Effects-Based Approaches to Operations: Canadian Perspectives

Edited by Allan English and Howard Coombs

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Foreword

Effects-based operations (EBO) has been a source of debate for many years. Some would argue that EBO is the ultimate conceptual approach to military operations that sees an adversary as a system-of-systems with key nodes and interconnectivities that can be influenced, through kinetic or non-kinetic means, to produce a desired effect (or effects). Proponents emphasize that in increasingly complex situations where overt military action may produce unintended adverse effects, EBO facilitates a more in-depth analysis of the mission requirements to identify the optimum method, such as diplomatic or economic initiatives, to achieve the desired effects. The result is a multi-faceted approach to multi-faceted problems.

Others argue that EBO is not a new concept and has been practiced in one form or another for centuries. While the need to identify and influence key nodes, or centres of gravity, has long been understood as a cornerstone of military planning and operations, our ability to predict multiple cascading effects remains an elusive goal. EBO often translates into an over emphasis on trying to identify ever elusive "effects" to the detriment of focused operational planning and the determination of achievable goals. In this case, the result is confusion, wasted effort and the illusion of progress.

As the papers presented in this book illustrate, the Canadian defence community has not been immune from this debate. However, our support or non-support of EBO has often been influenced by our need to be interoperable with major allies. To a large degree discussion within the US, UK and NATO has provided the background for our examination of EBO. While there is value to be gained from this approach, as military and defence professionals it behoves us to address EBO from a Canadian perspective as well. The works contained in this volume are a first step in examining EBO from a Canadian point of view.

Effects-based operations is a complex concept that is influencing our approach to operations in the 21st Century. The nature and extent of this influence will be determined by a reasoned, critical look at EBO's applicability within a Canadian context and the information contained in this book will provide you with a broader understanding of that context.

I look forward to continuing the debate.

M.R. Dabros
Colonel
Commanding Officer
Canadian Forces Aerospace Warfare Centre

Part I - Introductory Material

Chapter 1
Introduction

Allan English and Howard Coombs

There are currently three major theoretical approaches that dominate analyses and descriptions of military operations. They are Operational Art, network-centric warfare (NCW) (or network-enabled operations (NEOps) in the Canadian context), and effects-based operations (EBO). The concept of EBO is currently having a significant influence on Operational Art and NCW, as well as how operations are conceptualized in the new security environment. However, there are many variants of EBO and each alternative has been shaped by national and organizational cultures.[1] Some aspects of Canadian approaches to EBO have been published,[2] but no comprehensive or integrated Canadian approach to EBO has yet been documented. Given the importance of EBO in current operations and in Canadian Forces (CF) transformation initiatives, it is essential that we have a clearer picture of what this concept means in a Canadian context.

The concept of EBO is emerging through discussions and papers within Defence Research and Development Canada (DRDC) jointly with other stakeholders in the Department of National Defence (DND); however, there are many ways of describing EBO in the literature and in practice. In order to fully understand the nature of EBO today and how it might evolve in the future, it is essential to understand the theoretical and historical origins of this subject, as well as how EBO is conceptualized and practiced by the CF. Since there has been no comprehensive examination of these concepts in a Canadian context, the Command Effectiveness and Behaviour Section at DRDC Toronto co-sponsored with the Canadian Forces Aerospace Warfare Centre (CFAWC) a two-day workshop to identify the issues related to EBO and to begin to establish the agenda for better understanding EBO. This book is the product of that workshop and it includes not only the main conclusions of the workshop, but also essays on EBO by workshop participants and others. Terms related to EBO have a variety of meanings and are understood in a number of ways. No attempt is made here to reconcile these differences, but the differences are presented so that readers can get a better idea of how effects-based terminology is currently being used by Canadians.

The second part of this book, following the introduction in part one, consists of two essays which examine the origins of EBO, the context in which effects-based approaches exist, and the meaning of some concepts related to EBO. The first essay is an analysis of the origins and evolution of EBO by Colonel J.F. Cottingham, the first commanding officer of the CFAWC. He argues that there are currently two principal versions of EBO, one of which can be viewed as revolutionary while the other cannot. The next essay is a monograph by Canadian defence scientist Robert Grossman-Vermaas on the effects-based approach (EBA) as an alternative means to pursue foreign and defence policy objectives.

The third section of this book presents a summary of the views of the workshop participants on various aspects of EBO as expressed in syndicate and plenary discussions and as documented by syndicate facilitators and recorders. The workshop discussion was based on six questions provided by the organizers: What is an "effect" in the context of EBO? What is EBO in a Canadian context? What are the linkages between EBO and Networked Enabled Operations, network-centric warfare, and Operational Art? How might EBO affect future force employment? How might EBO affect future force development? How might EBO affect future force generation?

The contributions in parts IV and V of this book that assess effects-based approaches were written after the workshop, and are, therefore, presented after the workshop proceedings. The fourth section of this volume presents three assessments of EBO from different perspectives. The first essay here by Commander Ken Hansen, who is on the faculty of the Centre for Foreign Policy Studies at Dalhousie University, discusses the relevance of EBO to navies. He argues that naval historical context and theories of naval warfare suggest that an EBO-based approach to the conceptualization, planning, and conduct of naval operations, would be unwise. The second essay in this section by LCol Colin Magee, Chair of the Department of Military Planning and Operations at the Canadian Forces College (CFC), was written after the workshop. In it he argues that, because of the lack of precision in EBO terminology, current joint doctrine constructs should not be wholly supplanted by EBO concepts and methodologies for the planning and conduct of operations. The final essay in this section, by Lieutenant-Colonel Craig Dalton, an international planner on the Strategic Joint Staff at National Defence Headquarters (NDHQ), considers whether or not application of the effects-based approach could enhance the practice of strategic art. He concludes that the effects-based approach does not enhance the practice of strategic art because it offers no improvement over existing methods.

The fifth section of this book assesses the suitability of EBO for application in practice. In the first essay in this section provides observations by Robert Vokac, a former instructor at CFC and a graduate of the US Army's School of Advanced Military Studies, on effects-based operations as used in Canadian Land Force exercises and simulations. He concludes that while an effects-based approach to operations (EBAO) is consistent with existing practice, it has not yet been articulated in formal doctrine. Draft Canadian Army doctrine that incorporates the effects-based approach in the application of combat power is included at Annex B to this volume. This draft doctrine presents the Army's views on how effects-based concepts should be applied in its operations. Finally, Vokac observes that, given the increasing complexity of planning, knowledge requirements for military professionals are greater than ever. The second essay in this section, by Colonel Randy Wakelam, Director of Curriculum at CFC, examines where the study of effects-based operations could best be situated within the continuum of professional military education and the most effective options for professional military education. The final part of this section is an essay by Robert Grossman-Vermaas which explores the effects-based concept within a multinational and interagency context. He concludes that all those who are partners in a campaign - military and civilian - should be directly involved in the operational planning and execution

stages of a coalition effort so that capabilities and efforts towards stability, development and resolution of the conflict can be coordinated.

Concluding material is in Part VI, and the annexes in Part VII provide an annotated bibliography by James McKay, the draft Army doctrine described above, a list of abbreviations and a list of contributors to this volume.

Notes

1. See Allan English, Richard Gimblett, and Howard Coombs, "Beware of Putting the Cart before the Horse: Network Enabled Operations as a Canadian Approach to Transformation," DRDC Toronto, Contract Report CR 2005-212 (19 July 2005) for a detailed discussion of these issues. Available at http://pubs.drdc-rddc.gc.ca/inbasket/CEBsupport.050720_0917.CR%202005-212.pdf. Accessed 6 Sep 2007.

2. See for example C.R. Kilford, "On 21st Century Operational Art," James Simms, "Keeping the Operational Art Relevant for Canada: A Functional Approach," Craig King, "Effects Based Operations: Buzzword or Blueprint?", Pierre Lessard, "Reuniting Strategy with Policy," in Allan English et al., eds., *The Operational Art: Canadian Perspectives – Context and Concepts (*Kingston, ON: Canadian Defence Academy Press, 2005), and Howard Coombs and Rick Hillier, "Command and Control During Peace Support Operations: Creating Common Intent in Afghanistan," in Allan English, ed., *The Operational Art: Canadian Perspectives – Leadership and Command* (Kingston, ON: Canadian Defence Academy Press, 2006).

Part II - Origins, Concepts and Context

Chapter 2
Effects-Based Operations: An Evolving Revolution[1]

Colonel J.F. Cottingham

> Military revolutions have taken place throughout history, and one of the greatest may be underway now. They involve major changes in the conduct of war and in military organization and administration, both reflecting and further influencing wider technological, political, administrative, and social change.
>
> Christopher Bellamy[2]

Introduction

While it may be said that change is constant, revolutionary change is not. Indeed, while military revolutions that meet the criteria of Bellamy's definition (above) have taken place in the past, they have been rare. Some examples of military revolutions are the introduction of the chariot and heavy cavalry, the adoption of firearms, the emergence of standing armies in Europe, and the advent of nuclear weapons.[3]

Since the 1980s, many have claimed that we are in the midst of another military revolution. In 1981, futurist Alvin Toffler advanced the thesis that there had been only two military revolutions to that date (the agricultural and the industrial) and that the world's militaries were about to embark on a "third wave" of revolution with the dawning of the information age.[4] In 1984, Soviet military professional journals noted that the rapid development and advancement of new non-nuclear technologies was "engendering a new military-technical revolution in military affairs."[5] In the aftermath of the 1991 Persian Gulf War, many commentators declared that the US military was also experiencing a military-technical revolution and, by the mid-1990s, the term "revolution in military affairs" or RMA had been coined. The existence of the RMA was accepted in American official circles and became a matter of policy when, in 1997, the US Department of Defence (DoD), in its Quadrennial Defence Review (QDR), announced that it had been "involved in a concerted effort to 'transform' the US military" based on four main objectives:

1. "To achieve the operational goals outlined in Joint Vision 2010 (JV2010) (dominant manoeuvre, precision engagement, full-dimensional protection, focussed logistics)

2. To bring about the cost savings necessary to pay for force modernization

3. To achieve a new, affordable force structure that can be maintained in the future

4. To take advantage of the revolution in military affairs currently ongoing – the 'RMA.'"[6]

To the US defence establishment, the RMA was not just about the introduction of new technologies. The importance of the RMA instead rested with the changes that resulted from adoption of a new technology. As Jeffery Barnett noted in his 1996 assessment of probable future aerospace campaigns, "RMAs occur only when militaries fundamentally change their concepts of operations (CONOPS) and their organizational structures to best employ radical new technologies. RMAs are *underwritten* by technology but *realized* through doctrinal change."[7] Accordingly, the US DoD's highly influential internal think tank, the Office of Net Assessment, defined RMA as follows:

> A Revolution in Military Affairs (RMA) is a major change in the nature of warfare brought about by the innovative application of new technologies which, combined with dramatic changes in military doctrine and operational and organizational concepts, fundamentally alters the character and conduct of military operations.[8]

Following the 1997 QDR, and especially after Donald Rumsfeld was installed as Secretary of Defence in 2001 in the George W. Bush administration, considerable effort was expended to explore and exploit the so-called RMA to transform the US military.[9] Other nations soon followed with their own programs.[10]

One of the results of this effort was the creation of a concept that has come to be known as *effects-based operations* or, more commonly, EBO. In retrospect, the term EBO seemed to pop up out of nowhere. In the late 1990s, a few articles were published in US military professional journals that used the term "effects" or "effects-based," but no comprehensive treatment of EBO as a concept existed. However, by 2000, EBO was included as a subject of study in the curriculum of the US Air Force Air Command and Staff College (ACSC).[11] In the following year, Maris MCrabb wrote "effects-based operations seem to be on everyone's lips these days,"[12] as a flood of books, articles and study reports appeared on the subject.[13] The term then began to appear in US Air Force, US Navy and US Army transformation plans[14] as well as in US Air Force and joint doctrine publications.[15] Not surprisingly, references to EBO then began to appear in doctrinal publications and policy statements of major US allies such as the United Kingdom (UK)[16] and Australia.[17] By 2004, even the CF seemed "poised to adopt Effects-Based Operations (EBO) as its modus operandi for future defence and security operations."[18] Thus, it would appear that, in the words of RAND Corporation's Paul Davis, "it is undeniable that an EBO movement is well underway and is influential."[19]

The central thesis of EBO is best captured in the following quote:

> In the … effects-based contest, the objective is to break the will or otherwise shape the behaviour of the enemy so that he no longer retains the will to fight, or to so disorient him that he can no longer fight or react coherently.

> Although physical destruction remains a factor in EBO, it is the creation of such a psychological or cogitative effect that is the primary focus of the effects-based approach.[20]

A number of commentators recognize that ideas similar to the statement above have appeared before in the warfare theory and history literature; therefore, they assert that EBO is merely repackaging of an old idea. Others, however, contend that EBO is a fundamental and revolutionary change in the nature of war. The purpose of this essay to contribute to this debate by offering a thesis that both characterizations of EBO are correct because there are two versions of EBO, one of which can be viewed as revolutionary while the other cannot – at least so far. The first version, which operates in what Edward Mann describes as a conquest paradigm,[21] has mated new technologies to an old idea to produce what can be argued is a revolutionary change in war fighting. The second version operates within a broader context than war fighting, and, while this second version of EBO development has the potential to be revolutionary, it awaits the introduction of technologies and tools that will make it practical. Thus, it does not yet qualify as an RMA.

This essay is divided into three sections. In the first, the discussion will outline the development of the central idea that generated EBO - that being primarily the evolution of US thinking on airpower theory – in order to establish the intellectual foundations from which EBO sprang. Next, the essay will trace the development of the first version of EBO development into what has become a relatively mature and widely accepted concept for war winning. Finally, the essay will demonstrate that a second version of EBO development, aimed at a broader range of applications using all instruments of national power, has emerged and is progressing toward maturity as a concept.

Setting the Scene - The Underlying Theory

> The EBO movement and the passion of its advocates stem from wartime experiences of young US Air Force officers who were appalled by the frequently mindless and ineffective use of airpower in Vietnam. When their turn to lead came, they were determined to do better. The Gulf War was their first great opportunity and, in fact, joint fires (not just Air Force fires) were applied with decisive effectiveness as the result of sound thinking about affecting *systems*, not just servicing targets. Operations were dramatically different from anything previously seen. At that moment in history, a great many concepts and capabilities came together after years of evolution.[22]

In order to understand EBO, it is first necessary to understand its origins. The young air force officers who first conceived of EBO did so based on their experience, formed from their first-hand operational observations and their professional military education. In the US Air Force then and now (and in other services and in other nations) much of an officer's professional education is directed to understanding theories of war and, in the case of air forces, the theories affecting the application of airpower. It follows then that, to understand EBO, it is necessary to understand the theoretical baseline from which EBO

thinking emerged. Accordingly, this section will review the development of airpower and other theory that would have influenced the generation of US Air Force officers who started the EBO movement.

As Carl Builder observed, in the United States airpower was originally conceived as a "theory composed of three axioms:

1. Air power can be employed decisively in war by striking at the heart of the enemy.

2. To use air power decisively, command of the air (i.e., air supremacy or superiority is a prerequisite).

3. To gain command of the air and to use air power decisively in war, air power must be centrally and independently controlled."[23]

The roots of the first axiom can be traced to the end of the nineteenth century. In parallel to our present time, this was a time of technical innovation and invention. Successive waves of industrial revolution had transformed western societies and had produced a general expectation that humankind could achieve any goal through the application of science and technology. It was a time of inquiry and exploration, yet there were no new frontiers on land left to conquer. It was also a time when tabloid newspapers were becoming popular with increasingly enfranchised electorates who were experiencing a wave of nationalistic sentiment. [24] Thus, both the means and the opportunity were provided for the promise and then the reality of powered flight to capture the imagination of an informed and influential public who accordingly demanded that their governments and their military forces embrace and foster aviation development for the sake of national pride.

Not surprisingly, the popular sentiment that embraced aviation also revived an age-old idea of waging war from the air.[25] Perhaps the most conspicuous example of the popularization of this idea and the degree to which an apocalyptic vision of air warfare could be readily accepted by the public was H.G. Wells' *The War in the Air* (1908), a novel that depicted the destruction of civilization as a result of great air battles. Moreover, it was not just the common citizenry that accepted the inevitability of devastating air bombardment; diplomats and politicians seemed to have accepted the idea well before publication of *The War in the Air.* In 1899, before the first flight of a Zeppelin airship and nearly five years before the Wright brothers' first flight at Kitty Hawk, the delegates to the Hague Conference agreed to ban air bombardment for five years[26] in a de facto recognition that this type of attack would need to be regulated by the laws of war, but that it could not be prohibited outright because it might "decrease the length of combat and consequently the evils of war as well as the expenses entailed thereby."[27] Further deliberations resulted in "[A]nnexes to the Second Hague convention of 1908 [that] explicitly prohibited air attacks on towns, villages, houses, churches, hospitals and the like, even though the capability to do so scarcely existed."[28]

However, the first bombing mission by powered aircraft was not flown until 1911, by the Italian Army over Tripoli against the Turkish Army; therefore, it was not the substance but "the idea of airpower ...which was so compelling."[29] The small group of Italian aviators started their bombing experiments with the pilot tossing hand grenades and eventually they devised a bomb rack capable of carrying 10 bombs that could be released singly or in 10-bomb salvoes. "The effect (of the Italian bombing) was probably greater on the press than on the Turks. Immediately, the moral-humanitarian issue was raised. The Turks claimed that a hospital had been hit, though the bombs used were basically hand grenades lobbed from a somewhat abnormal distance."[30] This first use of aerial bombardment was widely covered in the press and was noticed by France, Germany and Britain. The press coverage of the bombing seemed to reinforce the notion that attack from the air was particularly devastating and that the aircraft were already sufficiently developed to pose a serious threat.[31]

When the First World War began three years later, the British public believed that air attacks would immediately commence. Indeed, there had been several Zeppelin scares in Britain beginning in 1912, but when war broke out "Zeppelinitis" gripped the citizens of London. Kenneth Poolman aptly describes the attitude at the time:

> Londoners watched the sky uneasily, lay awake at night waiting for the new terror of twentieth-century war to come, snarling and roaring overhead. "Zepp" was an altogether new shape of fear in British hearts. There had been no threat like it since Napoleon's invasion barges, and then there had been the Navy for protection, and the Militia if "Boney" had landed. Now…what was there to prevent these monsters from scorching London with their breath of fire?[32]

The "Zepps" did not appear because the German Navy's airship division (*Marine-Luftshiffe*) did not have the means to engage in strategic bombing in the earliest stages of the war. However, the advocacy of the naval staff for a strategic bombing role during the initial German attack in the west indicates that they believed that a strategic attack at the heart of Britain would create physical and psychological effects that might break British will to continue the war.

In a 20 August 1914 letter, the fleet commander who controlled the *Marine-Luftshiffe* wrote to the Chief of Naval Staff, Admiral Behncke, arguing for a strategic bombing campaign with London as the primary target because of its docks and because it was the location of the Admiralty, the "nerve-centre" of the Royal Navy. The fleet commander wrote:

> The bombing attacks "may be expected, whether they involve London or the neighbourhood of London, to cause panic in the population which may possibly render it doubtful that the war can be continued. … In general, air attacks with airplanes and airships from the Belgian and French coasts, particularly with airships, promise considerable material and moral results. They must, therefore, be considered an effective means of damaging England."[33]

Accordingly, the fall of 1914 saw the production of the first joint air campaign plan in history. The army and navy staffs collaborated to conduct a target analysis and to produce what today would be called a "master air attack plan." As Ernst Lehmann, one of the army's airship captains recalled after the war, the intent of the plan was to bring Britain to her knees by attacking her strategic war making capability, her economy and the morale of the British people. The targets "lay scattered throughout England – docks, arsenals, munitions factories, warehouses, railway yards, and not least in importance, the Bank of England. … If it (the Bank) could be destroyed England's entire monetary system might be thrown into confusion, and that would be one way of paralyzing the auxiliary industries in a war of this magnitude."[34] The German staffs who prepared the plan were well aware of the British press reports of various Zeppelin scares and reasoned that, if imaginary airships produced such reactions, then real Zeppelins dropping real bombs would surely produce mass panic. As Admiral Behncke concluded in one of his communications, "we dare not leave untried any means of forcing England to her knees, and successful air attacks on London, considering the well-known nervousness of the public, will be a valuable measure."[35]

As it turned out, the Zeppelin bombing campaign was a failure. The defending British Royal Flying Corps (RFC) and the Royal Naval Air Service (RNAS) soon learned that the slow, hydrogen-filled airships were highly susceptible to fire damage and quickly adopted the use of incendiary bullets. The resulting combat losses in the *Marine-Luftshiffe* were not sustainable and, in proportion, exceeded those of the submarine service.[36] However, by 1917, the German Army Air Service had developed the Gotha G-4 and the Staaken R-6 "Giant" bombers, capable of delivering bomb loads of 1,000 and 2,000 pounds respectively, and beginning in May 1917, formations of 20 or more bombers were launched in daylight raids against England.[37]

On 13 June, a formation of 18 Gothas attacked London, killing 574 people. Ninety-two aircraft from home defence squadrons, training units and the RNAS responded to the attack but no Gothas were shot down. A similar attack on 7 July resulted in 250 Londoners killed with the loss of only 1 Gotha to British fighters. "The bombing of London in broad daylight on 13 June and 7 July caused intense excitement, almost amounting to hysteria, in governmental and official circles."[38] Panicked Londoners were reported to have assaulted "Royal Flying Corps officers in the street for alleged failures to do their duty."[39]

These events were certainly not lost on the US Air Service officers serving in France. One of these men was Lieutenant-Colonel Edgar Gorrell, the head of "Strategical Aviation, Zone of Advance, US Air Service." During his tenure in this position, Gorrell came to be an advocate for the US acquisition of a force of between 3,000 and 6,000 bombers to be used in a night bombing campaign against Germany, and it is clear from the historical record that Italian and British thinking on the subject influenced him.

