or domestic priorities. However, defence policy takes several years to implement, especially if it requires the "… acquisition of new equipment. Thus, any serious mistake in defence policy will not be easily fixed."[157] Therefore, it behoves the government to formulate a defence policy that is specific enough to guide defence planning yet sufficiently general to remain relevant over time. In effect, the *1994 Defence White Paper* was such a document, except the resources needed to implement it were never made available. The aim of this chapter is to briefly discuss the factors of a defence policy and consider specific areas where the Information RMA can enhance the quest for an appropriate, achievable and affordable defence capability.

The Canadian government, through its defence policy, provides DND with a strategic defence mandate and the resources necessary to achieve that mandate.[158] In return, DND is expected to be ready to respond when called upon.[159] When enunciating its defence

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[155] National Defence, Shaping the Future of the Canadian Forces: A Strategy for 2020, (Ottawa: June 1999) 2.

[156] Standing Committee on National Defence and Veterans Affairs (SCONDVA), *Facing Our Responsibilities – The State of Readiness of the Canadian Forces*, (May 2002) Chapter 2, Section C.

[157] Standing Committee on National Defence and Veterans Affairs (SCONDVA), *Facing Our Responsibilities – The State of Readiness of the Canadian Forces*, (May 2002) Chapter 2, Section C.

[158] In reality, the government appears content "to provide what is available for national defence, not what is needed for national defence." Douglas L. Bland, "Funding Canada's Defence Policy," *Research Papers*, Council for Canadian Security in the 21st Century, 9 November 2001 (Taken from the University of Calgary website at http://www.stratnet.ucalgary.ca/ccs/default.htm)

[159] National Defence, Shaping the Future of the Canadian Forces: A Strategy for 2020, (Ottawa: June 1999) 2 to 7.

policy, the government must define DND's specific missions and tasks and any limitations on their achievement. In so doing, a number of factors need to be considered by both the government and DND, including; the domestic and global security environment (or threat), force modernization, force structure, deployability (which is related to readiness), interoperability, domestic requirements, jointness, funding, command and control, and manning.[160] The Information RMA is expected to have a direct influence on many of these defence policy criteria and each will be addressed in turn.

The Threat

The future security environment will continue to be complex and uncertain without a clearly defined threat. For that reason, defence planning is now based on providing a range of capabilities needed to conduct operations throughout the spectrum of conflict, as opposed to countering a specific threat in a known environment, such as a Cold War attack by the Warsaw Pact into Europe. The consensus is that a multi-purpose combat capable force is a logical option for Canada within such an uncertain security environment, because it provides the government with a variety of credible alternatives to deal with a range of security threats. A true enabler of a multi-purpose combat capable force is the ability to collect, analyze, disseminate, and ultimately act upon real time battlespace information – a spectrum of characteristics which the Information RMA is promising to provide.

Force Modernization

In order for a force to be multi-purpose and combat capable it must possess certain characteristics. It must be agile in terms of strategic, operational and tactical mobility. It must be sufficiently flexible to be able to perform varied and diverse tasks in any environment regardless of the situation. Most importantly, it must be lethal throughout as

[160] National Defence, Shaping the Future of the Canadian Forces: A Strategy for 2020, (Ottawa: June 1999) 6.

much of the spectrum of conflict as possible. The Information RMA has every indication of dramatically improving a military's ability to wage modern warfare by being multi-purpose and combat capable. With the appropriate doctrine and force structure, future armies will be able to completely dominate the battlespace with fewer, more combat capable forces. Commanders will be able to draw on enormous quantities of battlespace data and then concentrate their forces at the exact time and location where the enemy is weakest. In effect, providing commanders with the ultimate manoeuvre warfare combat multiplier.[161]

The conduct of war (or peace support operations for that matter) is typically an equipment intensive undertaking and for that reason militaries are in constant need of the most capable equipment possible, be it ships, armoured fighting vehicles or aircraft. Currently, many of the CF's systems are reaching the end of their useful life and in need of mid-life upgrades or replacement. Now is an appropriate good time to take advantage of the Information RMA and replace aging equipment with advanced information age systems such as uninhabited aerial vehicles (UAV), or the Multi Mission Effects Vehicle.[162] These systems will allow future commanders to tailor their force structure based on the threat, battlespace and mission. Also, the prospect of using unmanned platforms will minimize the risk to soldiers.

Force Structure and Manning

With new equipment there will inevitably come the need for new force structures and doctrine, especially in the case of Information RMA equipment. Many of these information age systems are either unmanned (UAV or robotic) or capable of replacing a

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[161] It is very topical to note that improved situational awareness is a key component of a Battlefield Combat Identification Device planned for the near future. Through a BCID, fratricide will be significantly reduced.

[162] The Directorate of Land Strategic Concepts (DLSC) coined the term Multi Mission Effects Vehicle (MMEV) to describe a multi role platform capable of the direct fire, indirect fire and air defence role. This technology does not currently exist but under development and expected to ready in the next 10 to 15 years.

number of current Cold War systems with one multi-purpose system. In the end, this translates into fewer personnel required for equivalent military capability. Additionally, improved sensor/shooter technology will allow forces to decisively engage targets at longer ranges with greater accuracy than present day systems, creating a less dense battlespace. In such an environment, a force can be smaller, more mobile and easier to sustain than a conventional industrial age force.

A new force structure based on replacing soldiers with technology could prove to be one of the contributing factors toward a solution to the recruiting problems the CF is currently experiencing and will continue to experience for the foreseeable future. These new force structures could call into question some long-standing traditions, which institutions like the military find difficult to discard.[163] For example, one area that would prove unacceptable to the Army is the possible amalgamation and/or elimination of certain capabilities such as armour, infantry and artillery. The impact of the Information RMA may provoke unnecessary and distracting opposition to change.[164] To resolve contentious issues of this sort, the government may have to legislate the necessary changes, as was recently done with the amalgamation of many British infantry and armoured regiments.

Force structures cannot be changed without clear doctrine to support the new equipment and structure. A mechanism must be put in place to develop this doctrine before a new capability is fielded. Fortunately, the Canadian Forces' Joint Experimentation Centre was recently created for this reason. This is a positive step in acknowledging the existence of the Information RMA and should provide valuable feedback and guidance to decision makers at every level.

The eventual role of the Reserves in the future information age CF is unknown and difficult to determine at this time. Suffice it to say the Reserves form a key component of

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[163] Military Power: Land Warfare in Theory and Practice 230.

[164] "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" 31.

A real life example is the ongoing difficulty to restructure the Canadian Militia.

defence policy and the impact of the Information RMA on their specific roles and missions must be carefully considered. However, this contentious topic is beyond the scope of this discussion.

Jointness, Command and Control

The increasing complexity of the future battlespace will require all available resources to be brought to bear against the enemy in a coordinated and synchronized fashion. New technologies will increase the operational tempo, resulting in simultaneous rather than sequentially phased operations against a threat. Due to the need for interconnectivity between the diverse aspects of the expanded, less dense battlespace, it will become increasingly important to fight as a single (joint) entity where the combat power of all three services is applied concurrently and not as a series of separate and imperfectly coordinated operations. Thanks to the enhanced situational awareness of the Information RMA, commanders will be able to coordinate their activities by accessing very detailed and timely information on enemy activity, the battlespace and friendly troops. In the end, this enhanced battlespace visualization may prove to be more conducive to "directive command" than "mission command." This is an interesting topic worthy of further study and analysis under the auspices of the Canadian Forces' Joint Experimentation Centre. The essential notion for policy makers is that Information RMA will continue to encourage the serious treatment of "jointness" throughout the CF. This includes not only the spectrum of operational functions but also in areas of education, training, and indeed within the reserves.

Interoperability

The ultimate aim of the Canadian government is to protect the nation and it citizens from threats to national security. However, due to its size and correspondingly low population density, Canada has a long-standing policy of collective defence. The US is the dominant global power and Canada's closest ally, therefore it can be assumed that any future military action will most likely be as part of a US led coalition. For that reason, it is in

the government's best interest to ensure the CF are interoperable with the US military at all necessary levels. The US is actively pursuing the Information RMA and if Canada does not stay abreast of emerging doctrine and technologies, there will come a time when interoperability will no longer be possible, jeopardising many of the collective security agreements Canada has with the US. This is particularly significant in view of the emerging defence of North America initiatives. Interoperability will be a major constituent of any new defence policy review; at no time in our recent history has the need to operate with allies been more important. The Information RMA will drive and facilitate our ability to fight with our friends.

Deployability

Many of the recent operations involving the CF occurred with very little warning, such as the Implementation Force (IFOR) to the Balkans or East Timor. The need for a rapid response highlights the growing requirement to (strategically) deploy forces on very short notice to distant areas of operation. Complimenting deployability is sustainability. Once a force is in theatre, it must be sustained and this is easier to achieve if the force package is small. To facilitate deployability and sustainability, force structures need to be as compact and lightweight as possible – characteristics the Information RMA will provide.