Gorrell actively corresponded with the Italian aircraft manufacturer Caproni on this topic and sometime in October 1917 "Caproni collaborated with his friend Captain Giulio Douhet[40] in the preparation of a "Memorandum on the Air War for the US Air Service." This document urged that mass attacks made at night by long-range Allied bombers against

industrial targets deep within Germany and Austria definitely could overwhelm the enemy by substantially reducing their war production at the same time that Allied production was increasing. That same month Caproni gave Gorrell a little book signed by Nino Salveneschi and entitled *Let Us Kill the War: Let Us Aim at the Heart of the Enemy*. Evidently written by a journalist to represent Caproni's views, this small, English-text book was a further exposition of the concept of strategic bombardment."[41]

Gorrell also collaborated with Major Lord Tiverton, who became the British Air Ministry's expert on bombing "target selection and related technical questions."[42] While Tiverton was serving with the naval section of the British Aviation Commission in Paris in September 1917, he authored a paper that laid out a detailed conceptual plan for long-range bombing. His work identified target sets aimed at crippling the German war economy, and included the location of bomber bases, numbers of aircraft required, expected sortie rates, weather considerations, navigation problems and logistical issues.[43] He shared his thoughts and his paper with Gorrell who was also serving in Paris at the time. In November, Gorrell produced a bombing plan for the use of American air power for General Pershing, commander of the American Expeditionary Force (AEF), and his incoming head of the AEF's Air Service, General Foulois. Gorrell's plan, an almost verbatim copy of the Tiverton plan, ironically, "came to be known as the 'Gorrell Plan' [and] was later considered paradigmatically American: the 'earliest' and 'clearest' statement of the 'American conception of the employment of airpower.'"[44]

Gorrell's plan was not the only manifestation of evolving American thinking on the employment of air power. The German collapse in the fall of 1918 provided additional food for thought, as Lee Kennett observed:

> Despite all the sophisticated gadgetry of the war, it had been at the bottom a contest of wills and of endurance. Germany's defeat offered eloquent proof, which the Germans themselves were the first to accept. The German Navy had scarcely seen action; not a single foot of German territory had been invaded. Yet, at the end of 1918, the whole country suffered a sort of collapse - a massive disintegration of confidence, of resolve, of belief in victory - which compelled the German government to sue for peace.[45]

The apparent psychological collapse of the German population certainly had an effect on those attempting to analyze the British aerial bombardment of Germany in the initial period after the war. For a number of reasons, the British post war reports placed great emphasis on the "moral" (meaning "psychological") effect of bombing on civilian populations.[46] Indeed, Hugh Trenchard, the first chief of the Royal Air Force (RAF) claimed that "the moral effect of bombing stands undoubtedly to the material effect in a proportion of 20 to 1."[47] On the other hand, the American study of the same bombing campaign, while it also recognized the presence of a moral effect on German populations, concluded that: "The three kinds of bombing that are of most importance are, first, that directed against war industries; second, that against railroad lines; and third, that against an enemy's troops in the field."[48]

The American report went on to say:

> In considering the first [bombing war industries] a careful study should be made of the different kinds of industries and the different factories of each. This study should ascertain how one industry is dependent on another and what the most important factories of each are. A decision should be reached as to just what factories if destroyed would do the greatest damage to the enemy's military organization as a whole. On these factories the entire available bombing force should be concentrated until it is satisfied that the factory is sufficiently crippled. Once the plan of bombardment is chosen it should be held to religiously and a choice of immediate targets affected only by weather conditions and airplanes available. Factories should be bombed night and day successively as far as the weather will permit until the desired results are thought to have been accomplished.[49]

Thus, by the end of the war, although they had not had the time to commence a bombing campaign of their own, Gorrell and other American airmen in the AEF had developed a conviction that aircraft should be used to conduct tactical actions (i.e., bomb industrial targets) that would have a strategic impact (cripple the war economy that would in turn shorten or end the war). Gorrell produced a *History of the American Expeditionary Forces Air Service, 1917-1919* that included a copy of his plan.[50] This document, together with a copy of the US Bombing Survey Report were held at the Air Corps Tactical School (ACTS) at Maxwell Field after the war and were often quoted in the tactical manuals produced by the School and in the lectures delivered by its staff. In addition to American documents, the ACTS staff also had ready access to translated copies of extracts of Douhet's *Command of the Air*[51] and German accounts of the war in the air.[52]

By 1926, ACTS instructors had postulated that the US could use bombers to strike at the "vital points of a nation's structure" to achieve victory quickly and at the least cost. In 1933, Major Donald Wilson began to advocate a concept that called for the attack of very specific targets that, if destroyed, would result in a collapse of the enemy's economy and strategic war making ability. [53]

The ACTS conviction that modern, industrial societies were vulnerable to bombing was later strengthened further by the experiences of the Great Depression. As Malcolm Smith noted:

> The supposed ability of the bomber to bring a war directly to the home front, and to win the war there rather than in simply military conflict, made frightening sense in a period of economic dislocation, mass unemployment

> and political dissent…The idea that the bomber would be the decisive weapon in any renewed war rested on a depressed faith in the future of advanced industrial society, with its economic recessions and social divisions. If indeed industrial societies were inherently unstable, how could they withstand the rain of high explosive? It was easily argued that an attack on important sectors of the economy could bring the entire structure crashing down under the cumulative weight of its interdependence. [54]

Additionally, the ACTS staff reasoned that in order to attack specific targets with efficiency and certainty of destruction, excellent bombing accuracy was required. Studies at ACTS found that night bombing could not achieve the required accuracy to destroy single, factory-sized targets and the school's staff concluded that "precision targets" could only be successfully attacked during daylight. Since the danger to the bomber from anti-aircraft fire was greater during the day at lower altitudes, it was theorized that US bombers should attack from high altitudes in order to reduce combat losses. Thus, the doctrine of the high altitude, daylight precision bombing evolved from ACTS's work in the early 1930s to the point where Air Corps doctrine in 1939 could be summarized as follows:

> The most efficient way to defeat an enemy is to destroy, by means of bombardment from the air, his war-making capacity; the means to this end is to identify by scientific analysis those particular elements of his war potential the elimination of which will cripple either his war machine or his will to continue the conflict; these elements having been identified, they should be attacked by large masses of bombardment aircraft flying in formation, at high altitude, in daylight, and equipped with precision bombsights that will make possible the positive identification and destruction of "pinpoint" targets; finally, such bombing missions having been carried out, the enemy, regardless of the strength of his armies or navies, will lack the means to support continued military action.[55]

In 1941, in anticipation of US entry into the Second World War, a small group of former instructors from ACTS was given the task of producing an overarching air war plan upon which to base American mobilization for war.[56] They were given little time for study and preparation and, not surprisingly, they turned to their experience for answers and produced a plan that was strongly reminiscent of the First World War Gorrell plan and the US bombing survey of 1919.[57] Indeed, the goal of the Air War Plans Division's Plan No. 1 (AWPD-1) was "to conduct a sustained and unremitting Air Offensive against Germany and Italy to destroy their will and capability to continue the war and to make invasion either unnecessary or feasible without excessive cost."[58] In order to accomplish this task, the planners realized that they would need to determine as the first order of business, "a. Target

systems in Germany whose destruction would accomplish the objective, and to establish them in order of desirability…[and] b. Targets within target systems, and estimate the effect of target destruction in terms of contribution toward the objective."[59]

The planning team determined that before anything else could be done, it would first be necessary to defeat the German Luftwaffe and accordingly identified this task as "an overriding immediate objective." Their next priorities for attack were electric power, the transportations system, petroleum production and distribution, and morale, in that order.

AWPD-1 was later updated and became known as AWPD-42 (for the year of its promulgation - 1942). Once the US had entered the war, however, it was realized that, in the interests of unity of allied effort, the US bombing plan would need to be coordinated with the RAF's bombing campaign that was already underway.

The result was the Combined Bomber Offensive, which received its formal political direction from the Casablanca conference, which began on 14 January 1943. The British and American air staffs that attended the conference to work out their combined strategy were prepared to hotly debate and defend their individual doctrines to ensure that the combined strategy would fit their national political realities. In the end, a compromise was reached whereby the US Army Air Forces (USAAF)[60] would continue its daylight precision raids and the RAF would continue its night area attacks, and, thus neither nation would be forced to change its doctrine in order to conduct the bomber offensive. In essence then, the combined offensive strategy was that the two nations would attempt to ensure that their operations complemented each other. With both day and night bombing, it was argued, Germany could be attacked "around-the- clock," and the final wording of the Casablanca directive reflected the compromise. The RAF's Bomber Command and the USAAF's 8th Air Force were told:

> Your primary objective will be the progressive destruction and dislocation of the German military, industrial and economic system, and the undermining of the morale of the German people to a point where their capacity for armed resistance is fatally weakened.[61]

Although the directive went on to provide a tentative order of priority for targets, the deliberate ambiguity of the wording allowed each of the participants to interpret the directive in their own way. The US interpretation is outlined in Table 2-1, which depicts the evolution of the priority of targeted systems by American planners from AWPD-1 to AWPD-42 to the Combined Bomber Offensive strategy. In each list it is possible to see the echoes of the American interpretation of the lessons from the First World War in that the plan is directed toward key German industrial "nodes," where tactical action by individual (or groups of) aircraft would have the maximum effect on the overall conduct of the war.

AWPD-1 Target Priorities	**AWPD-42 Target Priorities**	**Combined Bomber Offensive Target Priorities**
1. German Air Force • Aircraft Factories • Aluminium Plants • Magnesium Plants • Engine Factories	1. German Air Force • Aircraft Factories • Aircraft engine plants • Aluminium plants	1. German Air Force • Fighter aircraft factories • Aircraft engine plants • Combat attrition
2. Electric Power • Power Plants • Switching Stations	2. Submarine building yards	2. Submarine building yards and bases
3. Transportation • Rail • Water	3. Transportation • Rail • Water	3. Ball Bearings
4. Petroleum Refineries and synthetic plants	4. Electric Power • Power Plants • Switching Stations	4. Petroleum Refineries and synthetic plants
5. Morale	5. Petroleum Refineries and synthetic plants	5. Rubber synthetic plants
	6. Rubber synthetic plants	6. Military Transportation Armoured vehicle factories Motor vehicle factories

Table 2-1 - Progression of Targeted Systems from AWPD-1 to the Combined Bomber Offensive Strategy[62]

The outcome of the Second World War bombing campaigns is a subject of debate to this day.[63] As Builder observed, "the AAF [US Army Air Forces] leadership came out of the Second World War with the air power theory intact, despite considerable evidence that it was flawed and incomplete. It was as though the Second World War had never occurred and the spectre of the First World War still haunted its survivors."[64]

Following the war, the USAAF each set up commissions to study the results of the European and Pacific bombing campaigns.[65] In the final analysis, neither study was able offer conclusive proof of the theory that airpower could deliver a "knockout blow" that would compel an enemy to sue for peace.[66] However, the positive spin placed on the United States Strategic Bombing Survey (USSBS) by those who were committed to the concept of an independent air force, coupled with the introduction of nuclear weapons into the theoretical equation, ensured that, at least for some, the theory of strategic bombing was vindicated and, therefore, carried into the Korean War by the newly-formed, and fully independent US Air Force.[67]

The US Air Force realized that the Korean conflict would be seen by some to be the first test of the usefulness of the new service and the theory on which it was based. Accordingly, when that war was over, the US Air Force attempted to tread softly in determining its "lessons learned" and concluded that the Korean conflict was "unusual" and was "a very poor model for planning future operational requirements."[68] In fact, the experience of the Korean War seemed to invalidate the assumption that industrial societies were vulnerable to strategic bombing. Moreover, the Korean War presented evidence that another underpinning of the strategic bombing theory – an assumption that all future wars would be total wars – did not always hold true. For a new service whose existence was based on the theory of strategic bombing in total war, the experience of the Korean War was difficult to accept. Perhaps it is not surprising that the US Air Force dismissed Korea as an anomaly and only grudgingly accepted the lessons learned about the employment of tactical air power in that war.[69]

In the decade that followed the Korean War, the idea of the air-delivered knockout blow was entrenched ever deeper in the psyche of the US Air Force. At the dawn of the Vietnam conflict, the US Secretary of the Air Force, Eugene Zuckert, observed, "… there were myths that died hard – especially the myth of Air Force omnipotence. A lot of blue-suiters simply refused to believe that there was any war that couldn't be won by air power alone."[70]

Tami Davis Biddle noted that post-Korean War manuals reflected the idea of the omnipotence of air power. Drawing upon previous American air power theory and a particular interpretation of Second World War II experience, they asserted that "long-range bombers would strike the enemy nation itself so as to collapse the enemy's capacity and will to fight." Davis Biddle observed that even though nuclear weapons soon made the concept of precision bombing "absurd, the industrial fabric theory still took pride of place" as shown by this extract from US Air Force doctrine published in 1954 and that was not revised until 1965:

> "The fabric of modern nations is such a complete interweaving of major single elements that the elimination of one element can create widespread influence on the whole. Some of the elements are of such importance that [their] complete elimination … would cause collapse of the national structure …. Others exert influence, which while not immediately evident,

> is cumulative and transferable, and when brought under the effects of air weapons, results in general widespread weakening and collapse." [71]

Accordingly, it was not surprising that, when President Lyndon Johnson solicited advice on the conduct of the Vietnam War from the Joint Chiefs of Staff in 1964, the Air Force Chief of Staff, General Curtis LeMay, recommended a massive aerial assault against 94 targets in North Vietnam.[72] His recommendation assumed that a largely unrestrained attack on North Vietnam was politically possible and that it was an inherently unstable industrial society that was vulnerable to attack from the air. Unfortunately for the US Air Force, what Johnson wanted from the military were solutions that would prevent expansion of the war, not its intensification.

In the end, however, there were three major bombing campaigns mounted by the US military during the Vietnam War: Rolling Thunder, Linebacker I and Linebacker II. The first, Rolling Thunder, which began in March 1965, was intended to gradually increase pressure on the North by attacking selected infrastructure below the nineteenth parallel and by interdicting supplies flowing from the North to the Viet Cong in the South. The operation was a failure for several reasons, including the fact that "the industrial sector of North Vietnam's economy was not a highly valued asset"[73] and that the Viet Cong were not susceptible to an interdiction campaign. As a popular-based guerrilla force, the Viet Cong's re-supply requirements from the North were small and they were able to control the pace of their operations to meet the availability of materiel. The Viet Cong's entire war requirements were 34 tons per day, less than one per cent of the total imported into North Vietnam.[74]

Linebacker I, which began in May 1972, had essentially the same objective as Rolling Thunder; however, by this time, two main conditions had changed that affected its results. First, with improved US relations with China and détente with the Soviets, President Nixon was confident that neither country would enter the war on North Vietnam's side, and, therefore his use of force in the conflict was essentially limited only by US domestic public opinion. Secondly, after the 1968 Tet offensive, the Viet Cong had virtually ceased to exist and the style of war had switched from a guerrilla war to a conventional war fought against regular North Vietnamese Army (NVA) troops. The NVA was dependent on secure lines of communications to its rear for re-supply and reinforcement, and Nixon therefore approved attacks on targets north of the twentieth parallel as well as the mining of Haiphong harbour. The bombing campaign had an effect on the NVA's ability to continue operations in the field and forced it to discontinue its Easter offensive. However, Linebacker I did not end the war.

The final bombing campaign of the war, Linebacker II, has frequently been cited as a good indication that victory can be achieved by strategic bombing in accordance with the US Air Force's guiding airpower theory. Also referred to as the "Christmas bombing campaign," it was launched on 18 December 1972 in an attempt to force the North back to the Paris peace talks. Linebacker II lasted eleven days during which 20,000 tons of high explosive were dropped on vital targets throughout North Vietnam in 2,852 sorties. Using new technologies such as terrain-following radar and precision guided munitions (PGMs), B-52 bombers, supported by F-111 fighter-bombers, conducted strikes at night while US

Air Force and US Navy tactical aircraft conducted bombing by day. The bombing caused considerable destruction to North Vietnam's economic sector and military infrastructure, and, on 29 December, when Hanoi indicated a willingness to return to serious negotiations, the bombing ceased.

For the US Air Force and its supporters, Linebacker II was seen as a vindication of the idea that had been the *raison d'etre* for the formation of an independent air force in the US. Many air power advocates, shortly after the conclusion of Linebacker II asserted that, if only President Johnson had unleashed air power to do its job in accordance with airpower theory in the mid-1960s, then the costly Vietnam War could have been ended much sooner. Immediate post-war US Air Force analyses typically concluded: "That the air weapon was successfully employed in countless battles and campaigns is beyond question. Whether or not air power could have ended the war on satisfactory terms was not tested."[75]

Indeed, new generations of US Air Force officers were taught that the blame for the Vietnam debacle was to be placed squarely on President Johnson:

> Fearing escalation to a nuclear confrontation, President Johnson took personal control of the Rolling Thunder bombing campaign (1965-1968), selecting not only targets but also often dictating timing, ordnance loads, sorties, and alternate targets. In a sense Johnson's action was centralized control run amuck, with all strategic, most operational, and many tactical decisions emanating from the president's now infamous Tuesday lunch meetings. The result was a campaign unresponsive to local conditions; a campaign that lacked both operational and tactical flexibility. More importantly, the campaign was a failure despite the expenditure of three years of intensive effort, much American blood, and uncounted treasure.[76]

The Vietnam War also completed a splintering of the US Air Force that had commenced with the introduction of inter-continental ballistic missiles to the American military inventory in the 1950s and 1960s. As Carl Builder observed:

> As an institution, the Air Force started to fractionate once it shifted its devotion from the unifying ends or mission of air power to its separate (and unequally statured) means. Missiles and space were not the only areas accepted as different means and careers in the Air Force. If they could coexist alongside the aviators, then so too could the long-suppressed fighter (pursuit) pilots. Tactical air power as another independent means and career grew rapidly under the limited war theories of the 1960s. The Vietnam War brought TAC [Tactical Air Command] into full bloom and put TAC pilots into the senior leadership of the Air Force for the first time.
>
> The fighter aviators … were suddenly released to pursue their own interests. … Not only air power theory was neglected, the people who were now running the Air Force had no roots in the theory. Indeed the fighter pilots were

> knights of the air who were prepared to battle for control of the air, but who had lesser interests in supporting the ground war or striking at the heart of the enemy.
>
> With the ascendancy of TAC over SAC [Strategic Air Command] to the leadership of the Air Force, the application of the theory of air power came increasingly from the Army and its "AirLand" battle doctrine. Air power theory had now devolved into deterrence theory, AirLand battle doctrine, and the dictum of air supremacy. The first had to be shared with the civilian strategists and the Navy, the second yielded the initiative to the Army, and the third was of interest only to the aviators.[77]

Therefore, by the 1980s, the US Air Force had for all intents and purposes abandoned the theory that had guided its development and operation since the First World War. Its doctrine stagnated and the institution became more preoccupied with defending its force structure in budget battles than it did with preparing the institution with the next conflict.[78] Working in this environment of intellectual stagnation was a generation of young officers stinging from, what was in their view, an entirely avoidable defeat in Vietnam.[79] They were ready for a new, guiding vision of airpower to be articulated. It was in this fertile environment that the first version of what is now known as EBO occurred.

Resurrection – The First Version of EBO

The main catalyst for what would become a renaissance of air power theory was Colonel John Warden, who first gained notice in 1988 with the publication of his book *The Air Campaign*. Based on Warden's thesis written while he was a student at the National War College in the late 1980s, *The Air Campaign* was written before the fall of the Soviet Union when military thinking was primarily directed toward the most likely scenario of a European war between the North Atlantic Treaty Organization (NATO) and the Warsaw Pact. Moreover, since Warden wrote his thesis in a time of US Air Force doctrinal neglect, his thinking was "heavily influenced by the most doctrinally prolific, if not up-to-date, service – the US Army."[80] He therefore introduced the Army concepts of centre of gravity (COG) and operational art to air power thinking.

Warden argued that theatre air effort should be planned and executed as a single-service, all-encompassing air campaign aimed at directly accomplishing objectives at the operational and strategic levels of war. He said that he had thought through "the problems confronting an air commander or staff officer in preparation for planning and executing an air campaign,"[81] and he reasoned that a successful air campaign is contingent on a good plan and a good plan is the result of a sound understanding of basic theory. Therefore, he began the book with the basics, developing a general theory of how airpower could and should be employed, and then gradually transitioning to a theoretical discussion of principles that must be applied in the planning of an air campaign.

Warden's thesis may be summarized with four major points. First, the primary objective in an air campaign is air superiority, for air superiority permits freedom of action for one's own air, land and naval forces. Second, after air superiority is gained, airpower is best employed on the offence, to strike behind the enemy front lines and interdict his ability to make war. Interdiction is the most efficient use of airpower because it is more efficient to destroy an enemy air force on the ground than to seek fighter engagements to gain air superiority. Interdiction attacks mounted against the enemy's critical nodes or "centres of gravity" (such as fuel supplies) can ground air forces as well as bring mechanized armies to a halt. Moreover, not only can interdiction cut off enemy fielded forces from their sources of sustenance, but it can also strike directly at the enemy strategic centres of gravity. Thus, airpower may be the "key force" in a joint theatre campaign. Third, close air support is the least efficient and therefore least desirable role for airpower. If a lack of resources compels commanders to use air assets in the close air support role, this diversion of effort from air superiority and interdiction should only take place when the situation on the ground is desperate. Fourth and finally, numbers of aircraft matter; therefore, to ensure numerical superiority at the culminating points in the campaign, air commanders should consider holding air assets in an operational reserve. Thus, in *The Air Campaign* it is possible to see a resurrection of the American theory of air power that began to be formulated in the First World War, albeit expressed in the army language of operational art.

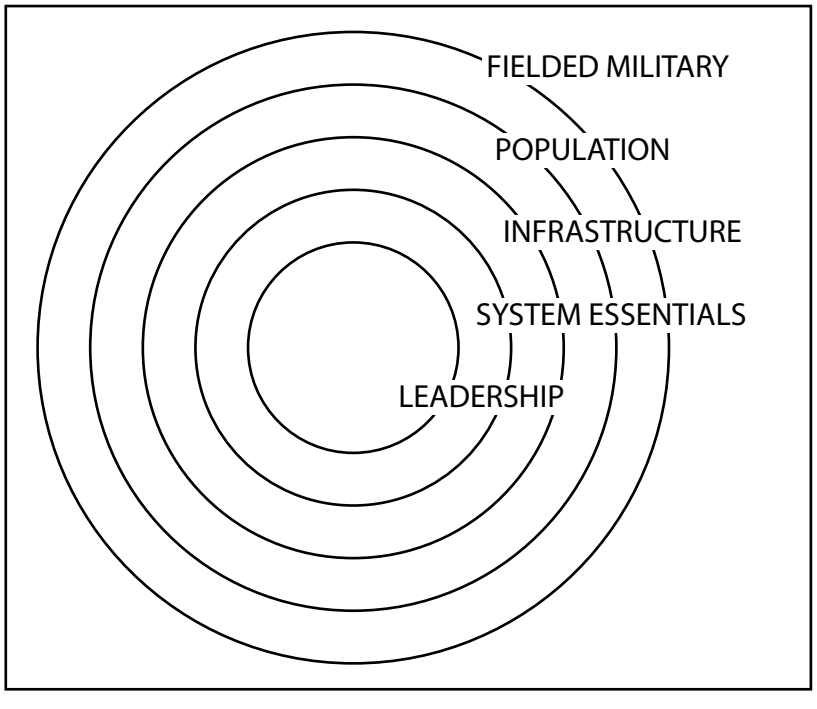

Figure 2-1. Warden's Five Ring Theory

After publication of *The Air Campaign*, Warden continued to refine his ideas on the use of air power, and he published them in a 1995 article titled "The Enemy as a System."[82] Echoing Gorrell's 1917 plan and ACTS and USAAF thinking, Warden asserted that any enemy might be viewed as a system of systems, and he visualized these systems as five concentric rings (see Figure 2-1). The innermost ring is, in Warden's view, the most important. It comprises the leadership of the enemy organization, or as he describes it, the brains, and eyes, and nerves that allow the organization to be purposely directed. Next to the centre is a ring comprising those "organic essentials" critical to the existence of the organization. In a state these would include energy and food supplies, physical resources and economic means. The third ring, or the infrastructure ring, contains the transportation networks. The fourth ring is the enemy population as a whole and the fifth and outer ring is comprised of the enemy armed forces. Warden also states that war can be reduced to a single equation where OUTCOME = (PHYSICAL) X (MORALE). He argues that, traditionally, war has been focussed on attacks against the outermost rings, elements that he considers to be the least important and the most easily reconstituted elements of an enemy system. Moreover, he argues that in past wars too much effort was wasted working on the morale factor of the equation, a factor that he considers too fickle to be realistically attacked. In essence, his thesis is that enemies should be attacked from their innermost ring outward rather than from the outside in, and that the attacks against the rings can (and should) be aimed at physical targets in order to produce the desired outcome. Thus, with the exception of leadership as a system category, Warden's model bears an uncanny resemblance to the categorization of target sets identified in AWPD-1 and AWPD-42.

Warden's thinking was also influenced by Colonel John Boyd, the originator of "the OODA (Observe, Orient, Decide and Act) loop" concept.[83] Boyd noticed from his experience in air combat, that victory usually went to the pilot who was able to maintain superior situational awareness (SA) and make the faster decisions. He theorized that there was, in each engagement, a continuous process whereby each combatant gathered information (observed), made sense of the data (oriented), chose an appropriate course of action (decided) and then carried it out (acted). In Boyd's experience, the victor in air combat was the combatant who was able to make his OODA loop move faster (and thus stay "inside") that of his adversary. Boyd later applied his observations of tactical air engagements to the higher levels of war, and he "hypothesized that this continuously operating cycle was at play" at all levels of war.[84]

Boyd's notion of exploiting time to force an adversary into decision paralysis prompted Warden to think of how to achieve a similar state of paralysis with an air campaign. The result was Warden's concept of "parallel attack," where he hypothesized that:

> If a significant percentage [of critical targets] is struck in parallel, the damage becomes insuperable. Contrast parallel attack with serial attack in which only one or two targets are under attack in a given day (or longer).

> The enemy can alleviate the effects of serial attack by dispersal over time, by increasing defenses of targets that are likely to be attacked, by concentrating his resources to repair damage to single targets, and by conducting counter offensives. Parallel attack deprives him of the ability to respond effectively, and the greater the percentage of targets hit in a single blow, the more nearly impossible his response.[85]

Warden's concept bore an eerie resemblance to the US Air Force's 1954 doctrine for strategic attack:

> Modern weapons permit us to deliver attacks against all activity within a given area simultaneously. Modern firepower has so compressed the time element that attacks on all vital targets of an enemy nation can be made almost simultaneously by relatively small forces. Thus, the capability exists to deliver attacks which horizontally will destroy or seriously reduce the total war making capacity of a modern nation. These effects will not be confined to any one segment of the enemy nation but will disrupt his entire capability. Control of the population and military forces will become virtually impossible through loss of communication and organized control mechanisms. Provided that the attack is delivered in sufficient weight in the shortest possible time, collapse of the nation for war purposes will be inevitable. The rapidity of the collapse will be directly proportional to the timing and weight of the attack.[86]

Following the Iraqi invasion of Kuwait, Warden and a small "think tank" of Pentagon planners known as "Checkmate" were called upon to prepare an air plan for the upcoming US-led counter attack against Iraqi forces. Warden based his plan on the five-ring model he had developed two years previously.[87] To assist his team's planning efforts, Warden recruited Lieutenant-Colonel David Deptula, who "had fallen under Warden's influence a year or so earlier when he had worked for him in the Air Force Doctrine Division at the Pentagon. Together, they had explored the high and low ground of aerospace doctrine and war-fighting strategy. Deptula, an F-15 pilot and Fighter Weapons School graduate, was a fast learner and quickly rose to the top of Warden's inner circle."[88] After initial development of the plan (code-named Instant Thunder), Warden and the majority of the Checkmate team were effectively fired following a disastrous session with Lieutenant General Horner, the Joint Force Air Component Commander (JFACC) for the coalition.[89] Deptula, however, remained in theatre and became the lead strategic attack planner, under Brigadier General "Buster" Glossen, of the team (known as "The Black Hole") that completed development of the Instant Thunder plan.

The Instant Thunder plan that was finally executed was a compromise between Warden's purely strategic plan and a more tactically oriented approach that was in accordance with the AirLand battle doctrine with which the Air Force's Tactical Air Command was more familiar. However, from an examination of the target sets that were attacked, it is easy to see among them those that suggest aspects of the industrial fabric, or web, approach to air

attacks against an enemy that guided development of AWPDs 1 and 42 and the CBO plan. The final Instant Thunder target sets were:

1. Leadership and command facilities
2. Electricity production facilities
3. Telecommunications and command, control and communications (C3) nodes
4. Strategic Integrated Air Defence Systems
5. Air forces and airfields
6. Nuclear, Biological, and Chemical research, production and storage facilities
7. Scud missiles, launchers, and production, and storage facilities
8. Naval and port facilities
9. Oil refining and distribution
10. Railroads and bridges
11. Army units, including Republican Guards
12. Military storage and production sites.[90]

The name of the plan provides a hint to its intent to achieve strategic paralysis. It was "called Instant Thunder to contrast it with Operation Rolling Thunder's prolonged, gradualistic approach to bombing North Vietnam during the 1960s. Instead of piecemeal attacks designed to send signals to enemy leaders, Instant Thunder was designed … in a single week … [to] paralyze Iraqi leadership, degrade their military capabilities and neutralize their will to fight."[91] It was intended to deliver death by a thousand cuts – simultaneously.[92]

However, despite its apparently devastating effects, the strategic paralysis that the planners hoped to generate was intended to be temporary. The aim was to be able to rapidly rebuild Kuwait and (a hopefully free) Iraq after the conflict;[93] however, in order to accomplish this aim while at the same time inducing strategic paralysis, the team recognized that it would be necessary to depart from the accepted norms of targeting. In the preceding three decades, the focus of attack was on destruction, and this focus is understandable when one considers that for much of that time the means of attack was with nuclear warheads. Moreover, the reasoning went that, in the past, the pace of war dictated the destruction of targets to prevent their return to service for the duration of the conflict. However, in the strategic paralysis construct, it was only necessary to achieve the effect of destruction for a period of time long enough to induce the collapse of the enemy through paralysis. Thus, planners wanted to measure success:

> …not by the amount of damage inflicted but by the effect produced (e.g., is the SOC [sector operations center] operating or not?). SOCs still operating after the first attack or returning to operation later could be re-attacked as necessary. This proposal entailed an important conceptual shift from *'destruction-based'* to *'effects-based'* planning. Furthermore, using two bombs instead of the eight recommended by the targeteers (note that both numbers apply to precision weapons delivered by a precise, stealth platform) freed six bombs for other targets and reflected a second conceptual shift: one should apply economy of force and at the operational level as opposed to the tactical, because of the additional leverage gained through simultaneous, parallel attack [emphasis added].[94]

Success in the Gulf War was quickly attributed in large measure to the innovative use of air power,[95] as President George Bush declared, "Gulf lesson one is air power… (it) was right on target from day one."[96] It is therefore not surprising that the victory promoted examination and study of the air campaign. Shortly after the war, Warden became the Commandant of the US Air Force Air Command and Staff College at Maxwell Air Force Base, Alabama (the former home of the Air Corps Tactical School). It was not long afterward that the ACSC included "effects-based operations" as a subject of study, and in 1995, Warden's "The Enemy as a System" and Deptula's *Firing For Effect: Change in the Nature of Warfare* were published.[97] Interest in EBO began to grow and, accordingly, Deptula re-published both an updated version of *Firing for Effect* and an expanded version entitled *Effects-Based Operations: Change in the Nature of Warfare* in 2001.[98] Notwithstanding the updates and additions in the successive iterations of his first essay, Deptula's argument remained essentially the same.

Deptula's work is based on the idea of parallel warfare, which he also describes as rapid decisive operations (RDO), a term that was introduced into the US joint lexicon in 2001.[99] Using the analogy of series and parallel electrical circuits, he relates how "old" war operations were conducted in a sequential fashion. In order to attack a target of value, leadership for example, it was first necessary to conduct a series of attacks to gain access to the intended target. One had first to destroy the enemy early warning radars, then his sector operating centres (SOCs), followed by his airfields where his defensive interceptor aircraft were based and finally his surface-to-air missile (SAM) systems before it was possible to attack the final high value target (or target set).

With parallel attack, however, all of the targets (e.g., radars, SOCs, airfields, SAMs and targets of value) are attacked simultaneously. He notes that hitting:

> …all elements of an air defense system simultaneously facilitates attacks on high value targets, but this still leads to a somewhat sequential application of force. … This … can be accomplished with large force packages of non-stealthy aircraft in discrete areas of a theatre or on a one-time attack against a limited target set. However, the large force packages required to suppress enemy air defences tends to limit the total number of areas struck in this

> manner. To hit an entire theatre wide set of high priority targets requires many attacks in a similar fashion.[100]

In other words, a parallel attack against defending systems is possible, but it is inefficient. On the other hand, an attack that bypasses the defences and simultaneously strikes on all classes of high value targets is the ideal:

> The capacity for a simultaneous attack on the entire array of high value objectives with little or no need to suppress enemy air defenses opens the door to monumental changes in the conduct of war – enables surprise at a tactical level, a larger span of influence, fewer casualties, paralyzing effects, and shorter time to impose effective control over the enemy.[101]

Deptula observes that traditionally, war has been regarded, in a Clauswitzian context, to be a "decision by force of arms" whose highest aim is always "the destruction of the enemy's armed forces."[102] He reminds us that the object of war is, however, to achieve a positive political outcome,[103] and that if a method of compelling a favourable political outcome could be found that did not require the destruction of the enemy armed forces, then costly force-on-force strategies could be avoided. The alternative method to force-on-force strategies, he argues, is a strategy of control, whereby if one is able to control the enemy's instruments of power or, "the essential systems on which an enemy relies to exert control," then the desired political end-state may be achieved with significantly less force.[104] To this familiar argument, Deptula adds a new twist - if less force is required to achieve control, then more forces are freed up and available to undertake more controlling actions, and this in turn eventually leads to the strategic paralysis where "the enemy has no choice but acquiesce to the will of the controlling force or face ever increasing degrees of loss of control."[105]

Deptula acknowledges that the idea of targeting systems to achieve strategic results is not a new one. What has changed is the introduction of new technology that has made viable the air power theory that was developed in the first half of the twentieth century. Precision weapons[106] with accuracies in the order of single meters, resolve the major difficulty encountered by American and British strategic bomber forces in the Second World War.[107] By 1999, a single B-2 bomber, armed with 16 independently targeted GPS guided munitions, could do what would have taken 16,000 B-17 bombers dropping 144,000 bombs in 1943. [108] Similarly, stealth technology effectively negates the growing effectiveness of SAMs and other air defence systems that have emerged since the Second World War. The result of the two technologies is an efficiency gain of significant proportions:

> A comparison of the first non-stealth aircraft attack in the Basrah area with a wave of F-117 [commonly known as "stealth fighters"] strikes at the same time illustrates the enormous leverage of the stealth/precision combination. The non-stealth package consisted of 41 aircraft attacking one target with three aimpoints. The force package consisted of: four A-6s and four Tornados dropping bombs on target; four F4-Gs providing suppression for

> a particular type of SAM; 5 E-6Bs jamming Iraqi early warning and acquisition radars; 17 F/A-18 fighters carrying radar-homing missiles to suppress SAMs; four other F/A-18s providing air-to-air protection, and three drones to excite the air defenses – 41 aircraft, so eight could drop bombs on three aimpoints. At the same time, 20 stealth aircraft (F-117s) were targeted against 37 aimpoints in other areas with an equal and even higher threat intensity – a 1,200 per cent increase in target coverage using fewer than half the number of aircraft.[109]

Thus, according to Deptula's reasoning, the revolutionary technologies of precision and stealth create additional means to conduct a paralyzing parallel attack. These means are multiplied by then adding a concept that seeks only effects instead of destruction. What he means by effects are those actions that "achieve effective control over an enemy, including; render ineffective, negate, disable, prevent, neutralize, limit, reduce, stop, etc."[110] He offers an example of this multiplication factor from his Gulf War planning experience.

Deptula and his team were trying to figure out a way to render the Iraqi air defence system ineffective in the lead up to the coalition air attack. Intelligence had determined that there were significantly more command and control (C2) nodes than originally thought. Using previous methods, where strikes would have been conducted to destroy each facility, Deptula and his planners would not have had enough stealth aircraft available to knock them all out in a single blow as desired. However, he pointed out to his colleagues that it was not necessary to destroy a system to render it ineffective. He recalled the discussion in a later interview:

> The point I'm trying to make is that you can't just rack them [targets] up and prioritize them and go from top to bottom. You have to look at what you want to achieve in each one of those individual target sets, and maybe you don't have to kill the target to achieve your objective. Maybe absolute damage and levels of destruction ought not to be your measure of merit and, in fact, might not be what you really wanted to happen. … You know, a 2,000-pound bomb can go off down the hall, it will make a heck of a lot of noise and we won't be dead, but I can guarantee you we ain't gonna continue to sit here and drink coffee and carry on this conversation. … You're going to get out of there.[111]

Based on this reasoning, the plan was rewritten to drop only one 2,000-pound bomb on each of the C2 nodes. Not only did this method work as planned and render the air defence system ineffective, but it also "multiplied the number of stealth/precision strikes for use against other targets – IOCs [interceptor operating centers], biological and chemical weapons storage facilities, and other critical targets."[112]

This merging of new technologies with old ideas permits, in Deptula's analysis, the ability for military forces to employ control strategies rather than the more traditional strategies of attrition or annihilation. Moreover, he argues that control strategies call for a re-examination of traditional force structures and overall war planning. Forces aimed

at attrition or annihilation war are by necessity large, complex and expensive. They must be moved into theatre, supported and built up to war-fighting strength with sufficient numbers and stocks of supplies and materiel on hand before they can be committed. Once committed, they must be sustained, reinforced and regenerated. Then, when their job is done, they must be redeployed and reconstituted. Therefore, they take time and great cost to achieve their objective. On the other hand, Deptula argues that light, easy to support, rapidly deployable forces can achieve the same strategic and operational effect in a much shorter period of time. There is little question in the reader's mind that Deptula's effects-based force centres on aerospace forces. Indeed, while Deptula argues that such a force should be truly joint in nature (and not just meaning that each service is equally represented), he strongly implies that it would require core competencies in rapid global mobility, precision engagement, global attack, air and space superiority, information superiority, and agile combat support – precisely the characteristics called for in the US Air Force's 1996 vision statement, *Global Engagement: A Vision of the 21st Century Air Force*.[113]

In essence, Deptula's work, modified over time, is aimed at war fighting and operates within a *conquest* paradigm. He is offering a new strategy aimed at controlling an adversary, primarily through military means. He does raise the possibility of employing other instruments of national power – such as economic and diplomatic – but he always considers these other instruments within a framework of conflict aimed at conquest. His emphasis on the end-state or the objective and the search for ways to create desired effects is essentially a discussion of targeting philosophy and methodology. While he most likely did not develop the idea on his own, his published works, speeches and interviews provide the best idea of this first iteration of EBO. There are, however, several other works that view EBO in a manner similar to Deptula or which offer supporting arguments for his viewpoint.

One of the earliest works in this vein is Jason Barlow's *Strategic Paralysis: An Airpower Theory for the Present* (1992).[114] His analysis of targeting strategies introduces the term national elements of value (NEV), a term that he defines as representing a cross section of an enemy's strength (as opposed to a centre of gravity that is, at least in the American literature, normally thought of as a critical vulnerability). He raises four important points concerning NEVs. First, they vary from country to country and, accordingly, careful case-by-case analysis is required to ensure that an adversary's NEVs are properly understood. Second, that NEVs are inter-connected in a self-compensating manner such that the weakening of one will tend to be compensated for by the others. Therefore, since attack on a single NEV yields little probability of success, an attack on all NEVs is necessary to achieve strategic paralysis and compel conflict termination. Third, the concept of NEVs is based on the assumption that the adversary will react in a rational manner (and capitulate) in the face of simultaneous attack on his NEVs. The final point (and related to the first) is the importance of accurate and timely intelligence. Barlow hints at Deptula's effects concept by stating that the point of an attack is to paralyse, not obliterate, but he does not explore this concept in depth. Instead he develops seven NEV categories that bear strong similarities to Warden's five rings.

In an article published in 2000, Thomas Tighe and his co-authors also support the concept of strategic paralysis.[115] They contend that the enemy is a system of OODA loops

and advocate conducting actions to create direct and indirect effects within this system through, among other things, use of information warfare. In other works exploring aspects of EBO, David Pendall, Robert Freniere, and others discuss the possibilities of emerging technologies and advocate the creation and use of lethal and non-lethal, kinetic and non-kinetic weapons to achieve desired effects.[116]

In other EBO-related works, David Fadok concludes that economic warfare is giving way to control warfare.[117] He observes that the information revolution may work against Warden's emphasis on leadership as the prime target if an adversary exploits the possibility of distributed command architectures. He also observes that information dominance is a prerequisite to effective control warfare. Expanding on this latter idea, Satterly and his co-authors describe in detail a process – intelligence preparation of the battlespace – that is essential to information dominance.[118] Discussing both intelligence and information flow, Price Bingham advocates adopting distributed architectures to manage the intelligence information flow and to permit realistic simulation and training in effects-based scenarios.[119]

In discussing EBO and COGs, K. Noedskov provides a somewhat simplistic listing of effects-based COGs, but also points to the need for a top-down planning and analysis process.[120] Edgar Knouse explores the idea of EBO and targeting, and offers a template (or checklist) for operational planners explaining what, when, where, and how effects-based targeting should be used.[121]

A critical army perspective on Deptula's work is provided by Gary Cheek in an article entitled "Effects-Based Operations: The End of Dominant Maneuvre?" In it, he argues that the origins of effects-based thinking lie in air power theory. He concludes that "attempts to vindicate Giulio Douhet and strategic bombing under the mantle of strategic attack, effects-based operations and control warfare … may be an effective strategy for airpower procurement, but is the antithesis of joint warfighting."[122] He also concludes that effects-based targeting has a place when used with dominant manoeuvre and that effects-based thinking, as an analytical approach to war can offer insights to ground commanders. Finally, he observes that: "the proliferation of 'effects-based' terminology into doctrinal products without regard to a defining construct makes it more problematic, if not dangerous."[123] Allen Batchelet agrees that the lack of a proper lexicon hampers meaningful debate on the utility of EBO; however, he argues that elements of EBO can be found in army AirLand Battle doctrine, and, therefore EBO is a "refining and broadening evolution of current Army doctrine."[124] He believes that the US Army should fully embrace the concept of EBO in its own thinking and take the lead in defining it in the joint arena.

Cheek's suspicion that EBO jargon was being used to justify procurements and to support the US Air Force in inter-service rivalries in Washington is probably valid. Nevertheless, his acceptance of the concept of effects-based thinking and of effects-based targeting as an adjunct to manoeuvre, as well as Batchelet's view that EBO is an extension of current doctrine should not be surprising. EBO and manoeuvre theory share many commonalities. As Martin van Creveld notes, the elements of manoeuvre warfare are tempo, *Schwerpunk*t (meaning focal effort at the centre of gravity), surprise, combined

arms, flexibility and decentralized command, and that tempo is defined best by Boyd's OODA loop theory.[125] Furthermore, EBO is used to attack centres of gravity to achieve end states and objectives, and surprise is to a large extent a significant part of strategic paralysis. Moreover, EBO concepts, such as economy, induced paralysis and attacking the adversary's will rather than his men and machines, can be found in the manoeuvrist approach:

> British Defence Doctrine, published in 1996, defines the manoeuvrist approach to war as "one in which shattering the enemy's overall cohesion and will to fight, rather than his materiel, is paramount." Manoeuvre warfare … aims to apply strength against identifiable weaknesses; significant features are momentum and tempo which in combination lead to shock action and surprise. Emphasis is on the defeat and disruption of the enemy – by taking the initiative and applying constant and unacceptable pressure at the times and places the enemy least expects – rather than attempting to seize and hold ground for its own sake. … Such an approach offers the prospect of rapid results or of results disproportionately greater than the assets applied. Hence it is attractive to a numerically inferior side, or to a stronger side which wishes to minimize the resources committed. A key characteristic of the manoeuvrist approach is to attack the enemy commander's decision-making process by attempting to get inside of his decision making cycle. This involves presenting him with the need to make decisions at a faster rate than he can cope with, thereby paralysing his capability to react.[126]

In order to address some of the confusion resulting from the lack of a common understanding of EBO raised by Cheek and others, Maris "Buster" McCrabb authored, in 2001, a seminal paper entitled "Explaining 'Effects': A Theory for an Effects-based Approach to Planning, Executing and Assessing Operations."

The first task McCrabb undertakes is to define and explain objectives, actions, effects and mechanisms:

> An **OBJECT** is the focus of attention; the purpose, aim or goal of a specific action. For example, a desired effect of "isolate the battlefield" has "isolation" as the effect and "battlefield" as the object. Objects always lie in context. By specifying the object, planners also provide the boundary between phenomena. This is essential … because otherwise the problem space can become huge and intractable. Indeed "isolating the battlefield" in a context such as the Gulf War would be daunting. Better to seek "isolation of the KTO"…[127]

> An **EFFECT** is the result of some action. In other words, actions cause effects. Now the action can be direct or indirect. … Whether an effect is a direct effect or an indirect effect depends generally upon point-of-view. An effect is a **DIRECT EFFECT** if it directly results from a direct action. It is an **INDIRECT EFFECT** if it results from the effect of some previous set of actions.[128]

McCrabb explains how point-of-view generally determines whether an effect is direct or indirect by using an example of observing a bridge being destroyed. It is easy to link a bomb detonation to the bridge collapsing as a direct action-effect relationship. However, linking a disrupted transportation system to the morale of frontline troops is difficult. "Ultimately, it is very difficult to measure the extent to which the relationships under consideration have caused desired, or altered undesired, preferences in the absence of overt action. Therefore, a statement of direct effect would be, 'If A is done then Z will result.' However, the statement 'If A is done, then Z will result and this will, in turn, cause X to result' is a statement about a direct effect causing an indirect result."[129]

McCrabb continues:

> A **MECHANISM** is the explanation on how an action causes an effect. Mechanism explains cause.[130] For example, "if A is done, then Z will result because of P and/or Q" is a statement of direct action (A) and its direct effect (Z) as well as its mechanism (P) or mechanisms (and/or Q). A **COMPLEX EFFECT** is a combination or intertwining of effects in an instance of time.[131] For example, "*If A is done then B will result"* is a statement of direct effect. *"If C is done then D will result"* is a statement of a different direct effect. "*If A is done then B will result and the effect of B will, in turn, lead to E"* is a statement of direct effect (B) and indirect effect (E).
>
> Combining two direct effects produces a complex effect (F) –
>
> "The impact of B + the impact of D will lead to F."
>
> Combining a direct effect (B) and an indirect effect (E) also produces a complex effect (G) –
>
> "The impact of B + the impact of E will lead to G."
>
> Note that a mechanism or mechanisms can be added to each of these statements by adding "because of _____."

McCrabb then goes on to say that a **CUMULATIVE EFFECT** is a complex effect that occurs over time. The statement of complex effect used as an example above is now modified to indicate a period of time and cause and therefore, becomes a statement of cumulative effect and mechanism:

> "The impact of B + the impact of D will lead to F over the next five days because of 1, 2 and 3."

> It is important to note that the temporal aspect of an effect applies to each primitive. A direct effect can be "delayed" in the sense that it is not instantaneous just as indirect and cumulative effects are delayed by definition. This is another example of the point made often: *effects are point-of-view dependant*.[132]

McCrabb argues that "**Cascading effects** are direct, indirect, complex or cumulative effects that ripple through a system."[133] This idea presumes that an adversary, when viewed from a system level, is the system of systems that Warden described. If all sub-systems (and sub-sub-systems and so on) are interlinked as per Barlow's NEV model or Tighe's system of inter-linked OODA loops, then an effect created in one subordinate system can create effects in all other systems within the whole.