In line with this thinking for example, the 2001 Defence Planning Guidance stated that the future Canadian Army is to evolve into a primarily wheeled (read lightweight, easy to deploy and sustain) fleet of com

and development budget in order to participate in these various programmes. Such direction should emanate from Defence Policy.

Force readiness is closely linked to deployability because there is no point deploying a force into theatre if it is not ready for the mission. Again, the Information RMA is expected to enhance this force readiness through the use of simulation for training and operational rehearsals.[166] The potential for improved efficiencies in such areas cannot be overstated.

Domestic Requirements/Considerations

If properly structured and equipped for operations abroad, the CF should by default also be able to conduct operations at home.[167] The rationale is that if a military force can deploy on short notice to a distant theatre and conduct operations throughout the spectrum of conflict, they should by virtue of the flexibility inherent in a well equipped, highly disciplined force, also be able to fulfill the majority of the domestic and/or homeland security tasks expected of them.

There are a number of domestic considerations that ultimately impact on defence policy to include the cost of implementation and the impact on other government departments. Due to the far-reaching impact of the Information RMA, it is essential that other government departments play a supporting role with DND in its efforts to transform the CF into an information age military. This support can range from financial backing to ensuring their respective objectives and priorities correlate with those of DND. Without support, the necessary transformation will be that much more difficult to achieve, if at all. Therefore, defence policy must not be developed in isolation but in concert with other

[166] Simulation can be used for both garrison and in-theatre training. This is particularly beneficial because training areas/facilities are not always available in-theatre and there is a tendency for skills to fade while on long deployments.

[167] Domestic armed intervention by Canadian troops has occurred only five times in Canada's history: the Fenian Raids of 1866-71, the 1870 Red River Rebellion, the 1885 North West Rebellion, the 1970 October Crisis and the 1990 Oka Crisis. The Future Security Environment 8 to 18.

government departments, industry and educational institutions to ensure the impact of the Information RMA is fully realized. From research done by the Conference of Defence Industrial Associations, it is evident that Canadian industry has the potential to support, sustain and profit from a transition to an information age force. Canada has many leading edge research and development facilities and academic institutions, which if energized toward common objectives could help transform the CF into an appropriate, achievable and affordable defence force. In the end, a focused and coordinated defence policy will translate into a better military capability for Canada.

Funding

The final cost to re-equip the CF with Information RMA equipment is unknown at this time. In order to manage cost and expectations, the government (and more importantly DND) must recognize that the key to transforming to an information age force is to completely replace it as opposed to building upon obsolete industrial age equipment and doctrine. Given the CF's smaller size and the advantage of the economies afforded by advanced technologies, Canada may well be able to modernize at a rate comparable to the US for relatively less funding. It is possible that the reduction in personnel, equipment and logistics brought about by the Information RMA could be used to fund the cost of transformation and in effect pay for itself.

Funding will always be in short supply and therefore DND must balance the sometimes conflicting criteria in order to ensure it receives best value for money. One way to ensure this happens is to carefully study the short and long term impact of a decision before implementing it, something that has not always been done in the past. Also, when a decision is made, the entire defence team must work in unison to see that it is implemented in a timely and efficient manner. This is sometimes difficult to do, especially when senior government and military leaders do not stay in the job long enough to see a decision through to completion, such was the case with the Maritime Patrol Helicopter project. Therefore, it is critical that the new defence policy be specific

enough to ensure the endstate is achievable over a succession of leaders, otherwise DND is doomed to wander aimlessly into the 21st century.

The Procurement Process

In some cases, it can take decades for new equipment to be introduced into the inventory or, it is rushed into service for political and/or Canadian regional economic reasons. Often, the end result is ill conceived and not adequately supported by the appropriate doctrine or force structure.[168] Although outside the scope of this discussion, DND needs to revise its overly bureaucratic paper based procurement system in order to deliver new equipment in a more timely and cost effective manner. This is especially true of high technology information based systems, which have the potential of becoming obsolete before they are delivered.[169] There is a role for Defence Policy to influence the management of procurement. Equipment procurement programs will need to emphasize adaptable designs that promote continuous pre-planned product improvements throughout the life of the system.