In addition to clarifying the terminology of EBO, McCrabb also makes another important contribution to an understanding of EBO by reminding us that EBO is an approach to operations, which overlaps with the two more familiar approaches to planning and executing operations. "Taking a 'top down' approach starting from a theater commander and ending at the executing elements, an effects-based approach is synonymous with an objectives-based approach [strategy to task] at the top (assuming the theater commander is concerned with strategic objectives, goals, or aims) and synonymous with a targets-based approach at the bottom."[134] As he stated in a later oral presentation:

> **Target-based approaches** identify the enemy entities or targets and sets out to destroy them. The focus is on the physical effects at the target level only. It has been the traditional—and bloody—approach to warfare for millennia.
>
> **Objectives-based approaches** look at the strategy at one level and turn that strategy (such as the national security level) into objectives at the next lower level (such as the theater or campaign level). The focus here is on objectives to satisfy the higher level strategies. This became a commonly used approach for planning, assessing, and executing warfare at all levels over the past decade in the US Air Force.
>
> With an **effects-based operations approach** one explicitly examines and models the causes between actions and effects. Both physical and behavioral direct and indirect effects. Effects are the main focus. EBO encompasses and supplements both target-based and objectives-based approaches. The goal is to model the enemy as a system and provide dynamic real-time assessment as opposed to the other approaches where no dynamic assessment is made. [135] [Emphasis added.]

This overlap of approaches is graphically represented in Figure 2-2.

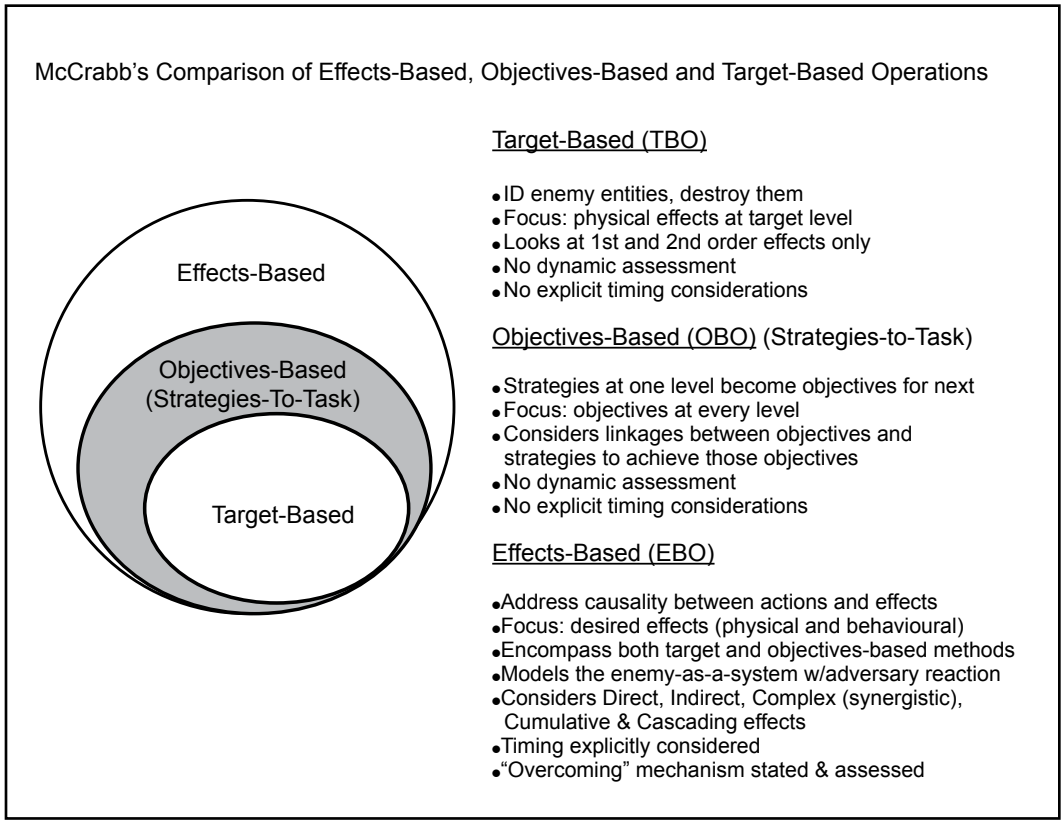

Figure 2-2.[136] McCrabb's Comparison of Effects-Base Objectives-Based and Target Based Operations

As stated earlier in this essay, the US Air Command and Staff College began to teach EBO and an effects-based planning process in the late 1990s. Reflecting McCrabb's observations, this is a top-down, integrated approach that begins and ends with a desired/achieved end state.

As may be seen in Figure 2-3, the entire planning process takes place within the context of the desired end state. First, the strategic objective is determined and from it, the military objective(s). Objective (both strategic and military) determination is accomplished taking the appropriate contextual elements (political, international, socio-cultural, economic, leadership and environment) into account. From there the planning process enters the realm of operational art, where centres of gravity are identified, desired tactical effects are determined, targets identified and matched to assets available for employment to produce a number of courses of action, from which the best would be selected for execution. The selected course of action (COA) would then be turned into a master air attack plan (a detailed plan) and issued as an air tasking order (a formatted order for the detailed execution of the plan). Measures of success are monitored and analyzed during the execution phase to verify that the end-state has been (or is in the process of being) achieved. If it is not achieved, in whole or in part, the new situation becomes the starting point for a repetition of the process.

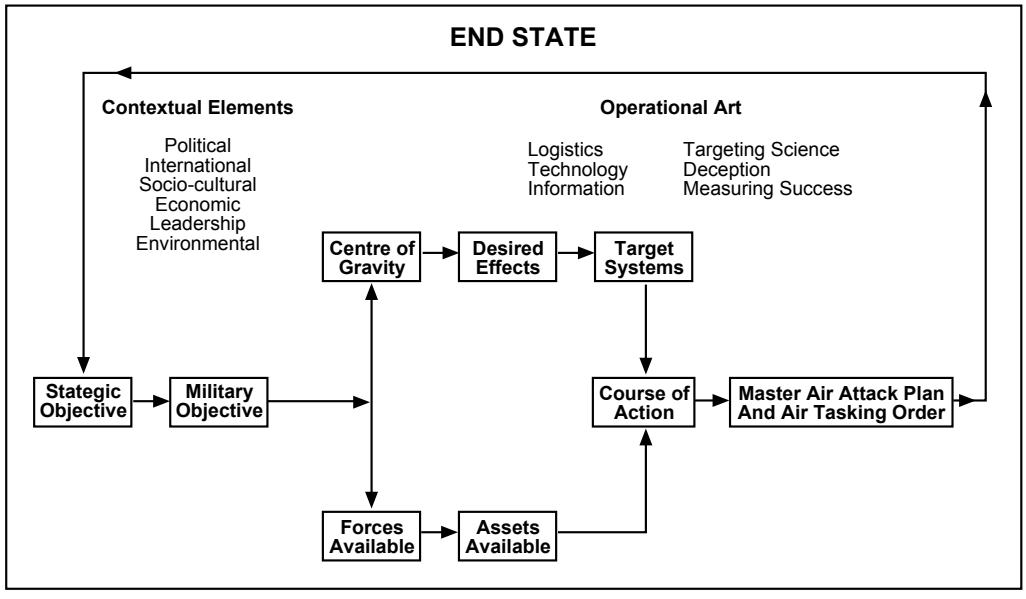

Figure 2-3. An Effects-Based Campaign Planning Model[137]

At this point, the development of the idea of EBO seemed to be complete. The mating of the newly available revolutionary technologies of stealth and precision to the old ideas of air power theory with a few updates in the form of parallel attack seemed to have provided a complete solution for war fighting. From initial rumbles, EBO became a regular subject of discussion in professional journals and attracted academic study. The concept then began to be expressed in air force doctrine publications, and next crept into other service and US joint publications. As part of this process EBO was included in the curriculum of US Air Force professional military education schools. However, as will be shortly demonstrated, development of the EBO concept did not stop there. In fact, almost as soon as this first iteration of EBO hit the street, a second version of EBO was being developed.

Evolution – The Second Iteration of EBO

For many, the melding of stealth, precision and air power theory to create the effects-based concept seemed to be a fundamental change in the way war was to be fought in the future. For many officers in the US Air Force, parallel war, effects-based targeting and the Gulf War victory had finally eliminated the stigma of the Vietnam War and assured air power a place of prominence in the American military pantheon. Effects-based operations was a change in the nature of warfare. However, while change did occur, it was not in the way that some expected.

For nearly all of the twentieth century, war had been waged by ever larger, ever more complex military forces. At the end of the Cold War, Western militaries emerged from a long period of expansion to find themselves without a competitor that was capable of successfully fighting the kind of war that they had prepared for. When Iraq invaded Kuwait and attempted to fight a conventional war with the United States and its allies, there was

no doubt as to who would be the victor. What was surprising to some was the speed and efficiency with which victory was achieved. The scale of the victory made it abundantly clear that no single nation or combination of non-Western nations could ever hope to defeat the United States in a conventional war. For opponents of the West, conventional war had joined nuclear war as an irrational act and a guarantee of self-destruction.

In the post-Gulf War period, the United States, NATO and various other, often ad hoc, coalitions used their military forces on peace enforcement operations such as Somalia, Haiti and the Former Republic of Yugoslavia. These operations presented new and largely unforeseen problems to the soldiers on the ground and their commanders, as the tools, structures and doctrines of conventional war were not necessarily transferable to the "three-block wars"[138] that marked the turn of the twenty-first century.

The experience of the use of air power in the former Republic of Yugoslavia posed a problem similar to the one faced by proponents of conventional war. Attempts to conduct control warfare within a conquest paradigm did not seem to work in the new situations at hand. It was in this environment that the concept of EBO began to shift from operating within a conquest paradigm to a success paradigm with a broader approach applicable in pre- and post-conflict situations, as well as in war.

In many ways, the second iteration of EBO stems from the coercion theories that had been debated since the end of the Second World War. Modern coercion theory descends from deterrence theory that emerged in the early years of the Cold War; in particular, it can trace its roots to Thomas Schelling's ideas concerning the use of coercive diplomacy.[139] Schelling begins his work with two very important observations. The first is that diplomacy and armed force are different means that may be used to achieve a common end. His second observation is that there is a difference between brute force and coercive force (i.e., between unrestrained violence and violence that is controlled to achieve the interests of the state by forcing the enemy to submit to the will of the state). From these principles, Schelling reasons that since the power to hurt is what makes coercive diplomacy possible, then it is the threat of violence (or latent violence) that is important. Therefore the incremental, controlled application of violence with an accompanying threat of much further destruction is the best method to apply force to compel an adversary to submit to the will of the coercing state.

In *Bombing to Win* (and subsequent works) Robert Pape builds on Schelling's work.[140] Pape conducts an analysis of the history of strategic bombing and concludes that it has failed in the past because those who have used it sought to coerce regimes to change their behaviour by punishing its civilian populations. This is done through direct attack against civilians themselves or indirectly through the destruction of infrastructure, economy, food supplies and the like. Instead, he argues that coercion will only work if a denial strategy is used in place of a punishment strategy:

> Denial strategies target the opponent's military ability to achieve its territorial or other political objectives, thereby compelling concessions in order to avoid futile expenditure of further resources. Unlike counter civilian

> strategies, denial strategies make no special effort to cause suffering to the opponent's society, only to deny the opponent hope of achieving the disputed territorial objectives. Thus, denial campaigns focus on the target state's military strategy.[141]

Pape identifies three main methods by which an enemy's military strategy may be defeated (denied): direct attack against the enemy's fielded forces; strategic interdiction, involving either isolating the enemy's fielded forces from their sources of weapons and supplies, or destroying these sources outright; and finally, operational interdiction, a strategy that seeks to disrupt an enemy's combat support functions and hence, his ability to concentrate his forces at decisive points. Pape weighs the positive and negative characteristics of each method and concludes that, while each method can produce favourable results, it is those strategies that can be implemented by theatre air power (namely operational interdiction and direct attack) that are more likely to be successful.[142]

Pape has his critics, but he has made an important contribution to the development of coercive airpower theory in situations that include operations other than war.[143] In essence, he has presented the problem as one involving the complex interaction of a number of variables. The great value of his theory is that it is not necessarily prescriptive, but it establishes a framework for analysis of each situation on its own merits.

In the aftermath of NATO's attempts to use coercive airpower in Bosnia and Kosovo, much effort went into understanding what happened and why. The British and American governments, as well as RAND, all produced reports on the NATO effort.[144] However, the analysis of Daniel Byman, Matthew Waxman and Eric Larson is of most interest to the subject at hand.[145]

Byman, Waxman and Larson see air power as a natural coercive device for several reasons. First, the unique combination of speed and lethality afforded by aerospace forces allows coercing nations to act and react quickly before they are presented with an irreversible *fait accompli*. Moreover, the force wielded by air forces can be, if necessary, both limited and precise, thereby allowing for a controlled escalation of violence. As well, the long range and global reach of air forces (especially the US Air Force) can permit the application of force without having to rely on forward operating bases. Finally, not only can air forces deploy into a theatre of operations quickly, but they can also be withdrawn just as quickly.[146] Therefore, the authors conclude that successful coercion is the result of the complex interaction of three factors - escalation dominance, military denial, and the magnification of third party threats. Each of these will be discussed in turn below.

Escalation dominance is, as the name implies, the ability to adjust one's level of coercive force while at the same time denying one's adversary the same freedom. There are three components to escalation dominance. The first is that the coercing power must have both the ability to increase coercive force as well as the will to do so. For example, it would be pointless to consider a strategy requiring real or threatened escalation of force if one had neither the means nor the will do so. Second, the coercer must have the ability to prevent

the subject of his coercion from escalating. This can be accomplished through offensive action (destruction of the coerced party's capability to escalate), defensive action (mount such an effective defence that the coerced party cannot conduct escalatory attacks), or a combination of both. Third, and finally, the coercer must be able to neutralize his targeted party's counter-coercion activities. For example, the propaganda resulting from unintended casualties due to collateral damage or from making unarmed peacekeepers hostages (as was done in Bosnia) can be used to counter coercive purposes. Accordingly, the coercer must be aware of his potential vulnerabilities and adopt measures to avoid or minimize the likelihood of presenting the targeted party with counter coercion opportunities.[147]

The second factor, military denial, borrows heavily from the work of Robert Pape. With military denial, the intent is to use air power to threaten the targeted party with outright military defeat or at least to prevent him from achieving his military objectives. This aim is accomplished by denying his means to success – his fighting forces. It is critical to recognize that there are some instances where air power may be inappropriate to accomplish this task because there are some irregular fighting forces (such as insurgents) that may be very difficult if not impossible to target with air forces. However, when the targeted party is counting on conventional forces to achieve military objectives, then air power can play a significant denial role.

The final factor is magnification of "other threats to the adversary, such as external military and internal threats."[148] A good example of the application of this factor was during Operation Deliberate Force, when destruction of the Bosnian Serb Army heavy weapons and denial of their theatre mobility altered the local balance of power and made the Bosnian Serbs vulnerable to the Croatian army offensive. The use of air power to magnify internal threats might not involve attack and destruction, but might instead include the use of air transport to deliver food and arms to internal disaffected populations, or it may be used for something as simple as dropping leaflets as part of a psychological operations campaign aimed at undermining the targeted party's moral influence.

At this point, it is worth emphasizing that Byman, Waxman and Larson did not conclude that coercion could only be conducted by air forces, as they stated that, while air power is an attractive coercive tool, it is "like any other instrument of statecraft."[149] Accordingly, while air power can play an important and perhaps even a decisive role in successful coercion, coercion theory cannot justify the independence of air forces. And they also noted that airpower should be applied as part of an overall coordinated strategy that includes diplomacy, and perhaps other forms of military force that are both lethal and non-lethal.

The work on coercion theory is important because it recognizes that the intent of coercive actions is to change behaviour and not to force a military defeat. In fact coercion might not involve the active use of military force at all (although the threat of its use could be a factor), but might involve military capabilities in humanitarian or goodwill operations to "win hearts and minds." Coercion theory accepts a high level of complexity and the need for the close coordination of all instruments of national power to create the desired strategic, or grand-strategic, effects across the entire spectrum of conflict.

Coercion theory is also supported by a growing understanding that, "war, many contingency operations short of war, and even foreign affairs generally occur in a *complex adaptive system* (CAS)," because any system involving humans will be complex and adaptive.[150] Simple systems are linear where a single input will produce a proportional and predictable output. Compound systems are those in which two or more external inputs force a selection of a range of possible and predictable outputs. On the other hand, complex systems react not only to external inputs from a given system, but they also interact within themselves and with all other external systems. Adaptive systems are those that change (either temporarily or permanently) in reaction to stimuli and therefore may react differently in one instance than they do in another.[151] Therefore working with CAS "requires adopting a systems perspective. Behaviours … of CAS depend more on the interactions between agents as they adapt to their environment and one another than the actions of any given agent or set of agents. … [T]he 'whole is greater than the sum of its parts' leads to the concept of emergence or the systemic behaviour not identifiable from studying the behaviour of the parts."[152] Thus, work with CAS re-emphasizes the need to develop an approach that accepts complexity and seeks a "top down" approach from the highest level possible.

Recently, alongside the work on coercion theory, debate within military circles has produced an entirely different view of one of the essential components of the first iteration of EBO – the concept of the centre of gravity.

As used in today's military context, the concept of the centre of gravity originated in the writings of Clausewitz. "The original text of *Vom Kriege* (On War) reveals that Clausewitz used the term COG – expressed primarily as *Schwerpunkt* – more than 50 times, although not all of them refer to the military concept."[153] Since the rediscovery of Clausewitz by Western militaries, and in particular the US military, in the 1950s, most have incorporated the COG concept into their doctrine.[154] However, since doctrinal work in the US has relied almost exclusively on translations of Clausewitz, there is some confusion as to his precise meaning based on differing translations of his work.[155] As a result, the doctrine of individual US services has used differing definitions of COG that suited their own particular needs:

> The US Marine Corps – a relatively small force designed for expeditionary, ship-to-shore operations – prefers to strike at enemy weaknesses. Accordingly, it tends to equate enemy COGs with key vulnerabilities. In contrast, the US Army, which has the role of fighting large-scale battles and winning major wars, sees the enemy COG as a "source of strength." It tends to look for a single COG, normally the principal capability – the opponent's land force – that stands in the way of marching on the enemy's capital. Likewise, charged with the mission of winning maritime wars, the Navy initially had a concept of the COG that resembled the Army's. Navy doctrine defined a COG as "something the enemy must have to continue military operations – a source of his strength, but not necessarily strong or a strength in itself. There can be only one center of gravity."

> In keeping with the views espoused by some of the early air power theorists, such as Billy Mitchell and others at the Air Corps Tactical School at Maxwell Field, Alabama, the US Air Force tends to see COGs as "vital centers" located deep in the enemy's heartland. In fact, John Warden, arguably the most well-known modern air power theorist, has gone so far as to say COGs exist within each of the five component parts (or rings) – leadership, organic essentials, infrastructure, population, and fielded forces – that describe any strategic entity. Warden defines a COG as "that point where the enemy is most vulnerable and the point where an attack will have the best chance of being decisive." His principal argument is that airpower has the unique capability to strike at COGs simultaneously through "parallel" – as opposed to serial – attacks, which can overwhelm and paralyse an opponent and thereby prove decisive. Thus, the theory of parallel attack goes hand in hand with the view that multiple COGs exist. The one tends to reinforce the other. Air Force Doctrine followed suit.[156]

The divergence in definitions of COG posed a problem for universal acceptance of EBO, since, in its first iteration, it was based upon the US Air Force's understanding of a COG. However, the disagreement over whether a COG was a source of strength or of weakness was not the only important difference in interpretation among the US services. Writing from an Army perspective, Milan Vego, in a 2000 article, observed that "a COG is also often confused with the military objective to be accomplished. Experience clearly shows that focussing on the objective without identifying and attacking the enemy's COG will invariably result in unnecessary losses of personnel, materiel and time – even despite overwhelming combat power."[157] While Air Force doctrine agreed that objectives and COGs were different, the Army interpretation of COG tended to take attention away from objectives - the key to EBO - and overly emphasize an adversary's fielded forces.

US joint doctrine attempted to develop an "authoritative consensus" on the concept of COG in 1995, but, according to Echevarria, wound up defining "COGs too broadly and offered no real method for determining them."[158] Recognizing the problem, the joint doctrine writers turned to Joseph Strange's "CG-CC-CR-CV" approach to COGs, which was described by Echevarria as follows:

> Strange correctly showed that the Joint (and individual service) definitions of COGs were flawed and lacked precision. They tended to equate COGs with vulnerabilities or strengths and paid too little attention to the psychological centers of power. To rectify that, he offered a 'fix' that redefined COGs as "dynamic agents of action or influence" or, more specifically, "moral, political and physical entities which possess certain characteristics and capabilities, or benefit from a given location/terrain." Accordingly, his CG-CC-CR-CV approach defined a COG, such as a key combat force, by those critical capabilities (CCs) that enabled it to function as a COG. Those CCs – the ability to shoot, move and communicate – in turn, have critical requirements (CRs) – such as open lines of communication and supply

> – that enable the CCs to keep functioning. A CR that is inadequately protected … constitutes a critical vulnerability (CV). If attacked and neutralized, these CVs would contribute to defeating the enemy's COG.[159]

The resultant US joint doctrine mixed the US Army's preference to engage the enemy's fighting force with Strange's model.[160] However, different, more EBO-friendly definitions of a COG have since challenged the US joint doctrine definition of a COG.

However, Echevarria contends that Clausewitz's idea of a COG was not a capabilities-based concept as Strange suggests, but was, in fact, an effects-based idea. While the two approaches to thinking about a COG are linked, they are decidedly different, Echevarria argues:

> Attacking specific capabilities produces certain effects. Achieving certain effects often requires attacking certain capabilities. Indeed, one could say that these approaches represent the proverbial two sides of the same coin. In the capabilities-based approach, the first step is to identify the key enemy strength that could prevent us from achieving our objective. In the effects-based approach, the first step is to identify the effect we want to achieve and then determine what actions we should take to achieve it. Frequently those actions might go well beyond merely neutralizing or destroying specific capabilities. In a manner of speaking, the capabilities-based approach seeks a negative aim, destruction of a certain capability. The effects-based approach, on the other hand, pursues a positive aim because it seeks to create a definite effect.[161]

In other words, unlike the traditional army view of COG voiced by Vega that the focus of attention should be on the capabilities of the adversary, Echevarria's argument swings attention back to the objective and effects. That is not to say that objective and effect are the same. In fact, they are not, because the effect is deduced from the objective and not from the COG. [162] This distinction is quite important when one considers that sometimes COGs may not exist at all and, when they do, they may be difficult to determine and/or may be irrelevant to the objective. Moreover, this focus on the objective, instead of an adversary's capability, shifts the emphasis of analysis from destruction to creation of a condition or an effect. And it was this shift that helped create the intellectual pre-conditions for a paradigm shift from one of conquest to one of success.

It was against the backdrop of the development of these ideas about COG and the changing strategic realities of the post-Gulf War world (accelerated by the 11 September 2001 terrorist attacks on the US) that the second version of EBO development began to emerge at almost the same time as the first version was gaining popular attention.

In June 2001, the Institute for Defense Analysis (IDA) released its *New Perspectives on Effects-Based Operations,* a significant US DoD-sponsored study of the subject. The authors of the report recognized that America was facing a new strategic context, and

acquiring new capabilities that necessitated a change in thinking about military operations. They recognized that the international challenges facing the US in the future would be asymmetric in nature, where neither America's national survival nor its vital interests would be directly at stake, but that survival or vital interests would be an issue for the other involved parties. Accordingly, they concluded that the US's traditional focus on developing and employing strong offensive capabilities in response to traditional conventional threats would no longer always be militarily appropriate or politically acceptable. Thus, they concluded that emphasis would need to be broadened from war winning to include "conflict prevention and producing the desired post-conflict environment (winning the peace as well as the war)."[163] Consequently, they advocated a version of EBO that was aimed at this broader spectrum of uses.

On the surface, the concept that they visualized was not much different from that developed in the first version of EBO development. The subtle distinction between the two can, however, be understood with an examination of the following passage from the study report:

> Effects-based thinking emphasizes:
>
> 1. the importance of linking all actions (political, diplomatic, economic, and military) to operational and strategic outcomes;
>
> 2. continuous assessment of the effect and adaptation, as needed, of plans and actions to the reality of conflict;
>
> 3. thinking about the implications of actions and operations in terms of their second-, third-, and n^{th}-order effects; and
>
> 4. thinking about the implications and consequences of effects over time.[164]

In the first point, the inclusion of all elements of national power (diplomatic, economic and military) seems similar to the thinking in the first EBO version. However, with the inclusion of conflict prevention and long-term, post-conflict end states, the importance of the non-military instruments of national power increase in prominence, arguably by a significant margin. Coming from an institution (DoD) that at the time saw its purpose as fighting and winning the nation's wars, this deliberate inclusion in EBO theory of other instruments of national power on a co-equal basis with military power was a significant change.[165] Moreover, since the aim in pre-conflict situations is usually not conquest but behaviour change, the application of coercion strategies would arguably be more effective in pre-conflict situations. Accordingly, the work in coercion theory that points toward the coordinated application of all forms of national power contributes to a broader interpretation of this first point.

The second point also illustrates a subtle change in emphasis. The first version of EBO recognizes that without a continuous process to find out "*what has happened, what is happening and what needs to be done*," "and a willingness and ability to adapt, operations

[would] remain based on pre-conflict rules and assumptions."[166] However, in an expanded concept of EBO, the level of complexity that this assessment process must cope with is orders of magnitude greater than it would be if it were just part of conducting the relatively simple task of monitoring the progress and results of a battle. Instead of conducting assessment by using familiar metrics such as sortie rates, kill ratios, body counts, tons of ordnance delivered, etc, the report's authors noted that it will become necessary to find a means to monitor the linkage between actions and outcomes. Therefore, in an expanded EBO concept the assessment would not be focussed on the easily measured and more readily understood physical domain, but would be aimed at the information and cognitive domains.[167]

The third and fourth points could also be said to hold true in the first version of EBO. However, if one thinks of pre- and post-conflict instead of conflict itself, then the temporal perspective and scope of possible actions and effects changes. Pre- and post-conflict effects may take a very long time to materialize and will probably tend to be cumulative or cascading in nature rather than complex, direct effects. Again, the subtle change is not the task *per se,* but its complexity.

To be sure, the IDA report recognized that the ability to conduct accurate and timely assessments of complex adaptive systems has been to date, and will continue to be for the foreseeable future, the limiting factor in EBO. However, the report also concluded (perhaps naively) that emerging intelligence, surveillance and reconnaissance technologies, networks and networking would be able to meet this challenge sooner rather than later.

Also in 2001, Paul Davis echoed the IDA report's views on the inadequacy of current analytical tools for EBO and therefore the importance of developing new ones. He indicated that much classified development work was in progress, and said that this developmental work should be guided by five broad principles. First, analytical tools supporting defence planning should focus on mission system capability to determine the range of circumstances in which a mission system would be able to accomplish missions and to what level of confidence. Second, the tools should fully consider the scope and magnitude of uncertainty and deal explicitly with probability and chance using low-resolution exploratory analysis and a family of models and games approach. Third, development effort should be placed in qualitative modelling including cognitive modelling of decision makers, key players and influential groups. Fourth, the tools should exploit a new base of empirical information – produced through historical analysis and a combination of gaming, realistic simulation and experimentation – instead of "best estimate" databases that tend to be misleading. Finally, modelling should be based around C2 and decision-making in the complex adaptive system rather than around mass and physical characteristics of forces. Davis concluded by stating that the necessary improvements are feasible but further in-depth work is still required.[168]

In 2002, Edward Smith published a lengthy work on the subject of EBO. His view of EBO was similar to that expressed in the IDA report. He also recognized the problems posed by the analytical challenges and by the need for unprecedented levels of

situational awareness. In his view, the solution for problems with analytical tools for EBO lies in enabling EBO through the exploitation of network-centric warfare (NCW), which he defined as "the concept of linking all aspects of warfighting into a shared situation awareness and shared understanding of command intent so as to achieve unity and synchronicity of effects that multiplies the power of military forces."[169]

Smith pointed out that NCW operations are not new and used the US Navy's 1987 operation off Libya as a historical example of how the concept has already been employed.[170] In the past, however, Smith contended that network centric operations were configured to provide situational awareness for combat operations and not for EBO, which is focussed on objectives rather than means and on human behaviour and decision-making rather than on things. Thus, he argues that it is possible to mate EBO concepts with existing NCW technologies to conduct EBO now. However, he also points out that the technologies supporting NCW, namely sensor, information and weapons technologies, are in the midst of revolutionary change and, accordingly, the increasing power of NCW will make EBO more and more feasible.[171]

In shifting from traditional NCW to EBO, Smith tells us that the combat situational awareness presently available in network centric systems, where all sensors, shooters and decision makers have the same tactical "picture" and situational awareness, must be expanded to produce what he terms "effects-based, shared situational awareness." This capability would provide two major additions to the tactical picture, according to Smith:

1. First, in effects-based operations we must deal with human beings and their responses to the stimuli presented by our actions. That means that our awareness must somehow integrate large numbers of imprecise, often subjective data and information containing complex variables into a picture that includes all of the elements of the tactical and operational picture….

2. Second, because many of the inputs needed to fashion an effects-based awareness are imprecise, subjective, and meaningless without a context, we must also create and maintain a knowledge base to provide that context.

The knowledge base to which Smith refers consists of three major categories. The first is knowledge of the adversary. This knowledge is much more than statistical databases of inventories, locations, and so forth that are used today. Instead, this is knowledge of how the adversary will perceive actions taken, orient them into their system of heuristics and biases and formulate a response (essentially understanding their OODA process). This subjective knowledge will best come from sound "local knowledge" provided by well-informed regional analysts, local commanders on the ground, and the like. The second category is knowledge of self. This includes the same understanding of the protagonist's OODA processes and also the protagonist's objectives and intent. As Smith points out, in the interagency and often multi-national environment where EBO will be undertaken, this knowledge of self will need to be constantly updated because objectives and intent frequently evolve over time in reaction to stimuli. Finally, knowledge of the situation provides the ability to know when something has changed and how that change might produce cascading physical and psychological effects

in the targeted opponent and other players in the region. Here again expert advice will be the key to developing this knowledge.

Thus, by combining the current NCW tactical pictures with expert advice into an effects-based way of thinking and planning, EBO-based activities are currently possible to a degree, Smith argues. However, he points out that the weakest area of the EBO process is in providing feedback – particularly feedback on the status of behavioural change – an assessment in common with the IDA analysis. Nevertheless, Smith contends that finding practical solutions to problems with EBO will not be insurmountable and, when solved, NCW will further facilitate EBO by increasing the number of options available to decision makers. These solutions will increase access to significant amounts of knowledge rather than information, thus permitting coordinated actions focussed on the creation of the right effect at the right time.

The points made by the IDA report, by Davis and by Smith are echoed in other sources. Most of them agree that the main challenge is to develop the analytical tools to enable EBO. Some take the position that it is possible to do so,[172] while others do not.[173]

In examining the organizational aspects of EBO, Charles Miller recognized that, to properly employ all forms of national power in an EBO concept, unprecedented levels of interagency coordination would be required. In order to implement this coordination, he advocated significant organizational changes in the US defence and security system. At the national level, he called for the creation of a Secretary-General for National Security Affairs that would have the funds and the mandate to orchestrate interagency coordination at the executive level of US government. He also argued that "military/civil commands, departments, agencies, and foreign bureaus should be regionally aligned as similarly as possible to simplify regional coordination and planning problems and to maximize efficiency in the execution of interagency crisis operations." [174] At the theatre level, he suggested that focussed interagency planning, coordination and execution cells should be established at each regional combatant command to help ensure that the military effort is planned and executed in coordination with the overall national effort. He also observed that, to achieve true interagency coordination, all players would need to follow a common planning process and, accordingly, he advocated that the US military's Joint Planning and Execution System (JOPES) planning process (similar to the Canadian Forces operational planning process or CFOPP) should be adopted by the "State, Treasury, Justice, and other US government departments, agencies and bureaus."[175]

The subject of a common planning process has also been discussed by Edward Mann and others in *Dominant Effects: Effects-Based Joint Operations*.[176] They also recognized that any military action would require close interagency coordination at the national level; therefore, they proposed linking the military JOPES to a strategic planning process as shown in Figure 2-4. In this model, the strategic cycle begins and ends with continuous research concerning the strategic environment, which is followed by the development of political goals, effects and desired outcomes. Next, an overall national strategy is determined and then each applicable government agency is given its tasks. In this example, the tasks assigned

to the military are then taken and analysed using its own specific planning process. However, if Miller's logic is extended to this model, the military planning process could be used by any government agency and, ideally, all would use roughly the same planning process to analyse their tasks. Once each agency has completed their first cycle of analysis, they then feed back into the central strategic ring, for the re-evaluation and integration of the various plans. The goal is that, with multiple repetitions, the plans should become increasingly coordinated and remain absolutely focussed on high-level effects and objectives.

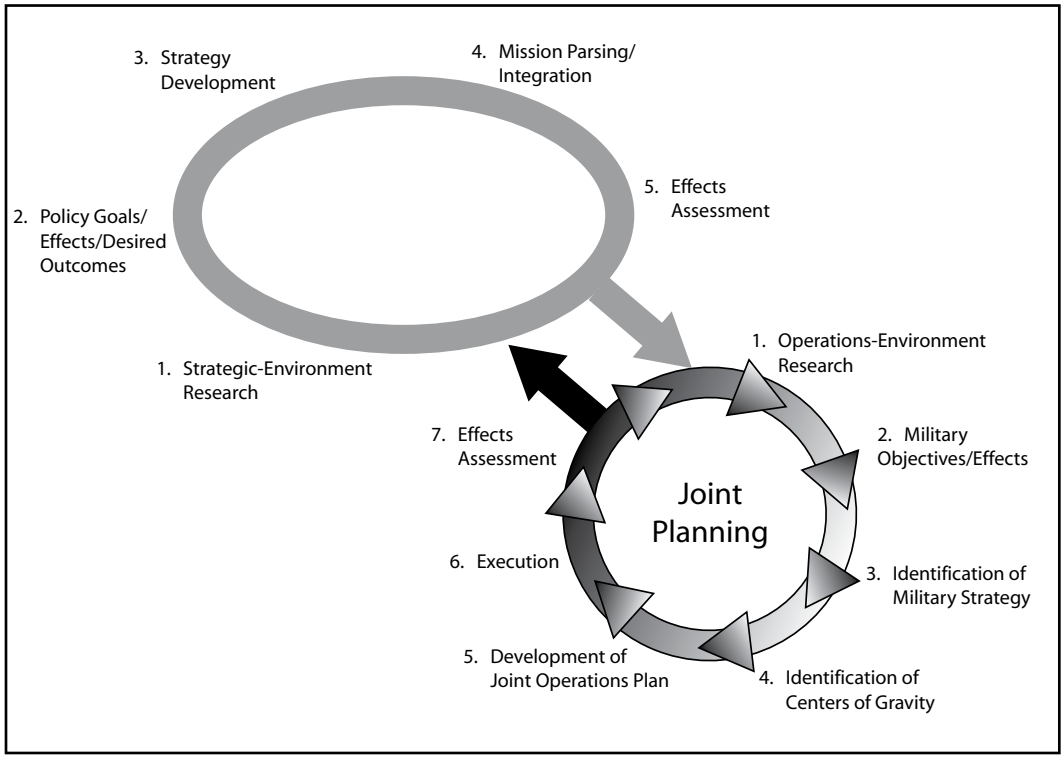

Figure 2-4. Mann's Idealized Functional-Planning Process[177]

Almost all of the ideas presented above were, to varying degrees, incorporated into US joint doctrine publications. The first significant document to incorporate them was the final draft of US Joint Forces Command's 2001 white paper on rapid decisive operations.[178] This document presented effects-based concepts as an enabler of RDO and recognized the need for knowledge of self, adversary and environment, as well as network-centric tools such as operational net assessment (ONA), common relevant operational pictures (CROP) and joint intelligence, surveillance and reconnaissance (ISR) systems to achieve RDO's effects-based goals.

The Joint Forces Command RDO white paper also described how effects-based decisive operations could only be accomplished through close coordination of the various instruments of national power enabled by the following conditions:

1. A **coherent interagency planning mechanism** under the oversight of the National Security Council. Supported by appropriate agencies, this planning process will produce a broad range of options to apply DIME [Diplomatic, Informational, Military, and Economic] instruments of national power.

2. A **secure and fluid collaborative information environment** that integrates the strategic and regional/operational levels for planning, execution, and transition operations. Regional and functional CINCs [Commanders-in-Chief - now called Combatant Commanders] will participate in the development of political-military plans for crisis response. Information will flow from the operational level as readily as it flows to it. This process must be supported by appropriate collaborative planning tools.

3. A **comprehensive, operational net assessment for selected adversaries**. With these ONAs, we will generate a wide range of feasible and innovative, ways and means to resolve a crisis.

4. A **virtual or actual interagency staff element** to collaborate with agencies at the strategic and regional/operational levels assigned to each regional CINC. Non-military agencies will collaborate with the warfighter to develop plans to produce desired effects.[179]

Moreover, the white paper also proposes coordinating all effects within a theatre through the use of an effects tasking order (ETO), which specifies for all those US and coalition actors in the theatre (military or otherwise) the specific effects desired by the theatre commander, including who will create the effects and at what time. The all-encompassing interagency nature of a document such as an ETO is supposed to ensure that all players are aware what the others are doing and contribute to a common understanding of the commander's intent.

With the publication in 2004 of the US Joint Forces Command, Joint Warfighting Center's pamphlet, *Operational Implications of Effects-Based Operations*, it became apparent that EBO has moved out of the shadow of RDO and was being examined in the joint area as a stand-alone construct. The description of EBO in the pamphlet shows that the concepts from the first version of EBO development had been supplemented with concepts from the second version:

> Effects-based operations seek to promote synchronized, overlapping, near simultaneously executed actions conducted by US forces in joint operations closely integrated with multinational and interagency partners to achieve national and theatre objectives.[180]

In this statement, the overlapping and near simultaneity of the operations recall the parallel war and strategic shock provided in the first version of EBO, and the inclusion of theatre objectives is also a hallmark of the first version. However, the inclusion of national objectives, interagency partnering and synchronicity all point to the expansion of the original EBO concept into the second version. The new definition of EBO also demonstrated the broadened application of the concept:

> Operations that are planned, executed, assessed, and adapted based on a holistic understanding of the operational environment in order to influence or change system behavior or capabilities using the integrated application of selected instruments of power to achieve directed policy aims.[181]

From this definition it is clear that EBO is no longer limited to warfighting scenarios and is aimed instead at altering the behaviour of some system. It is important to note here that neither the word "enemy" nor "nation" is used in the definition. Thus, the door is open to use EBO to influence adversaries, neutral parties or allies, whether they are nations, non-governmental organizations or trans-national groups. Further, it is clear that all or only some instruments of national power could be used as required to achieve the desired political objectives and effects.[182]

The major components of EBO are described in the pamphlet as effects-based planning, effects-based execution and effects-based assessment. All reside within a collaborative information environment (CIE) and are linked by adaptation and ONA. The collaborative information environment is the network-centric environment, discussed by Smith (above), since it includes networks, knowledge management, decision support capabilities and the like. ONA is an operational level process and product that is used to conduct top-down analysis of a Political, Military, Economic, Social, Infrastructure, and Information (PMESII) system. The key to this analysis is the location and understanding of the linkages and nodes, which can be behavioural, physical or functional, in the targeted system of systems.

The effects-based planning methodology described in the joint pamphlet is designed to integrate the use of all instruments of power in time, space and purpose in order to create the desired effects, which will in turn bring about the attainment of objectives. Working from the objectives, EBO planners determine what effects will produce the directed objectives and then use ONA tools to determine what actions taken on which nodes are likely to produce these effects. These are then coupled with resources or forces to complete the effects-nodes-actions-resources (E-N-A-R) linkages. Once these linkages are understood, then various courses of action can be considered and tested before one is selected for execution.

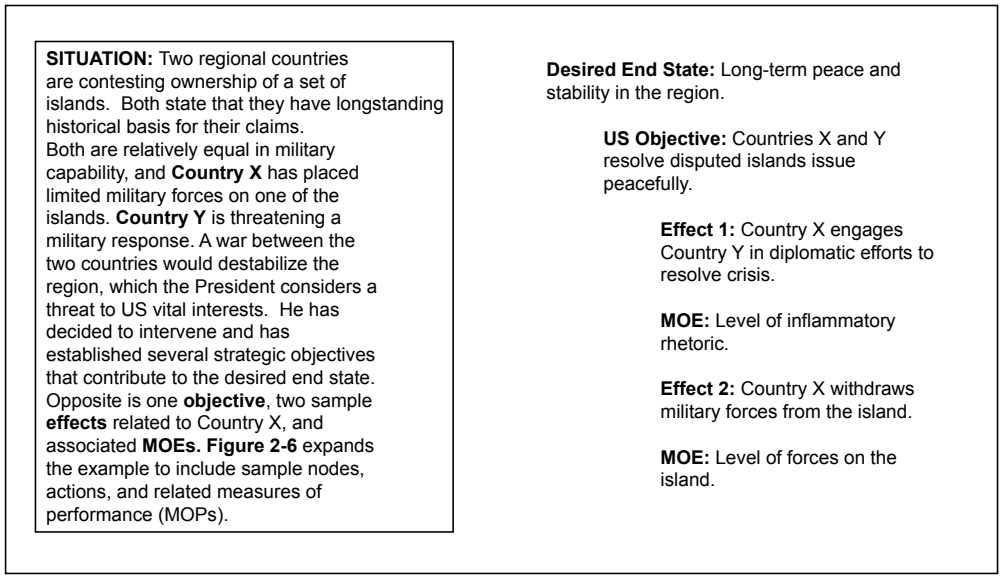

Figure 2-5. EBO Planning - Objectives and Effects[183]

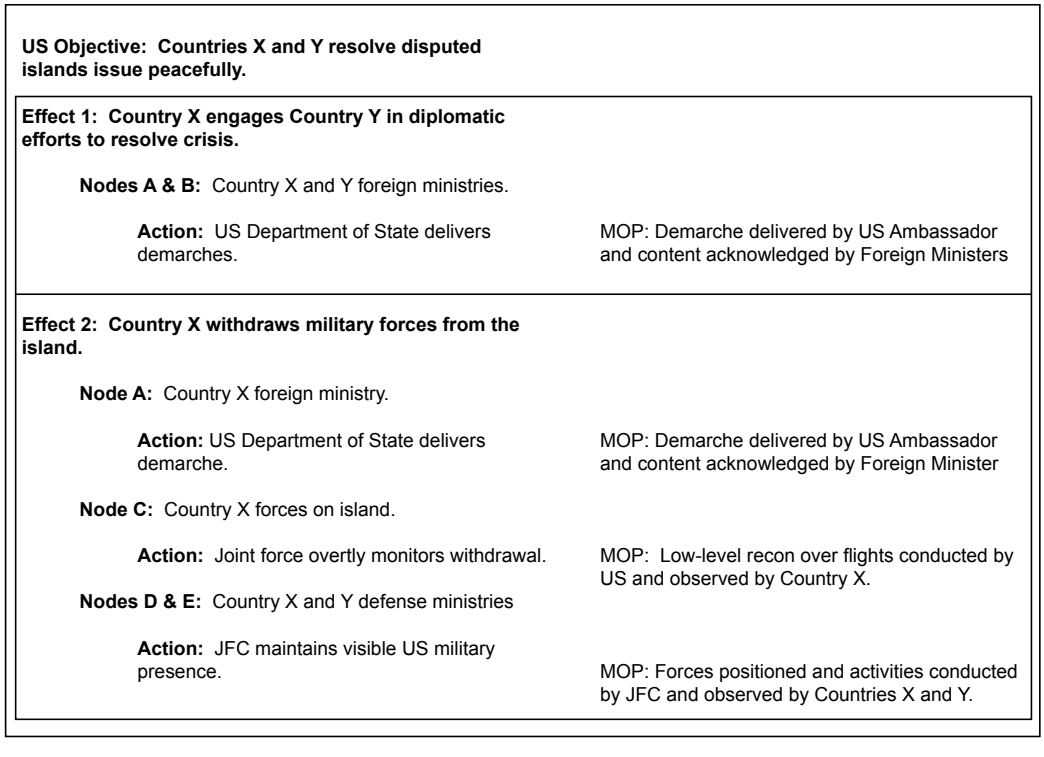

Figure 2-6. Nodes, Actions and MOPs[184]

The expansion of EBO to include pre-and post conflict situations is abundantly clear in the simple planning example given in the pamphlet. The figures from this planning example (see Figures 2-5 and 2-6 below) are shown to illustrate the use of EBO in a conflict avoidance situation where conquest does not produce success. Indeed, it is a situation where the use of military force to achieve overall success would be construed as a partial failure. (Note that in the Figures MOE is measure of effectiveness and MOP is measure of performance.)

In this rather simple example beginning at Figure 2-5, planning begins from the top down. First the desired end-state is identified and the national objective is deduced. After analysis, two effects are identified (in this example) that will fulfil the objective. Next, at Figure 2-6, nodes are identified and again, after analysis, actions that can work on or through that node are identified. While this example has not gone so far as to identify resources, it does identify measures of performance that hint at what the resource allocations would be. Again, this is a very simple example but its importance here is to illustrate that nothing in the example is about parallel war, strategic shock or precision weaponry as would be expected in an EBO version-one scenario, because this is an example of an EBO version-two scenario.

Little is said in the pamphlet about effects-based execution other than that it is normal military execution coordinated with the other elements of national power. However, since the document calls for the establishment of a Joint Interagency Coordination Group at the joint force commander's (JFC) headquarters, it would appear that this entity would be expected to facilitate or even conduct this coordination during the execution and planning phases. Effects-based assessment receives little attention in the pamphlet, considering the depth of discussion in the literature. However, this is understandable since this is a concept paper that assumes that the technical challenges can be overcome.

The pamphlet acknowledges that there are many challenges yet to be overcome to make this second version of EBO workable. In fact, the pamphlet recognizes that this version of EBO may never be workable as it is currently envisioned. Nevertheless, the pamphlet concludes that, "as EBO matures, the joint community can expect significant refinements to the concept. This maturation is likely to transpire over a number of years. But no matter the scope or rapidity of these developments, EBO will likely be judged as an important stimulus to operational art."[185]

As Plato sagely stated, "necessity is the mother of invention."[186] In the aftermath of the Gulf War, it appeared that war had fundamentally changed from a pattern of increasingly total war to one of asymmetric war waged over a spectrum of conflict that ranged from peace to full-scale war. The first iteration of EBO, which was based on an assumption of traditional modes of armed conflict and which operated with the paradigm of military conquest, had only limited application in this new environment. Accordingly, some analysts began to conceive of a new twist to EBO that would make it applicable in a much broader range of

situations where conquest was not the only means to achieve success.