Conclusion

"Armed forces are conservative institutions, often slow to change. Sometimes the military's slow-paced change is justified since many technological advances are developed and realized over generations, not overnight. At other times, the military's reluctance to change is similar to that same reluctance found in any organization or

[168] For example, the Iltis jeep, Bison light armoured vehicle and Griffon helicopter were purchased to keep Canadian industry in business. If the Iltis had been purchased directly from Germany it would have cost only $28,000 each as opposed to the $84,000 charged by Bombardier. In 1997 the Coyote was purchased to replace the Lynx reconnaissance vehicle on a one for one basis, without considering the doctrinal and force structure impact its increased capability would mean to the Army. In fact, the Army is still struggling to develop doctrine and tactics, techniques and procedures for its employment. In the end, the Griffon helicopter replaced three helicopters with a less capable platform that is of limited utility to the Army.

[169] For example, the Army's Tactical Command, Control and Communications System (TCCCS) project was started in 1985 (when a "286" computer was considered state of the art) and finally began fielding in the late 1990s (when Pentium 4s are the norm).

traditional profession. Technology is tempting, but it is outside the formative experience of the senior members of the profession. Often budgets are tight, and generals and politicians are sometimes reluctant to invest in new, unproven technology at the expense of the tried and true. Sometimes new technology is inconvenient because it gets in the way of how things are done."[170] Regardless, in order to advance and grow, change has to be pursued and accepted, especially when the outside world has and is changing so dramatically.

This investigation into the impact of the Information RMA began with an evaluation of the global strategic environment and the nature of future warfare. It concluded that Canada must maintain a credible military in order to play a role internationally and protect its economic well-being. Chapter Two examined the current defence policy and showed that the Canadian government, mainly through the lack of resources, has hampered DND's ability to defend the nation while also contributing to international peace and security. This led to the conclusion that a new, more appropriate, achievable and affordable defence policy is needed to better align capability with resources. Chapter Three examined, in general terms, how the Information RMA will influence future warfare and concluded that Canada must pursue advanced information based technologies if it is to have a sustainable and relevant armed forces to meet the challenges of the 21st century. In Chapter Four, the links between the Information RMA and a new defence policy showed that without a doubt, the Information RMA is a viable contributor to a defence policy revision.

The articulation of defence policy is a complex process of balancing a number of conflicting priorities and agendas. However, the impact of the information RMA cannot, and must not, be ignored. Its impact on the future will be profound and it would be a mistake if Canada chose not to participate. Therefore, the only sound decision is for the government and DND to accept the risk and imbed the Information RMA in its new defence policy. A revised policy enabling the exploitation of modern and projected

[170] "The Fog and Friction of Technology"

elements of the Information RMA will be critical to the quest for an appropriate, achievable and affordable defence capability.

As this paper has shown, the Information RMA is not an overstated concept but a viable contributor to a defence policy review. The challenge is for the Canadian government and senior military leaders to recognize that fact and have the leadership and courage to pursue it. Because history has shown that "there's always a war … somewhere!"[171]

[171] Motto for the US Air Force Wargaming Institute, Maxwell Air Force Base, Alabama.

Annex A – View 1/View 2 Conflict

To better define and visualise the future security environment, Canada has adopted the NATO definition of View 1 and View 2 warfare, which in essence, occupy opposite ends of the conflict spectrum.

View 1 conflict is a high tempo conventional conflict between the established military forces of national entities, where the combatants are equipped with modern weapons and technology. It is usually expeditionary in nature in an unfamiliar area, without the support of in-place logistic infrastructure or host nation support found during the Cold War. Inevitably it will be a joint operation in order to maximize combat effect. With the end of the Cold War and the movement toward smaller standing armies, View 1 conflict will almost always be fought as part of an alliance or coalition. This will ensure sufficient combat power and add "legitimacy" to the campaign. It is the least common form of conflict,[172] "but there is still a risk that it could, and if it were to occur, the consequences could be the most grave."[173] From a Canadian perspective, there are two View 1 scenarios that the CF must be ready for; one where Canada is attacked (most dangerous) and the other where Canadian participation in a coalition action is required, such as Kosovo or Afghanistan (most likely).

View 2 conflict is asymmetric in nature, where at least one of the adversaries is not necessarily an armed force in the conventional sense, being directed by social entities that are not necessarily states and fought by combatants that are not necessarily soldiers. Both the battlespace and end state is poorly defined. The opposition is equipped with a range of weapons, to include weapons of mass destruction, and will use them against both civilian and military targets using unconventional or guerrilla tactics. Rules of engagement and the Laws of Armed Conflict will not constrain the opposition, which makes their defeat that much more difficult. During a View 2 conflict, force protection and the ability to maintain offensive action (or freedom of movement) will be of paramount importance. Note that peace support operations are included under View 2 situations and, as such, will be the most common form of conflict.[174] "The defining features of this variant [of war] will be the physical closeness of combatants, the presence of non-combatants, complex terrain, and a high degree of passion."[175]

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[172] The Future Security Environment 57 to 63.

[173] National Defence, VCDS Military Assessment 2000, Part 3, page 1. (Taken from the VCDS website at www.vcds.dnd.ca/dgsp/dda/milassess/intro_e.asp)

[174] The Future Security Environment 57 to 63.

[175] National Defence, VCDS Military Assessment 2000, Part 3, page 1. (Taken from the VCDS website at www.vcds.dnd.ca/dgsp/dda/milassess/intro_e.asp)

Annex B – US Army's Future Combat Systems (FCS) Program

For over 50 years, NATO forces prepared for a defensive battle against the Warsaw Pact, on the northwest German plain. In anticipation of a Soviet attack, NATO developed detailed campaign plans, exercised regularly, pre-positioned equipment, and adapted German infrastructure. These battlefield modifications took the form of constructing elaborate road and rail networks, hardening riverbeds for fording vehicles and preparing battlefield positions. In anticipation of battle, NATO countries also spent billions of dollars equipping their armies with the latest and most effective conventional (and nuclear) war fighting equipment possible. Over time, this equipment grew in size and weight until main battle tanks and other pieces of equipment came to weigh in excess of 60 tons and only just fit through west European road and rail tunnels. Martin van Creveld argues that "[f]or all the countless billions that have been and still are being expended on them, the plain fact is that conventional military organizations of the principal powers are hardly even relevant."[176] His point is that despite the cost in time and resources to develop these large armies, in particular the US Army, they have virtually been rendered ineffective by their lack of strategic and operational mobility whenever they had to deploy to the low intensity conflicts of the 1990s. This same lack of mobility will also be a problem in the event of a conventional ground war in a location where the US has not pre-positioned equipment. It should be noted that this equipping policy worked well for the Cold War. However, war and how it is fought is changing and this construct is no longer valid.

By design, current US light infantry units can deploy rapidly into a theatre of operations. However, once there, they do not have the "firepower, survivability, tactical mobility and capability for sustained operations"[177] against a well-equipped enemy. In contrast, the heavy armour forces have the "firepower, survivability, tactical mobility and capability for sustained operations"[178] but take much too long to deploy and once there, are very difficult to sustain.

To overcome this dichotomy, the US Army Chief of Staff, General Shinseki, is implementing the most radical change to the US Army since World War I in order to maintain their full spectrum dominance.

The Future Combat Systems (FCS) is a concept/system of systems that is under development and if successful will allow the US Army to, as President George W. Bush said, skip a generation of weapons.[179] These systems will "rely on technology advances to make them lighter, but just as lethal and survivable as today's heavy force systems."[180]

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[176] Martin van Creveld, The Transformation of War (The Free Press, 1991) 20.

[177] "Defense Acquisition: Army Transformation Faces Weapon System Challenges" 1.

[178] "Defense Acquisition: Army Transformation Faces Weapon System Challenges" 1

[179] Economist 34

[180] "Defense Acquisition: Army Transformation Faces Weapon System Challenges" 2

"FCS will be a networked combined-arms team made up of manned and unmanned (robotic) ground systems as well as unmanned aerial vehicles (UAVs)"[181] that "will have networked communications links … to allow for the rapid and decisive engagement of targets at significantly longer distances."[182] This end state is known as the Objective Force.

However, the Objective Force cannot be fielded overnight. Therefore, a number of Interim Brigade Combat Teams will be established and equipped as soon as possible using current military off-the-shelf systems. The purpose of this interim step is to improve the capability of the existing force structure and fill the capability gap with forces that are configured for rapid strategic deployment while, at the same time, being operationally and tactically lethal over extended periods.

Concurrent with the development of the Objective Force and the equipping of the interim force, the US Army will modernize selected portions of its current heavy force and put other parts through a mid life upgrade in order "to ensure that heavy combat systems can maintain their superiority over potential enemy systems during the transformation period."[183]

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[181] Glenn W. Goodman, "Futuristic Army Vision: The Service's Future Combat System Is A True Leap-Ahead Program," Armed Forces Journal May 2001: 26.