This shift in thinking was aided by the body of work that had been built around coercion theory, which held that action short of armed conflict could produce strategic results. Coercion theory also introduced, among other things, an appreciation for the complexity of the new problems, the multifaceted interplay of many variables, the need for careful analysis of each situation on its own merits, and the acceptance that all instruments of national power were relevant to finding desired solutions. Moreover, re-examination of the centre of gravity concept within military circles permitted a change in focus from destruction as an end to attainment of objectives, using a variety of means, as an end.

Much has been written on this more widely focussed, second version of EBO development. The idea has caught hold and appears to have surpassed the original version of EBO, as US joint publications are currently reflecting the conduct of EBO within a broader paradigm of success rather than conflict. However, much work remains to be done to create the necessary analytical and situational awareness tools to make the second version of EBO truly practical.

Conclusion

The purpose of this essay was to contribute to the current debate over whether effects-based operations is or is not a revolution in military affairs. The question is complicated by the fact that there are two versions of EBO, one that seeks success in armed conflict and one that seeks success in a much broader application.

What we now know as EBO began with a very old notion that shaped the development of the US Air Force, the organization from which EBO suddenly seemed to spring in the 1990s. The central idea behind EBO at that time was that there was a better, cheaper and—in the long run—a more humane way of winning than to wage the total wars that characterized much of the twentieth century. To many, the aeroplane offered the means to achieve this dream.

Germany and Great Britain both developed the idea of strategic bombing during the First World War as a means to sap the will of their adversaries and to force them out of the fight by striking at their strategic heart. The idea of attacking certain key targets by air was passed to the US through Lieutenant-Colonel Edgar Gorrell of the US Air Service while he was in France. His writings then inspired the members of the Air Corps Tactical School in the inter-war years, who then developed an airpower theory based on attacking key nodal targets within the industrial web of the enemy nation. The theory that they developed became the raison-d'etre of the Army Air Corps in its struggle for independence from its parent service, and, thus this idea was deeply ingrained in its members as an enduring truth. Indeed, the concept was so deeply ingrained in US Air Force culture that it survived the

experiences of the Second World War, which provided inconclusive data to support existing air power theory, and the Korean and Vietnam wars, which appeared, in some ways, to contradict existing air power theory.

The stinging – and for many, the unnecessary – American defeat in Vietnam provided fertile conditions for the resurrection of the idea that airpower could strike at the strategic heart of an enemy, sap its will and force its capitulation. An update of this idea by Colonel John Warden and the addition of manoeuvre warfare-like ideas such as Colonel John Boyd's OODA loop, produced a revised version of the original concepts of strategic bombing using terms such as "parallel war" and "strategic paralysis." Up until the 1990s, however, the means to practically implement these concepts did not exist.

In the Persian Gulf War, or first Gulf War, these concepts were mated with new technology in the form of stealth and precision weaponry with promising results. In the aftermath of that war, General David Deptula introduced the term "effects-based operations" and declared that EBO was a fundamental change in the nature of war.

Was this a revolutionary change? Viewed from a short-term perspective, it was not. It could be seen as the continued evolution of an idea that had predated the introduction of powered flight. However, viewed from a historical perspective, the first iteration of EBO did seem to meet the requirements of an RMA. It could be argued that the technological innovations developed in the first century of flight had finally reached the point, in the first Gulf War, where they could be successfully applied to the airpower theory that had emerged in the First World War and that, over the course of the century, these innovations had, in fact, fundamentally altered the manner in which wars were fought. Accordingly, whether or not this first version of EBO is revolutionary or evolutionary is a matter of perspective.

As the twenty-first century dawned, the US and other powers were faced with a new strategic reality where their familiar pattern of conflict resolution by total war was no longer operative. Success was no longer necessarily achieved by military conquest and, since EBO as it was originally conceived was about military victory, it seemed to be a less useful and revolutionary tool than it first appeared to be. This failing of EBO gave rise to the second version of EBO development, which is intended to broaden the application of EBO into areas other than armed conflict between nations.

Does this second version of EBO qualify as an RMA? The answer appears to be "no" because this new version of EBO evolved from the original thinking that shaped the development of airpower theory and has been supplemented by other ideas to create a new way of thinking about how to achieve national objectives in peace and in war. It is, to paraphrase Clausewitz, a continuation of policy by other means rather than just by means of war. However, the second iteration of EBO still awaits the development of the practical

enabling technologies and tools such as those promised by the proponents of network-centric warfare. Much as the first version of EBO was not practical until stealth and precision weapon technologies had matured sufficiently, the second version of EBO will not be practical until it is mated with the new technologies currently under development.

Notes

1. This chapter was originally written by Colonel Cottingham as a directed study paper for the War Studies program at Royal Military College of Canada in July 2004.

2. Christopher Bellamy, "Military Revolution," in Richard Holmes, ed., *The Oxford Companion to Military History* (Oxford: Oxford University Press, 2001), 587.

3. See Gunther E. Rothenberg, "Maurice of Nassau, Gustavus Adolphus, Raimondo Montecuccoli, and the 'Military Revolution' of the Seventeenth Century," in Peter Paret, ed., *Makers of Modern Strategy* (Princeton, NJ: Princeton University Press, 1986), 32-63, and Martin van Creveld, "Technology and War I: To 1945," in Charles Townsend, ed., *The Oxford History of Modern War* (Oxford: Oxford University Press, 2000).

4. Alvin Toffler, *The Third Wave* (New York: Bantam Books,1989), and Alvin and Heidi Toffler, *War and Anti-War: Making Sense of Today's Global Chaos* (New York: Warner Books,1995).

5. Richard O. Hundley, *Past Revolutions, Future Transformations: What Can the History of Revolutions in Military Affairs Tell Us About Transforming the U.S. Military?* (Santa Monica, CA: RAND, 1999), 7. Available at http://www.rand.org/cgi-bin/Abstracts/ordi/getabbydoc.pl?doc=MR-1029&hilite=1&qs=rma. Accessed 24 Jul 2007.

6. Ibid., 75.

7. Jeffery R. Barnett, *Future War: An Assessment of Aerospace Campaigns in 2010* (Maxwell Air Force Base, AL: Air University Press, January 1996), 13. Emphasis in original.

8. Andrew Marshall, Director of the Office of Net Assessments in the Office of the Secretary of Defense as quoted in Lothar Ibrügger, *The Revolution in Military Affairs* (NATO Parliamentary Assembly Report, Science and Technology Committee, Report AR299STC-E, November 1998), np. Available at http://www.iwar.org.uk/rma/resources/nato/ar299stc-e.html. Accessed 24 Jul 2007.

9. For an indication of the transformation activities being examined or implemented, see the US DoD Transformation website at http://www.defenselink.mil/transformation/ . Accessed 24 Jul 2007.

10. Elinor C. Sloan, *Allied Approaches to the Revolution in Military Affairs: Britain, France, Germany and Australia* (Ottawa: Department of National Defence, Directorate of Strategic Analysis, Policy Planning Division, Policy Group Project Report No. 99.03, February 1999).

11. For a detailed outline of the ACSC understanding of EBO and its application at the time, see Robert D. Pollock, "Roads Not Taken: Theoretical Approaches to Operation Deliberate Force," in Robert C. Owen, ed., *Deliberate Force: A Case Study in Effective Air Campaigning – Final Report of the Air University Balkans Air Campaign Study* (Maxwell Air Force Base, AL: Air University Press, January 2000), 440-5.

12. Maris "Buster" McCrabb, "Explaining 'Effects': A Theory for an Effects-based Approach to Planning, Executing and Assessing Operations," Version 2.0, dated 7 August 2001, 3. Available at http://www.dtic.mil/jointvision/ideas_concepts/ebo.doc. Accessed 24 Jul 2007.

13. A good survey of the published literature may be found in Z. Zobaggy, *Literature Survey on Effects-Based Operations, A PhD Study on Measuring Military Effects and Effectiveness* (The Hague: Netherlands Organization for Applied Scientific Research (TNO) 2003). Available at http://www.iwar.org.uk/rma/resources/ebo/Literature_survey_on_Effects-Based_Operations.pdf. Accessed 24 Jul 2007.

14. See US Air Force, *The US Air Force Transformation Flight Plan 2004* (Washington, DC: HQ USAF /XPXC Future Concepts and Transformation Division, 2004), US Army, *2004 Army Transformation Roadmap* (Washington, DC: Office of the Deputy Chief of Staff, US Army Operations, Army Transformation Office, July 2004), and US Navy, *Naval Transformation Roadmap 2003: Assured Access & Power Projection … From the Sea* (Washington, DC: Secretary of the Navy, 2003). All are available at http://www.iwar.org.uk/rma/. Accessed 24 Jul 2007.

15. See US Air Force, *Strategic Attack*, Air Force Doctrine Document 2-1.2 dated 30 September 2003. Available at http://www.dtic.mil/doctrine/jel/service_pubs/afdd2_1_2.pdf. Accessed 24 Jul 2007. See also US Joint Staff, *Joint Doctrine for Targeting*, Joint Publication 3-60, dated 17 January 2002. Available at www.dtic.mil/doctrine/jel/new_pubs/jp3_60.pdf. Accessed 24 Jul 2007.

16. For references to the UK doctrinal publications on the subject, see R.M. Poole, "Washing the Windows? The Utility of Air Power in Nation Building," Advanced Military Studies Course Paper, Canadian Forces College, dated October 2004. Available at http://wps.cfc.dnd.ca/papers/amsc/amsc7/poole.htm. Accessed 24 Jul 2007. See also United Kingdom, *British Defence Doctrine* (Second Edition), Joint Warfare Publication 0-01 (Shrivenham, Swindon: Joint Doctrine and Concepts Centre, October 2001).

17. Donald Lowe and Simon Ng, *Effects-Based Operations: Language, Meaning and the Effects-Based Approach* (Canberra, Australia: Defence Science and Technology Organization, Department of Defence, 2004).

18. Craig King, "Effects Based Operations: Buzzword or Blueprint?" Advanced Military Studies Course Paper, Canadian Forces College, dated October 2004. Available at http://wps.cfc.dnd.ca/papers/amsc7/king.htm. Accessed 24 Jul 2007.

19. Paul K. Davis, *Effects Based Operations (EBO): A Grand Challenge for the Analytical Community* (Santa Monica, CA: RAND, 2001), 1. Available at http://www.rand.org/pubs/monograph_reports/MR1029/. Accessed 24 Jul 2007.

20. United States, *Military Transformation: A Strategic Approach* (Washington, DC: Director, Force Transformation, Office of the Secretary of Defense, Fall 2003), 36.

21. Edward Mann, Gary Endersby and Tob Searle, "Dominant Effects: Effects-Based Joint Operations," *Aerospace Power Journal* 15, no. 3 (Fall 2001), np (online version). Available: http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/fal01/vorfal01.html. Accessed 24 Jul 2007.

22. Paul K. Davis, *Effects Based Operations*, 2.

23. Carl H. Builder, *The Icarus Syndrome: The Role of Air Power Theory in the Evolution and Fate of the US Air Force* (New Brunswick, NJ: Transaction Publishers, 2003), 207.

24. Robin Higham, *Air Power: A Concise History* (Manhattan, KS: Sunflower University Press, 1988), 9-11.

25. The idea of aerial warfare predates the introduction of aircraft by a wide margin. See, for example, David Wragg, *The Offensive Weapon: The Strategy of Bombing* (London: Robert Hale, 1986), 18, J.W.R. Taylor, *A History of Aerial Warfare* (London: Hamlyn, 1974), 7, and Manfred Griehl and Joachim Dressel, *Zeppelin!: The German Airship Story* (London: Arms & Armour Press, 1990), chapter 1.

26. Tami Davis Biddle, "Air Power," in Andreopoulos Howard and Shulman, eds. *The Laws of War: Constraints on Warfare in the Western World* (London: Yale University Press, 1994), 141-2.

27. W. Hays Parks, "Air War and the Law of War," *The Air Force Law Review* 32, no. 1 (1990), 1-226. The quote is from the presentation of Captain Crozier, the US representative, to the plenary session of Convention I from Parks, "Air War and the Law of War," 12.

28. Alan Stephens, *In Search of the Knock-Out Blow: The Development of Air Power Doctrine 1911-1945* (Canberra, Australia: RAAF Air Power Studies Centre (APSC), APSC Paper No. 61, 1998).

29. Alan Stephens, "The True Believers: Airpower Between the Wars," Alan Stephens, ed., *The War in the Air: 1914-1994*, (Maxwell Air Force Base, AL: Air University Press, 2001), 55.

30. Higham, *Air Power*, 11.

31. In reality, this was far from the truth, for the major lesson of the Libyan campaign was the airplane's ability to conduct battlefield reconnaissance and develop timely and accurate intelligence on the enemy.

32. Kenneth Poolman, *Zeppelins Against London* (New York: The John Day Company,1961), 27-8.

33. Quoted in Douglas H. Robinson, "The Zeppelin Bomber: High Policy Guided by Wishful Thinking?" *The Airpower Historian* 3, no. 3 (July 1961), 133.

34. Ernst A Lehmann and Howard Mingos, *The Zeppelins: The Development of the Airship with the Story of the Zeppelin Air Raids in the World War* (New York: J.H. Sears and Company, 1927), 38-9.

35. Quoted in Robinson, "The Zeppelin Bomber," 135.

36. Ibid., 147.

37. For a full accounting of the German Gotha raids and the British reactions to them, see Raymond H. Fredette, *The Sky on Fire: The First Battle of Britain 1917-1918* (Washington, DC: Smithsonian Institution Press, 1991).

38. Basil Collier, *A History of Air Power* (London Weidenfeld & Nicolson, 1974), 68.

39. George Quester cited in Martin L. Fracker, "Psychological Effects of Aerial Bombardment," *Airpower Journal* 6, no. 3 (Fall 1992), np (online version). Available at http://www.airpower.maxwell.af.mil/airchronicles/apj/apj92/fall92/fracker.htm. Accessed 24 Jul 2007.

40. Douhet would later be heralded as one of the inter-war air power prophets. As Richard Hallion explains in his introduction to Douhet's *The Command of the Air*, "in the pantheon of air power spokesmen, Giulio Douhet holds center stage. His writings, more often cited that perhaps actually read, appear as excerpts and aphorisms in the writings of numerous other air power spokesmen, advocates – and critics." See Giulio Douhet, translated by Dino Ferrari, *The Command of the Air* (Washington, DC: Air Force History and Museums Program, 1998).

41. Robert Frank Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907-1960* (Maxwell Air Force Base, AL: Air University Press, December 1989), 24.

42. George K. Williams, *Biplanes and Bombsights: British Bombing During World War I* (Maxwell Air Force Base, AL: Air University Press, 1999), 149. Before becoming a Major in the newly formed RAF, Tiverton had been a Lieutenant in the RN.

43. Tami Davis Biddle, *Rhetoric and Reality in Air Warfare, The Evolution of British and American Ideas About Strategic Bombing, 1914-1945* (Princeton, NJ: Princeton University Press, 2002), 38-9.

44. Ibid., 54.

45. Lee Kennett, *A History of Strategic Bombing* (New York: Charles Scribner's Sons, 1982), 51.

46. For an excellent analysis of the British post-war analysis see Chapter 6 of Williams, *Biplanes and Bombsights*. His examination uses the RAF first-hand reports, which are corroborated in the most part by independent, US first-hand reports, to demonstrate that, during and after the war, the RAF greatly exaggerated the effect of bombing raids on Germany and sought to conceal the loss rates of RAF aircraft and crews. Williams paints a picture of how first the RNAS, then the RFC and finally the RAF consistently portrayed a rosy picture of strategic bombing to please a war weary British public and government during the war. After the war, the Air Ministry perpetuated the optimistic viewpoint in an effort to justify the continued independence of the RAF. While the positive spin was successful in protecting the RAF from its sister services in the post-war period, it also denied the RAF the opportunity to learn the true lessons of the First World War.

47. Hugh Trenchard cited in Tami Davis Biddle, "British and American Approaches to Strategic Bombing: Their Origins and Implementation in the World War II Combined Bomber Offensive," *Journal of Strategic Studies* 18, no. 1 (1995), 92.

48. The "US Bombing Survey, WWI (Summary)" report. Available at http://www.au.af.mil/au/awc/awcgate/ww1/bbg-ww1.htm, np. Accessed 24 Jul 2007.

49. Ibid.

50. "Col Gorrell's History of the US Army Air Service," is held at The National Archives, Washington DC. While copies or extracts of the document are not available on the internet, several references to it are. These may be found with a Google search for "Gorrell's history."

51. Futrell, *Ideas, Concepts and Doctrine*, 39.

52. The Air University Library's only English language copy of Ernst Wilhelm von Hoeppner's *Germany's War In the Air* (published 1921) was an Air Corps Tactical School in-house translation from the original German by J. Hawley Larned, Air Corps Reserve. The date of the translation is not indicated on the manuscript. However, the library's catalogue indicates the document was taken on charge in 1940. Copies of the same book in German and French were available in the 1920s.

53. Robert T. Finney, *History of the Air Corps Tactical School 1920-1940* (Air Force History and Museums Program,1998), 63.

54. Malcolm Smith, "The Allied Air Offensive," *Journal of Strategic Studies* 13, no. 1 (1990), 69-70.

55. Barry D. Watts, *The Foundations of US Air Doctrine: The Problem of Friction in War* (Maxwell Air Force Base, AL: Air University Press, 1984), 18.

56. A number of persons were involved in the production. However the "Task Force" that did most of the detailed work consisted of four officers. They were Colonel Harold George, Lieutenant-Colonel Kenneth Walker, Major Laurence Kuter and Major Haywood Hansell. Hansell's account of the development of AWPD-1 can be found in Haywod S. Hansell, *The Air Plan That Defeated Hitler* (Atlanta: Higgins-McArthur/Longino & Porter, Inc, 1972), 61-99.

57. AWPD received the task on 4 August. Hansell is unclear on when the first briefing on the plan was given to Brigadier-General Twaddle, the G-3 of the War Dept General Staff as a rehearsal. It was presented to the Chief of the Air Corps on 22 August and then to General Marshall on 30 August. Thus the team had in the order of two weeks to produce a complete war plan from a clean sheet of paper. Hansell, *The Air Plan That Defeated Hitler*, 60, 90, 93, 94.

58. Hansell, *The Air Plan That Defeated Hitler*, 76.

59. Ibid.

60. The name US Army Air Forces had replaced the designation US Army Air Corps in December 1942.

61. Quoted in Victor B. Anthony and R.A. Mason, *The Combined Bomber Offensive In Europe* (US Air Force Academy, Colorado Dept of History, nd).

62. Information extracted from Hansell, *The Air Plan That Defeated Hitler*, 163.

63. See for instance Williamson Murray, "Did Strategic Bombing Work?" *MHQ: The Quarterly Journal of Military History* 8, no. 3 (Spring 1996), 28-41.

64. Builder, *The Icarus Syndrome*, 141.

65. See Franklin D'Olier et al., The United States Strategic Bombing Survey Summary Report (European War) (30 September 1945), reprinted in *The Unites States Strategic Bombing Surveys (European War) (Pacific War)* (Maxwell Air Force Base, AL: Air University Press, 1987).

66. See Alan Stephens, *In Search of the Knock-Out Blow*.

67. An interesting critique of the structural bias of the United States Strategic Bombing Survey has been offered by Gian Gentile who notes "[a]s a collection of documents, as an establishment organisation, and through the ideas of its civilian and military analysts, the United States Strategic bombing survey reflected the American conceptual approach to strategic bombing. Two fundamental tenets formed the American conception: strategic air power should be used not to attack ground forces in battle directly but instead to attack the vital elements of the enemy's war making capacity, and the air force must be independent of and coequal with the army and the navy." Gian P. Gentile, *How Effective is Strategic Bombing?: Lessons Learned From World War II to Kosovo*

(New York: New York University Press, 2001), e quote from p. 5. The evidence for the structural bias of the USSBS is provided in chapter 2. See also Tami Davis Biddle, *Rhetoric and Reality*, 293.

68. In fact, the Far East Air Force report paraphrased the comments made by General Stratemeyer in 1950 (at the beginning of the war). See Robert Frank Futrell, *Ideas, Concepts, Doctrine*, 346. See also M.J. Armitage and R.A Mason, *Air Power in the Nuclear Age*, Second Edition (Chicago: University of Illinois Press, 1985), 44.

69. More appropriately, this was a Second World War lesson re-discovered in Korea. See Futrell, *Ideas, Concepts, Doctrine*, 347-51.

70. Eugene M. Zuckert, "Some Reflections on the Military Profession," *Air University Review* 27, no. 1 (November-December 1965), 4.

71. Tami Davis Biddle, *Rhetoric and Reality*, 296-7. Extract from US Air Force Manual 1-8, *Strategic Air Operations* (published in May 1954).

72. Mike Worden, *Rise of the Fighter Generals: The Problem of Air Force Leadership 1945-1982*, (Maxwell Air Force Base, AL: Air University Press, March 1998), 140. LeMay was only offering a solution that he firmly believed was correct based on his experience. After all, he was the last of a generation who had helped to develop the original United States Army Air Corps bombing theory in the inter-war period and had been a commander of US strategic bombing forces in the Pacific Theatre at the end of the Second World War.

73. Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 1996), 189.

74. Mark Clodfelter, *The Limits of Air Power: The American Bombing of North Vietnam* (New York: The Free Press, 1989), 134.

75. Ray Bowers, "Air Operations in South East Asia: A Tentative Appraisal," in Hurley and Erhart, eds., *Air Power and Warfare: The Proceedings of the 8th Military History Symposium, USAF Academy 18-20 October 1978* (Washington, DC: Office of Air Force History, 1979), 325.

76. US Air Force, Air Force Manual 1-1 Volume II, *Basic Aerospace Doctrine of the United States Air Force* (March 1992), 114.

77. Builder, *The Icarus Syndrome*, 179-180.

78. See James A. Mowbray, "Air Force Doctrine Problems 1926-present," *Airpower Journal* 9, no. 4 (Winter 1995), 21-41.

79. Builder estimates that approximately one third of the officer corps was seriously disaffected. See Builder, *The Icarus Syndrome*, 22-23.

80. Bob Martyn, "Theories of Post-Cold War Air Campaigning: The Development of Air Power Doctrine," in Allan D. English, ed., *Air Campaigns in the New World Order*, *Silver Dart Canadian Aerospace Studies Series,* Vol. 2 (Winnipeg: Centre for Defence and Security Studies), 50.

81. John A. Warden III, *The Air Campaign: Planning For Combat* (Washington, DC: National Defense University Press, 1988), 169.

82. John A. Warden III, "The Enemy as a System," *Airpower Journal* 9, no. 2 (Spring 1995), 40-45. The article is a refinement of an earlier article published shortly after the Gulf War – see John A. Warden, III, "Employing Air Power in the Twenty-first Century," in Richard H. Shultz, Jr and Robert L. Pfaltzgraff, Jr, eds., *The Future of Air Power in the Aftermath of the Gulf War* (Maxwell Air Force Base, AL: Air University Press,1992), 57-82.

83. If Warden had not read Boyd earlier, he could not have escaped exposure to Boyd's work while he was Commandant of the Air Command and Staff College after the 1991 Gulf War. One of the crescents near the college makes a loop around a B-52 bomber mounted on a pedestal. The crescent is signed as "OODA Loop." For a good summary of Boyd's life and ideas, see Grant T. Hammond, "The Essential Boyd," (nd, 1997?). Available at: http://www.belisarius.com/modern_business_strategy/hammond/essential_boyd.htm . Accessed 27 Jul 2007.

See also Jeffery L. Cowan, "From Air Force Pilot to Marine Corps Warfighting: Colonel John Boyd, His Theories on War, and their Unexpected Legacy," a Master of Military Studies thesis, Marine Corps University, academic year 1999-2000, available http://www.d-n-i.net/fcs/boyd_thesis.htm. Accessed 27 Jul 2007.

84. Phillip S. Meilinger, "Air Strategy: Targeting for Effect," *Airpower Journal* 13, no. 4, (Winter 1999).

85. Warden, "The Enemy as a System."

86. US Air Force, AFM 1-8, *Strategic Air Operations* (Department of the Air Force, 1 May 1954), 5.

87. Richard T. Reynolds, *Heart of the Storm: The Genesis of the Air Campaign Against Iraq* (Maxwell Air Force Base, AL: Air University Press, January 1995), 17. This would put Warden's development of the model in 1988.

88. Information on Deptula's early doctrinal thinking can be found in Barry D. Watts, "Doctrine, Technology and War," a paper presented to the Air & Space Doctrinal Symposium, Maxwell Air Force Base, AL, 30 April -1 May 1996. Available: http://www.airpower.maxwell.af.mil/airchronicles/cc/watts.html. Accessed 27 Jul 2007. Quote from p. 22.

89. Ibid., 120-30. Reynolds offers a detailed account of Warden's final briefing of the INSTANT THUNDER plan based on interviews and notes taken by the Pentagon briefing team.

90. Extracted from United States, "Conduct of the Persian Gulf War: Final Report to Congress," (April 1992), 148-151. Available at: http://www.ndu.edu/library/epubs/cpgw.pdf. Accessed 27 Jul 2007.

91. Ibid., 144.

92. Edward C. Mann, *Thunder and Lightning: Desert Storm and the Air Power Debates* (Maxwell Air Force Base, AL: Air University Press, April 1995), 100.

93. Warden believed that a properly executed air campaign would result in the overthrow of the Saddam regime by the Iraqi people. All members of his original planning team did not share this belief. Moreover, there was concern that destroying Iraq's infrastructure would inhibit Iraq's ability to pay war reparations after the conflict. See Reynolds, *Heart of the Storm*, 18, 54.

94. Mann, *Thunder and Lightning,* 106-107.

95. Subsequent analysis questioned the degree of success. See Grant T. Hammond, "Myths of the Gulf War: Some 'Lessons' Not to Learn," *Airpower Journal* (Fall, 1998). Available at: http://www.airpower.maxwell.af.mil/airchronicles/apj/apj98/fal98/hammond.pdf . Accessed 27 Jul 2007.

96. "Conduct of the Persian Gulf War: Final Report to Congress," 140.

97. David A. Deptula, *Firing For Effect: Change in the Nature of Warfare* (Arlington, VA: Aerospace Education Foundation, 1995).

98. David A. Deptula, "Firing For Effect: Change in the Nature of Warfare," *Air Force Magazine, Journal of the Air Force Association* 84, no. 4 (April 2001). Available at: http://www.afa.org/magazine/april2001/0401effect.asp. Accessed 27 Jul 2007. See also David A. Deptula, *Effects-Based Operations: Change in the Nature of Warfare* (Arlington, VA: Aerospace Education Foundation, 2001). Available at http://www.aef.org/pub/psbook.pdf. Accessed 27 Jul 2007.

99. By definition, "Rapid Decisive Operations is a joint operational concept for future operations. A rapid decisive operation will integrate knowledge, command and control, and *effects-based operations* to achieve the desired political/military effect. In preparing for and conducting a rapid decisive operation, the military acts in concert with and leverages the other instruments of national power to understand and reduce the adversary's critical capabilities and coherence. The United States and its allies asymmetrically assault the adversary from directions and in dimensions against which he has no counter, dictating the terms and tempo of the operation. The adversary, suffering from the loss of coherence and unable to achieve his objectives, chooses to cease actions that are against US interests or has his capabilities defeated." United States, "A Concept for Rapid Decisive Operations," RDO White Paper Version 2.0, US Joint Forces Command, J9 Joint Futures Lab, 25 October 2001. Available at: http://www.globalsecurity.org/military/library/report/2001/RDO.doc. Accessed 27 Jul 2007.

100. Deptula, *Effects-Based Operations*, 4.

101. Ibid.

102. Carl von Clausewitz, *On War*, Michael Howard and Peter Paret, eds. and trans. (Princeton, NJ: Princeton University Press,1984), 99.

103. In Clausewitz's words, "The political object is the goal, war is the means of reaching it, and means can never be considered in isolation from their purpose." Ibid., 87.

104. Deptula, *Effects-Based Operations*, 5.

105. Ibid., 6.

106. Precision weapons were not a new development in the Persian Gulf War; however, it was the first time that they were available in large numbers and used to dramatic effect (which gave the impression that more PGMs were used than was the actual case). In fact, the history of PGMs dates back to the First World War. For an excellent history of the development of cruise missiles, see Kenneth P. Werrell, *The Evolution of the Cruise Missile* (Maxwell Air Force Base, AL: Air University Press, September 1985). An assessment of the impact of PGMs on modern warfare is offered in Richard P. Hallion, *Precision Guided Munitions and the New Era of Warfare*, Paper no. 53, (Canberra, Australia, Air Power Studies Center, 1995. Available at: http://www.fas.org/man/dod-101/sys/smart/docs/paper53.htm. Accessed 28 Jul 2007. See also the Smart Weapons page on the Federation of American Scientists for a good overview of US inventory and web based articles on the subject of PGMs at: http://www.fas.org/man/dod-101/sys/smart/index.html. Accessed 28 Jul 2007.

107. An excellent examination of these problems and their implications may be found in Chapters 4 and 5 of Tami Davis Biddle, *Rhetoric and Reality*.

108. This uses Deptula's data from his example in figure 4. Deptula, *Effects-Based Operations*, 8.

109. Ibid., 10-11.

110. Ibid., 6.

111. Quoted in Edward Mann, et al. "Dominant Effects: Effects-Based Joint Operations."

112. Deptula, *Effects-Based Operations*, 12.

113. US Air Force, *Global Vision: a Vision for the 21st Century Air Force* (Department of the Air Force, 1996). Available at: http://www.au.af.mil/au/awc/awcgate/global/nuvis.htm. Accessed 28 Jul 2007.

114. Jason B. Barlow, *Strategic Paralysis: An Airpower Theory for the Present* (Maxwell Air Force Base, AL: School of Advanced Airpower Studies, May 1992) Available at: http://www.maxwell.af.mil/au/aul/aupress/SAAS_Theses/SAASS_Out/Barlow/barlow.pdf. Accessed 28 Jul 2007.

115. Thomas Tighe, Raymond Hill and Greg McIntyre, "A Decision For Strategic Effects: A Conceptual Approach to Effects Based Targeting," *Air & Space Power Chronicles* (11 October 2000). Available at: http://www.airpower.maxwell.af.mil/airchronicles/cc/Hill.html. Accessed 28 Jul 2007.

116. David W. Pendall, "Effects-Based Operations and the Exercise of National Power," *Military Review* 84, no.1, (January-February 2004); and Robert W. Freniere, John Q. Dickmann and Jeffery R. Cares, "Complexity-Based Targeting: New Sciences Provide Effects," *Air & Space Power Journal* (Spring 2003). Available at: http://www.airpower.maxwell.af.mil/airchronicles/apj/apj03/spr03/freniere.html. Accessed 28 Jul 2007.

117. David S. Fadok, "John Boyd and John Warden: Air Power's Quest for Strategic Paralysis," (Maxwell Air Force Base, AL: School of Advanced Airpower Studies, February, 1995). Available at: http://www.maxwell.af.mil/au/aul/aupress/SAAS_Theses/Fadok/fadok.pdf. Accessed 28 Jul 2007.

118. Mark T. Satterly, et al., "Intelligence Preparation of the Battlespace," *Air & Space Power Chronicles* (26 July 1999). Available at: http://www.airpower.maxwell.af.mil/airchronicles/cc/Satterly.html. Accessed 28 Jul 2007.

119. Price T. Bingham, "Transforming Warfare with Effects-Based Joint Operations," *Air & Space Power Journal* 17, no. 4 (Spring 2001); and his "Seeking Synergy: Joint Effects-Based Operations," *Joint Force Quarterly* no. 30 (Spring 2002); and his "Air Power Targeting Theory: A Key Element in Transformation," *Military Review* 82, no. 3 (May-June 2002).

120. K. Noedskov, "Systemizing Effects Based Air Operations," *Air & Space Power Chronicles* (24 May 2000). Available at: http://www.airpower.au.af.mil/airchronicles/cc/noedskov.html. Accessed 28 Jul 2007.

121. Edgar M. Knouse, "Effects-Based Targeting and Operational Art in the 21st Century," (Newport, RI: US Naval War College, 5 February 1999). Available at: http://handle.dtic.mil/100.2/ADA363060 . Accessed 28 Jul 2007.

122. Gary H. Cheek, "Effects-Based Operations: The End of Dominant Maneuver?" in Williamson Murray, ed., *Transformation Concepts for National Security in the 21st Century* (Carlisle, PA: US Army War College, September 2002), 95.

123. Ibid., 96.

124. Allen W. Batchelet, "Effects-Based Operations: A New Operational Model?" in Murray, ed., *Transformation Concepts for National Security in the 21st Century*, 118.

125. Martin van Creveld with Stephen L. Canby and Kenneth S. Brower, *Air Power and Maneuver Warfare* (Maxwell Air Force Base, AL: Air University Press, July 1994), 3-7.

126. Christopher Bellamy, "Manoeuvre Warfare," in Holmes, ed., *The Oxford Companion to Military History*, 544.

127. McCrabb, "Explaining 'Effects,'" 8.

128. Ibid.,10.

129. Ibid.

130. Ibid., 12.

131. Ibid., 16.

132. Ibid., 17.

133. Maris "Buster" McCrabb, "Effects Based Operations: An Overview," PowerPoint presentation, undated, available: http://www.au.af.mil/au/awc/awcgate/af/ebo.ppt , slide 16. Accessed 28 Jul 2007.

134. McCrabb, "Explaining 'Effects,'" 32-33.

135. McCrabb, "Effects Based Operations: An Overview," notes to slide 5.

136. Ibid., slide 5 graphics.

137. This figure is my own kludge of work presented by Deptula and by Larry Weaver and Robert Pollock. Deptula's chart can be found in Edward C. Mann, *Thunder and Lightning*, 93. The Weaver-Pollock model may be found at Owen, ed., *Deliberate Force*, 441.

138. This phrase is attributed to General Charles "Chuck" Krulak, former Commandant of the US Marine Corps. Source: BBC news report 30 March 2003, Available: http://news.bbc.co.uk/2/hi/middle_east/2901423.stm Accessed 28 Jul 2007.

139. Thomas Schelling, *Arms and Influence*, (London: Yale University Press, 1966).

140. For example see Robert A. Pape, "Coercion and Military Strategy: Why Denial Works and Punishment Doesn't," *Journal of Strategic Studies* 15, no. 4 (December 1992), 423-475; his "The Limits of Precision-Guided Air Power," *Security Studies* 7, no. 2 (Winter 1997/98), 93-114; and his "The Air Force Strikes Back: A Reply to Barry Watts and John Warden," *Security Studies* 7, no. 2 (Winter 1997/98), 191-214.

141. Pape, *Bombing to Win*, 19.

142. In addition to punishment and denial strategies, Page identifies risk and decapitation strategies and dismisses both. Risk is based on Schelling and decapitation on Warden.

143. Pape's critics include Barry D. Watts, "Ignoring Reality: Problems of Theory and Evidence in Security Studies," *Security Studies* 7, no. 2 (Winter 1997/98), 115-71; and John A. Warden III, "Success in Modern War: A Response to Robert Pape's Bombing to Win," *Security Studies* 7, no. 2 (Winter 1997/98), 172-90. See also Peter Faber, "Competing Theories of Airpower: A Language for Analysis." Available at: http://www.au.af.mil/au/awc/awcgate/au/faber.htm. Accessed 28 Jul 2007.

Faber's critique is based on a view that Pape's theory is just an update of the traditional "outside in" approach (he uses Warden's ring model where Warden is advocating an "inside out" approach). In my view, this is an overly literal interpretation of Pape. If one recalls that Pape's objective is to deny/defeat the enemy's strategy rather than aim to destroy the enemy's fielded forces, then Faber's argument loses validity.

144. For Bosnian operations see Owen, ed., *Deliberate Force*. For operations in Kosovo, the British Survey is *Kosovo: Lessons From the Crisis* (Ministry of Defence, June 2000), available at: http://www.kosovo.mod.uk/lessons/. Accessed 28 Jul 2007. The US Air Force Kosovo report is *The Air War Over Serbia: Aerospace Power in Operation Allied Force* Initial Report (Headquarters, United States Air Force, 25 April 2000).

145. Benjamin S. Lambeth, *NATO's Air War for Kosovo: A Strategic and Operational Assessment* (Santa Monica, CA: RAND, 2001); Stephen T. Hosmer, *The Conflict Over Kosovo: Why Milosevic Decided to Settle When He Did* (Santa Monica, CA: RAND, 2001); and Daniel Byman, Matthew C. Waxman, Eric V. Larson, *Air Power as a Coercive Instrument* (Santa Monica, CA: RAND, 1999).

146. Byman, et al., *Air Power as a Coercive Instrument*, 3-4.

147. Byman, Waxman and Jeremy Shapiro present a thorough list of adversary counter coercive strategies in Zalmay Khalilzad and Jeremy Shapiro, eds. *Strategic Appraisal: United States Air and Space Power in the 21st Century* (Santa Monica, CA: RAND, 2002), 53-78. Available: http://www.rand.org/publications/MR/MR1314/index.html. Accessed 28 Jul 2007.

148. Byman, et al., *Air Power as a Coercive Instrument*, 39.

149. Daniel L. Byman and Matthew C. Waxman, "Kosovo and the Great Air Power Debate," *International Security* 24, no. 4 (Spring 2000), 6.

150. Paul K. Davis, *Effects Based Operations*, 24.

151. See Christopher D. Kolenda, "Transforming How We Fight: A Conceptual Approach," *Naval War College Review* 56, no. 2 (Spring 2003), 100-21.

152. McCrabb, "Explaining 'Effects,'" 18.

153. Antulio J. Echevarria, *Clausewitz's Center of Gravity: Changing Our Warfighting Doctrine – Again!* (Carlisle, PA, Strategic Studies Institute, September 2002), 6. Available at: http://www.carlisle.army.mil/ssi/pdffiles/PUB363.pdf. Accessed 28 Jul 2007.

154. See the introductory essay by Michael Howard, "The Influence of Clausewitz," in Clausewitz, *On War* Howard and Paret, eds. and trans., 43.

155. For an example see Echevarria, *Clausewitz's Center of Gravity*, 9.

156. Antulio J. Echevarria, "'Reining in' the Center of Gravity Concept," *Air & Space Power Journal* 17, no. 2, (Summer 2003). Available at: http://www.airpower.maxwell.af.mil/airchronicles/apj/apj03/sum03/echevarria.html. Accessed 28 Jul 2007.

157. Milan Vego, "Center of Gravity," *Military Review* 80, no. 2 (March/April 2000), 23-9.

158. Echevarria, *Clausewitz's Center of Gravity*, 3.

159. Ibid., 4.

160. In 2002, the accepted US joint definition of COG was, "Those characteristics, capabilities, or sources of power from which a military force derives its freedom of action, physical strength or will to fight." From the glossary of United States, JP 3-60 *Joint Doctrine For Targeting*, dated 17 January 2002.

161. Echevarria, *Clausewitz's Center of Gravity*, 12-13. Links to many of his works are located on the Clausewitz.com reading list page. Available at: http://www.clausewitz.com/CWZHOME/Readings.shtml. Accessed 28 Jul 2007.

162. McCrabb, "Explaining 'Effects,'" 11.

163. Dennis J. Gleeson et al., *New Perspectives on Effects-Based Operations: Annotated Briefing* - IDA Document D-2583 (Alexandria, VA, Joint Advanced Warfighting Program, Institute for Defense Analyses, June 2001), 2. Available at: http://handle.dtic.mil/100.2/ADA395129. Accessed 28 Jul 2007.

164. Ibid., 6.

165. That the US Army's purpose is to fight and win the nation's wars is a common saying within that institution and the source is obscure. Similar thoughts have also governed the US Air Force. See Builder, *The Icarus Syndrome*, 265-68.

166. Gleeson et al., *New Perspectives on Effects-Based Operations*, 8, 11.

167. See Chapter 4 of Edward A. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War* (Washington, DC: DoD Command and Control Research Program, November 2002). Available at: http://www.iwar.org.uk/rma/resources/ebo/effects-based-ops.pdf. Accessed 28 Jul 2007.

168. Paul K. Davis, *Effects Based Operations*, 29.

169. Smith, *Effects Based Operations*, 61.

170. Ibid., 506-15.

171. Ibid., Chapter 2.

172. See for instance Desmond Saunders-Newton and Aaron B. Frank, "Effects Based Operations: Building the Analytic Tools," *Defense Horizons* no. 19 (October 2002). Available at: http://www.ndu.edu/inss/DefHor/DH19/DH_19.htm. Accessed 28 Jul 2007. Kevin B.Glen, "The Challenge of Assessing Effects-Based Operations in Air Warfare," Air *& Space Power Chronicles* (24 April 2002). Available at: http://www.airpower.au.af.mil/airchronicles/bookrev/glenn.html. Accessed 28 Jul 2007. Maris "Buster" McCrabb, "Effects-based Coalition Operations: Belief, Framing and Mechanism," a Paper presented to the Knowledge Systems for Coalition Operations (KSCO) Conference, April 2002. Available at: http://www.aiai.ed.ac.uk/project/coalition/ksco/ksco-2002/pdf-parts/S-ksco-2002-paper-02-mccrabb.pdf. Accessed 28 Jul 2007.

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173. See for example Carl A. Barksdale, "The Network Centric Operations – Effects-Based Operations Marriage: Can it Enable Prediction of 'Higher Order' Effects on the Will of the Adversary?" (Newport, RI: US Naval War College, 13 May 2002); and Christopher W. Bowman, "Operational Assessment – The Achilles Heel of Effects-Based Operations?" (Newport, RI: US Naval War College, 13 May 2002). Available at: http://handle.dtic.mil/100.2/ADA405868. Accessed 28 Jul 2007.

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178. United States, "A Concept for Rapid Decisive Operations," RDO White Paper Version 2.0.

179. Ibid., 40.

180. United States, "Operational Implications of Effects-based Operations (EBO)," The Joint Warfighting Center Joint Doctrine Series Pamphlet 7, United States Joint Forces Command, 17 November 2004, 1. Available at: www.dtic.mil/doctrine/jel/other_pubs/jwfcpam7.pdf. Accessed 28 Jul 2007.

181. Ibid., 2.

182. Ibid., 3. The pamphlet defines "directed policy aims" as the President's objectives that comprise the desired national end state.

183. Ibid., 13.

184. Ibid., 14.

185. Ibid., 30.

186. E. D. Hirsch, Jr. et al., eds., *The New Dictionary of Cultural Literacy*, 3rd ed. (Boston: Houghton Mifflin, 2002). Available at: http://www.bartleby.com/59/3/necessityist.html. Accessed 28 Jul 2007.

Chapter 3
Future Perfect: Effects-Based Operations, Complexity and the Human Environment[1]

Robert Grossman-Vermaas

Introduction

An epigraph in a recent article in the *Economist* opens: "Problems, problems" and then describes in depth the litany of problems that have developed following the Coalition intervention into Iraq:

> Patchy public services, continuing guerrilla attacks on coalition troops, widespread criminality, confusion over oil revenues and the financing of reconstruction, and still no sign of a home-grown government—just some of the problems facing Iraq's interim leaders.[2]

The article continues, "did the Bush administration spend too much time thinking about how to secure military victory, and too little working out what to do with the country once Saddam Hussein had been removed?"[3] Edward Luttwak amplifies this sentiment, calling the Coalition strategy in Iraq a "childish deception" with "hugely ambitious aims" and "unwinnable goals."[4] Furthermore, former US Secretary of State Madeleine Albright has claimed in a recent article in *Foreign Affairs* that the Bush Administration has, with its expanded war in Iraq, alienated many potential allies and has, in turn, made the global fight against terrorism all the more difficult to win.[5] At their core, these articles question a traditional and decidedly Western "military" approach to warfare and its immediate aftermath. This traditional approach, they claim, is incapable of accurately perceiving, or forecasting, the results of such an approach because it is incapable of delivering to the decision maker the desired strategic end-states, or "effects," on selected political, military, economic, and social systems.[6]

This chapter is based on a research note written for the Operational Research Division that was the first in a planned series of monographs on the effects-based approach (EBA). It explores the developing theory of the EBA, introduces effects-based operations (EBO) as a concept of strategic and operational planning and implementation, and proposes possible applications of this concept in the human and virtual environments of the future. In so doing, it introduces EBO to the Canadian Forces and the wider operational research communities and explores the implications for the Canadian government in adopting such a concept.

The EBA offers a number of advantages, but to realize these advantages a number of difficult challenges must be met, such as understanding how to effect a shift in the

psychological mind-set of the decision maker, and how to apply suitably technology to the overall planning, decision making, and analysis phases of an operation. Indeed, the effective management and manipulation of large quantities of irregular data is necessary to maintain a shared situational awareness both within and outside of an area of operations, as well as to gain an understanding of what effects may be achieved and how; what the potential unwanted or undesired effects may be, and what the potential secondary and tertiary effects may be. If EBO are to gain acceptance and function with the appropriate level of accuracy and speed, there is a requirement for governments and armed forces to adopt alternative thought processes to assist operational planners in recognizing where challenges and uncertainty may exist.[7] In Canada, this may require a series of marked shifts that include: 1) greater interagency cooperation *and* coordination of planning and operations; 2) greater inclusion of academia, international organizations (IOs) and non-government organizations, and private industry in planning for crises, mitigating threats, planning for "effects," and developing a robust operational net assessment (ONA); 3) further exploration, both nationally and with international partners, of the complex nature of warfare generally and EBO specifically; 4) further studies of the requirements needed to operationalize EBO over the long-term; and 5) and most importantly, a cross-government appreciation of the advantages of adopting an effects-based approach as a major operating concept of the future.

This chapter has three sections, each of which will be explored more fully in subsequent Operational Research Division publications. The first section provides an introduction to the concept of EBO and ONA. The second section analyzes the concept's foundations in complexity theory, complex adaptive systems theory and networking theory. The reasons for the inclusion of this section are two-fold. First, it is essential that one is able to conceptualize the logic (and at times illogic) behind effects-based planning (EBP) before one attempts to operationalize it. Second, EBO requires a rigorous understanding of complexity, causality theory and the complexity of actions over time and space. Thus, the operationalization of EBO has, as a *functional* requirement, a compelling need to codify that which is traditionally non-linear (i.e., war). This is a daunting task. The third section of this chapter expands the second's logical stream. Even though EBOs are complex in nature, "operators" (often military professionals) often wish to quantify that which is unquantifiable in order to act (and react) in sufficient time to produce the desired effects. This being the case, this last section explores technological requirements that may, in future, enable EBOs to be conducted more efficiently through time and space.

What Are Effects-Based Operations?