[182] "Defense Acquisition: Army Transformation Faces Weapon System Challenges" 2

[183] "Defense Acquisition: Army Transformation Faces Weapon System Challenges" 8

Glossary

Alliance – The result of formal agreements (i.e. a treaty) between two or more nations for broad, long-term objectives that further common interests of the member nations.[184]

Battlespace – "The environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission. This includes the air, land, sea, space, and the included enemy and friendly forces; facilities; weather; terrain; the electromagnetic spectrum; and the information environment within the operational areas and areas of interest."[185]

C^4ISR – Command, Control, Computer, Communications, Intelligence, Surveillance and Reconnaissance.

Coalition – An ad hoc arrangement between two or more nations for common action.[186]

Complex Terrain – The Canadian Army defines complex terrain as urban, wooded, jungle, swamp and mountainous or any other form of close difficult terrain. It is interesting that the vast majority of the references do not make mention of complex terrain operations.

Doctrine – "Doctrine provides a military organisation with a common philosophy, a common language, a common purpose, and a unity of effort." General George H. Decker, address at Fort Leavenworth on 16 December 1960.

Information Revolution in Military Affairs – In order to distinguish the current RMA from past revolutions in military affairs, the term "Information RMA" is used. This helps to focus the reader's attention toward the impressive array of "information age" technologies being developed for the conduct of warfare. Also see Revolution in Military Affairs (RMA).

Interoperability – "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."[187]

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[184] United States Department of Defense Dictionary of Military Terms. (Taken from the website at http://www.dtic.mil/doctrine/jel/doddict/data/.html)

[185] United States Department of Defense Dictionary of Military Terms. (Taken from the website at http://www.dtic.mil/doctrine/jel/doddict/data/.html)

[186] United States Department of Defense Dictionary of Military Terms. (Taken from the website at http://www.dtic.mil/doctrine/jel/doddict/data/.html)

[187] The Future Security Environment 35.

Manoeuvre Warfare – Unlike attrition warfare, manoeuvre warfare is based on defeating the enemy through manoeuvre and guile, as opposed to fighting for, and the holding of, "ground." However, attrition battles will still occur at places where a decision is sought and ground will continue to be fought for and held, usually in the context of how that ground can be used as an anchor for further manoeuvre rather than for its own intrinsic value.[188]

Multi-Purpose Combat Capable Force – A force able to operate successfully in a variety of force planning scenarios.[189]

Operational Tempo – This is the rate or rhythm of activity relative to the enemy, within tactical engagements and battles, and between major operations. It incorporates the capacity of the force to transition from one operation of war to another.[190]

Peace Support Operations (PSO) – A broad term that encompasses peacekeeping, peace enforcement, peace making and humanitarian operations conducted in support of diplomatic efforts to establish and maintain peace.[191]

Revolution in Military Affairs (RMA) – For a RMA to occur, there has to be a "paradigm shift in the nature and conduct of military operations which either renders obsolete or irrelevant one or more core competencies or creates one or more new core competencies, in some dimension of warfare, or both." Also see Information RMA.[192]

View 1 Conflict – View 1 conflict is a high tempo conventional conflict between the established military forces of national entities, where the combatants are equipped with modern weapons and technology. (See Annex A)

View 2 Conflict – View 2 conflict is asymmetric in nature, where at least one of the adversaries is not necessarily an armed force in the conventional sense, being directed by social entities that are not necessarily states and fought by combatants that are not necessarily soldiers. (See Annex A)

Visualization (as in Battlespace Visualization) – "The process whereby the commander develops a clear understanding of his current state with relation to the adversary and the

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[188] Robert Leonhard, The Art of Maneuvre – Maneuvre-Warfare Theory and AirLand Battle (Presidio 1991) 18 to 20.

[189] National Defence, Advancing with Purpose – The Army Strategy, Ottawa. (Taken form the DND website at www.dnd.ca)

[190] The Future Security Environment 60.

[191] United States Department of Defense Dictionary of Military Terms. (Taken from the website at http://www.dtic.mil/doctrine/jel/doddict/data/.html)

[192] "Past Revolutions, Future Transformations: What can the history of revolutions in military affairs tell us about transforming the U.S. Army?" xiii.

environment, envisions an endstate, and then subsequently visualizes the sequence of activity to this endstate."[193]

[193] Department of National Defence, Land Force Information Operations (B-GL-300-005/FP-001, (Ottawa: 18 January 1999)) 8.

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