During the Cold War, the dominant principle of Western military planning was the ability to mass forces at key points whilst preventing or deterring an adversary from doing the same.[8] Success in battle, then, was understood by strategists and "operators" alike to depend on the ability to overcome the adversary in a lengthy war of attrition. However, the nature of conflict has clearly changed since 1991. Conflict is no longer limited to attritional, linear battlefronts and mass manouevre. As clearly demonstrated during recent events in Afghanistan and Iraq, the historic focus on achieving military superiority at the strategic, operational or tactical levels should be considered perfunctory steps towards the achievement

of strategic military, economic and diplomatic aims.[9] Increasingly, conflict has become akin to a complex adaptive system that operates within the complex environments such as terrorism, peace support operations, and regime change, as shown in Figure 3-1. Moreover, the complexity of warfare has come to include cyberspace, the nano-dimension, space, and the biological and chemical environments. Operations to attend to such factors and threats will, therefore, require an equally adaptive approach.

Figure 3-1. Conflict Shift and Complexity

First of all, the concept of EBO is linked to the effort to leverage a nation's (or a coalition's) strategic capabilities at the political, economic, technological, and information networking levels in order to achieve politically satisfactory outcomes for a nation or coalition. It is, at the same time, an intrinsically *psychological* concept, linking proposed actions to achieve physical *and* psychological results at the operational level. Here, psychological results may include the ability to affect an adversary's *will* to act, or, the ability to affect through dissuasion or deterrence an ability to act *in some way*.

Focussing merely on the degradation of an adversary's military combat power does not represent a holistic approach to future operations. These operations will likely place increasing emphasis on establishing *influence* over the *mind* of an adversary whilst keeping casualties and collateral damage to a minimum. Conceptually, EBO may enable desired

aims to be achieved without the need for attritional warfare, although success is more likely to be achieved through a combination of both physical and psychological effects. Of course, a credible war-fighting capability must always buttress psychological capabilities. Canada's military capability, for example, is one component of a reductionist pillar of the three-dimensional principles of foreign affairs that include diplomacy, defence and development. This is known as the 3-D defensive policy, in which strategic success will rely on being able to identify the end-states, or, *effects,* that will lead to campaign success and being able to deploy the optimum mix of capabilities with which to achieve them. Clearly, Canadian values may dictate that operations abroad include complementary diplomatic measures such as sanction, financial incentives, and trade-offs, just as easily as the deployment of a peacekeeping force. Alternatively, of course, such actions may also include the offer of developmental aid and reconstruction assistance at a level equal to or greater than that of the defence option.

Secondly, EBO also seeks to control the duration and gravity of a crisis or conflict, allowing nation states to achieve strategic objectives at a minimal cost, thereby assisting decision makers to achieve desired effects, which may be pursued under the primary objectives of physical and psychological effectiveness.[10] This juxtaposition of effectiveness can incorporate quantitative and qualitative measures and must consider the relative relationships between cascading, unintended, or unwanted secondary and tertiary effects. As such, EBO is very much rooted in theories of complexity and complex adaptive systems, as well as theoretical causality. These issues will be addressed below, and more fully in a subsequent Operational Research Division publication.

Thirdly, EBO may be considered a process for obtaining a desired outcome or effect from an adversary, friend or neutral through the synergistic and cumulative application of military and non-military capabilities at the tactical, operational and strategic levels.[11] Other definitions of EBO portray them as operations conceived, planned and executed within a systems framework that considers the full range of direct, indirect and additional cascading effects that may be achieved by the application of political, military, diplomatic or psychological instruments.[12] It is worth underscoring that EBO involves a broad range of activities, of which military action is only a subset. For example, if a nation or coalition has, as one of its strategic objectives, the establishment of a democratic regime in a formerly violent totalitarian region, there may be infinite (or permutated) operational level actions and resources needed to achieve the desired effects. From this it follows that EBO may be defined as the combined direct and indirect administration of *any* means at the nation's disposal applied in a synergistic manner in order to elicit a desired strategic outcome. Therefore, it is imperative that planners think rigorously about the orchestration of effects and proposed actions and resources needed to achieve them, that is, what is needed to achieve the above effect – diplomacy, military action, financial incentives, or some combination of them?

In summary, EBO is a coordinated set of actions (or inactions) directed at shaping the *behaviour of foes, friends and neutrals* during times of peace, crisis and war. They rely primarily on the exploitation of cognitive and kinetic weaknesses rather than simply massing traditional power against traditional power. This approach to the achievement of a long-term strategic aim requires planners to develop a better appreciation of increasingly complex

human networks. Planners also require a significantly more sophisticated understanding of human values and mindsets over *time and space* as well as a multidimensional analysis of the primary and secondary "nodes," or "targets" to be affected during the course of EBO.[13] A "node" may be any selected person, place, thing, or social construct, identified by a planning team. It may include, for example, a national or party leader, a military base, a non-governmental organization, a power grid, a bank, a religious movement, an international fund, a population indicator.

Finally, the EBO concept demands from decision makers a recognition that sophisticated technological tool-suites will enable an efficient effects-based planning (EBP) process. The complexity associated with the EBP process requires, by nature, a technological tool-suite capable of affording the decision maker the opportunity to compile, evaluate, assess, and analyze relevant strategic, operational and tactical data in real-time. This is a task of incredibly high order that, conceptually, integrates specific, time-sensitive knowledge about an area of operations with data associated with proposed courses of action susceptible to an evolving strategic objective.

From the discussion above, it is clear that EBO is a concept still in its infancy. It has not yet advanced to a mature experimentation phase, nor has it been developed adequately enough to consider immediate implementation. Making EBO a reality will require the maturation of the appropriate theoretical and analytical frameworks, both of which consider a holistic spectrum of conflict that includes political, military, economic, social, legal and ethical, and infrastructure and information segments. This framework (or frameworks) and associated methodologies will enable decision makers to plan for activities and operations more effectively and then adapt plans as situations evolve. Future operations that reflect the principles of EBO will, by their very nature, require political and military leadership to both *anticipate and understand* the consequences of actions. Decision makers will require a framework that integrates concepts such as the explicit linking of actions to resources and actions to effects. Decision makers will also require a framework that relates actions to national strategy, the continuing assessment of operational outcomes and intended and unintended consequences, the coordination and optimization of interagency efforts and the effective use of enabling operational concepts such as network-enabled capabilities and operational net assessment.

It should be noted that while the EBO concept requires further refinement, there are a number of multinational and Canadian initiatives in place that are investigating the "sub-concepts" involved in the effects-based approach. Canada has been involved in the conceptual development, analysis, technological development, experiment design, and participatory phases of Limited Objective Experiment II (LOE II) and Multinational Experiment III (MNE III). The former experiment was conducted in February 2002 and addressed multinational information sharing in "real-time" over a secure collaborative information environment (CIE) and the development of a multinational ONA database. The latter, which took place in February 2004, explored the technological, organizational and process requirements for multinational effects-based planning and coalition development of a robust ONA database. At the time of the writing of the report on which this chapter is

based, MNE 4 was scheduled for the summer of 2005 and was planned to be an experiment on the conduct of an EBO. Such experimentation is highly desirable and produces a great deal of qualitative and quantitative data for analysis on the preparatory stages of EBO.

Operational Net Assessment

A critical sub-concept, or tool, in the EBP process is the operational net assessment. ONA is a continuously updated analysis of adversary, allied, or neutral capabilities based on a limited number of courses of action (COA) that a state or coalition may take. Underlying ONA is both a process and a database that includes an assessment of all national or coalition assets and that incorporates the analytical expertise of the strategic and operational context that shapes it.[14] A functional ONA reflects a constantly refreshed national (or international) analysis of political, military, economic, social, infrastructure and informational systems relating to a proposed COA. The systems, and their interaction, are an integral component to understanding how to plan and execute EBO (see Figure 3-2). This process is ideally developed through collaborative intelligence and information sharing arrangements among academia, government and treasury intelligence services, non-governmental organizations (NGOs), international organizations (IOs), corporations, and defence establishments, as well as the use of technology that accommodates geographical dispersion.

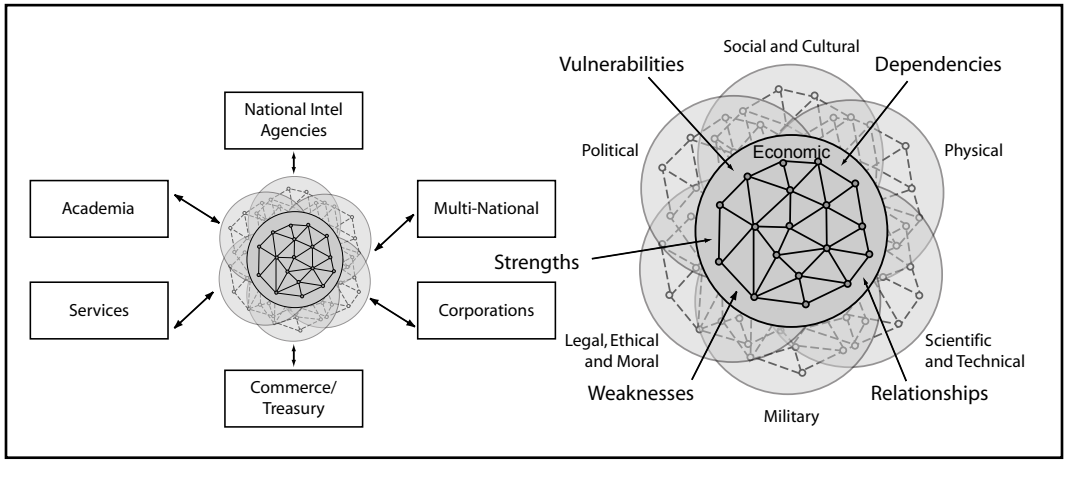

Figure 3-2. Inputs Required for the ONA Process

The nature of the strategic environment means that the effects-based approach must adopt a global posture. This posture necessitates ready access to an ONA that contains information gathered from national, international and coalition sources. National information may be derived from a broad range of classified and unclassified sources and requires a strong interagency collaborative process for successful application. This requirement is sometimes encumbered by traditional bureaucratic structures, however. For example, in Canada, there are a number of departments and agencies that develop security and development policy, including, but not limited to, the Privy Council Office (PCO), the Department of Foreign Affairs and International Trade (DFAIT), the Solicitor General, the

Royal Canadian Mounted Police, Health Canada, Transport Canada, and the Department of National Defence (DND).[15] While each of these departments may share a unified strategic aim, there may be varied interpretations of how best to achieve that aim.

In order to conduct EBO amongst national agencies, there is a requirement for strong interagency cooperation and coordination. Arguably, at present, this requirement is at best superficially implied, or at worst, simply ignored. The reasons for this situation are far too diverse for this essay to discuss; suffice it to say, there is a challenge ahead for the Canadian government and its agencies and departments. For example, should a severe humanitarian crisis develop abroad, one to which the Canadian government pledged assistance, it is generally understood that there would be a certain level of cooperation and coordination among a number of associated agencies and departments, including the DND and DFAIT. It is also understood that decision making would indeed take place in some collaborative fashion. However, currently such decision making and collaboration is, for the most part, ad hoc and would therefore fail to provide an adequate assessment of the cascading effects of potential actions and capabilities when decisions are made. Moreover, although decisions would be made collaboratively, at least in spirit, it is unlikely that such decisions would be made based on the most holistic set of information available, nor would they be made in sufficient time. This is a challenge to overcome and one exponentially more complicated in the dynamics of a coalition environment.

The effects-based planning process envisages interagency coordination and assistance in developing the ONA, creating potential "effects" and actions linkages, and pursuing actions based on capabilities. The United States has explored the Standing Joint Forces Headquarters (SJFHQ) concept and it is now in its prototype phase. The SJFHQ concept has, at its core, a combat commander with the capability to "reach-back" to knowledge and planning-specific boards, centres and cells, and more importantly, to a Joint Interagency Coordination Group (JIACG). This is an innovative approach to decision making, one which places an appropriate emphasis on the role of other government departments in the EBP process. However, alternative concepts of C2 give even greater emphasis to the interagency role in decision making. Research has been initiated in Canada that will explore the National Interagency C2 Group concept and its position relative to ONA and EBO.

Once a unified strategic aim has been developed and a net assessment of desired end-states and the means to achieve them has been agreed upon, a representation of the real world is generated that allows the "battlespace" to be considered as a complex adaptive system (CAS). From this understanding, the planning process can be properly configured to ensure that the right information gets to the right people at the right time. EBO seeks to assure decision superiority by improving one's (or one's allies') information posture, whilst manipulating another actor's position in order to exploit every opportunity to increase the speed and accuracy of operations.[16] Decision making will involve an assessment of the multitude of possible (and probable) outcomes or goals which "include the assurance of "beyond first-order" effects on the agents, institutions, technologies, and motivations that constitute an adversary's infrastructure, as well as on the global state of the socio-physical systems that comprise the adversary and international system."[17]

In summary, ONA promises to provide an understanding of the nature, structure, and vulnerabilities of key critical nodes or targets in a "system of systems." To provide this understanding, ONA must be continually updated to support an ongoing planning process for each selected contingency. ONA's utility extends from peacetime interaction with potential adversaries through to the conduct of rapid decisive military operations. Given the level of understanding provided by the ONA, EBO planners, assisted by sophisticated decision support tools, can identify appropriate response mechanisms, the body and sequence of means to upset the adversary's coherency, and then coerce him to take actions that are favourable to national and coalition interests. The objective is to provide the decision makers with a current analysis of the adversary's capabilities and vulnerabilities (or "nodes"), as well as an array of effects-based options that can be applied to adversary courses of action as they are identified.

Complex Systems and EBO

The most direct implications of EBO in the future are likely to lie in the areas of command and control. That said, the effects-based approach relies on a firm understanding of complexity theory, causality, networking and complex adaptive systems theory. EBO and complexity theory both deal with how a widely distributed collection of diverse autonomous agents acting individually can nonetheless behave like a single, even directed, entity.[18] Alternatively, traditional (Newtonian) science has always provided metaphors and models for isolated military concepts and, even more fundamentally, it has provided *the* general paradigm that has classified Western culture. This paradigm shapes both our interpretation of the problems we face and the solutions we generate to those problems. It is mechanistic, measurable, and reliable.[19]

The traditional Western way of warfare has been as heavily informed by Newtonian principles. If one accepts this interpretation, it would follow that, like other events, warfare is deterministically predictable. Given knowledge of the initial conditions and having identified the universal laws of combat, one should be able to resolve specific political and military issues and predict the results. Indeed, for argument's sake, all Newtonian systems can eventually be distilled to one concept: linear *cause and effect*. In fact, such efforts to quantify cause and effect in war have been numerous, with some recent methodologies including those used in the Correlates of War Project.[20] This approach accepts that war is altogether "knowable" and that which we cannot directly understand, we should be able to extrapolate scientifically. Unfortunately, this paradigm is limited when applied to EBO and the complex nature of future conflict.

The marriage of complexity theory to international security studies should come as no surprise, because since the 11 September 2001 terrorist attacks,[21] there has been increasing focus on non-linear theories as ways to help us understand, and mitigate, unpredictable and complex adaptive systems such as terrorism.[22] Complexity theory, then, can be viewed as an innate form for investigating the properties and behaviour of the dynamics of non-linear systems, such as warfare.[23] This stands in contrast to traditional methods within the theoretical domain designed to analyze the relatively non-linear world, such as statistics.

Complexity has been defined as:

> The set of deterministic theories that do not necessarily lead to long-term prediction… The numerical variables are still uniquely related to each other locally in space and time. But… we cannot obtain the future values implied by the theory just as a result of compact, well-defined manipulation of the present values.[24]

Complexity can appear even in apparently simplistic or deterministic causal situations, such as those in the natural world.[25] The mathematician Henri Poincaré showed that the motion of three celestial bodies, although governed by scientific laws, defied exact solution: while eclipses of the moon could be predicted thousands of years in advance, they could not be predicted millions of years in advance—a very short period in astronomical terms.[26]

As we know, linear systems portray an arrangement of nature (with all of its warts and foibles) where outputs are proportional to inputs, where the whole is equal to the sum of its parts, and where cause and effect are directly (or indirectly, through inductive reasoning) observable. According to David Alberts, linear systems exist in a scientific environment where prediction is facilitated by planning, success is pursued by detailed monitoring, and a "premium is placed upon reductionism, rewarding those who excel in reductionist processes," in which large swaths of data are reduced to manageable morsels.[27] By contrast, non-linear systems consider the arrangement of nature, with all of its complications (including warfare), as an environment where inputs and outputs are not proportional; where the whole is not quantitatively equal to its parts, and where cause and effect are not immediately visible.[28] It is the world of EBO—where phenomena are not visibly predictable, but are self-organizing; where unpredictability defeats conventional methods, and where self-organization defeats traditional control.[29]

It is clear that social interactions within political environments constitute systems and that the many outcomes within those systems are the consequences of complex interactions. In EBO, we are dealing with a system (or system of systems) where 1) a set of elements are inter-connected so that shifts in the system produce changes in other parts of the system; and 2) the entire system exhibits properties and behaviours that are related to but different from the sum of the parts.

The result of this situation is that the systems within EBO display non-linear (and causal) relationships that cannot be understood by adding together the units or their relation. Indeed, many of the results of actions are unpredictable, unintended or unwanted.[30] Actions produce effects, but these effects may be neither the intended results of the action, nor what was wanted to achieve the overall objective.

International relations are full of inter-connections and complex interactions. Ripples move through channels established by interests and strategies.[31] Therefore, when these interactions are elaborate, or multidimensional, the ramifications will be as well.[32] Similarly, when planning EBO, one must consider, and mitigate, the wide array of potential, possible, and probable effects and cascading effects which may result from a single course

of action. In a system, the chain of consequences extend over time and space and the effects of actions are always multiple. Any disturbance of a "node" within the system, or the disturbance of a system within a system of systems, will produce several effects. Consequently, and contrary to all the hopes and aspirations of some strategists, one cannot always find or develop *the* key agent which will produce *the* desired effect. For example, one cannot expect to link with linear methods 100 years of scientific, economic, and cultural degrees to the events on 11 September 2001. That is, a link from Ernest Rutherford to Albert Einstein to Robert Oppenheimer to Harry Truman to Joseph Stalin to Winston Churchill to Jawaharlal Nehru to Mohammad Ali Jinnah to Prince Mohammed Daoud to the Mujahideen to the Taliban to Osama bin Laden, although arguably causally sufficient is not causally logical in a non-linear system. Because of the prevalence of inter-connections, we cannot understand systems by simply summing-up the characteristics of the parts.[33] More precisely, actions interact to produce effects that cannot be readily comprehended by linear models.[34] While we may intuitively expect linear relationships, this is not possible, particularly in warfare.[35] Moreover, the effect of one series of characteristics can depend heavily on what other characteristics are within the environment.[36] Even if one were to hold true Michael Doyle's thesis that democracies do not fight each other in a world where other regimes exist, it would not hold true that an entirely democratic world would be a peaceful one.[37]

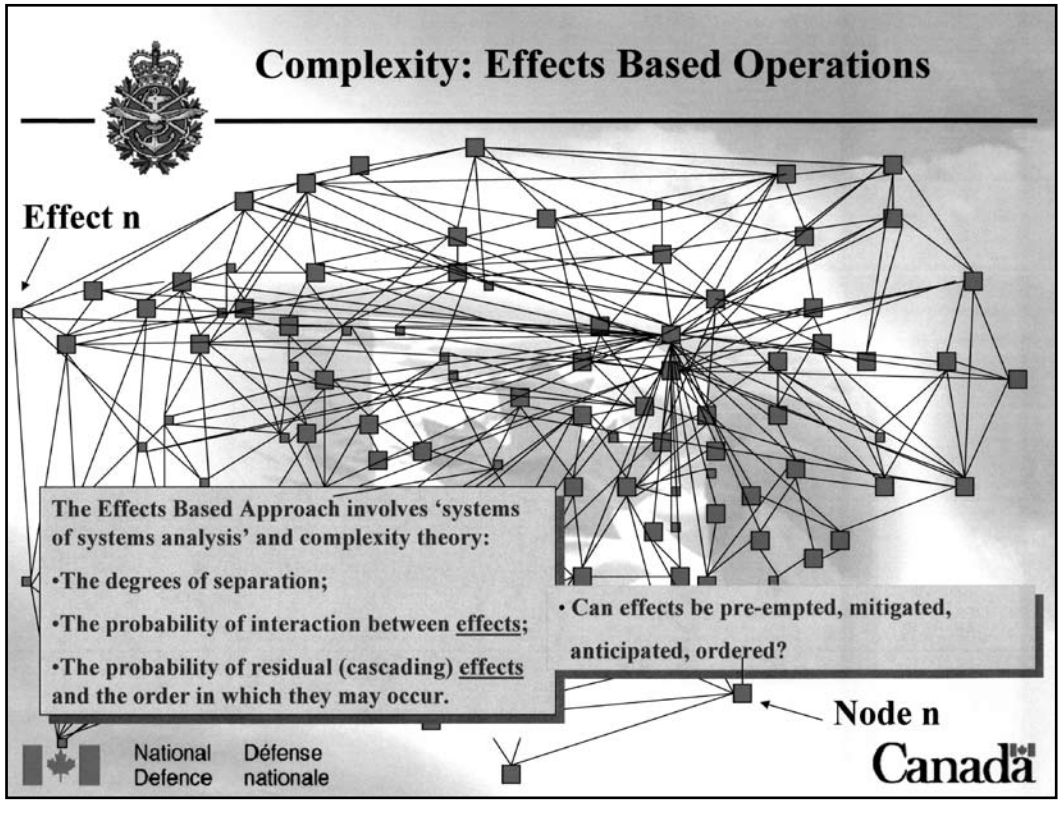

Figure 3-3. Complexity and Cause and Effect

EBO are not linear; nor is the ONA process that feeds them. EBO are conducted in an open, collaboratively distributed, non-linear system that is sensitive to initial conditions and characterized by complex, continuous feedback. Thus, EBO are a *process* rather than an event. The environment in which EBO operate, the "system of systems," is an open system - continuously exchanging energy and information with other systems and with the strategic environment at large. EBO are in a continuous state of flux—they operate within the perpetual cycle of crisis, conflict and post-conflict resolution. Planners and decision makers must, therefore, be cognizant of interactions and linkages between nodes, or targets, within and between systems, as illustrated in Figure 3-3.

Complexity theory and causality theory, then, provides a fundamental theoretical background to the nature of conflict generally and EBO specifically. The challenge is to apply this understanding to the operational planning levels.

EBO In A Virtual Environment

If we are to treat war as a non-linear system, two premises emerge. First, war as we traditionally understand it, is uncertain; and second, war as we traditionally understand it, is uncontrollable, given our linear understanding of command and control.

Uncertainty is a natural and unavoidable product of a dynamic endeavour such as war, and complex systems cannot be manipulated to suit our current understanding of the so-called "battlespace." On the other hand, decision makers can adapt to complex systems and produce technology enablers to help mitigate uncertainty. Thus, if EBO are uncertain and uncontrollable, one might consider technological enablers as a means of achieving at least *relative* certainty and *relative* control. In the end, it is not a question of whether we will ever have the technology to gather enough information to understand the complexities involved in EBO, but once we have the capability, how can we use it to best shape events?[38]

The quest to remove uncertainty from strategic and operational planning has always dominated warfare. Indeed, recent US and coalition political/military experiments have been specifically designed to help mitigate uncertainty.[39] US-led experiments on collaborative information environments, dominant effects, network-enabled capabilities, and rapid decisive operations (RDO), have all placed an emphasis on technological enablers to help achieve certainty.[40] This reliance on technology to mitigate uncertainty reflects the reality of a technologically advanced US military unsure of its future role in global affairs,[41] not to mention a very conscious defence decision to continue the transformation that was initiated under Secretary of Defence Donald Rumsfeld.[42] As mentioned above, the MNE III experiment is designed to test the processes, organizations and technologies required to conduct effects-based planning. Once the experiment is concluded and analysis completed, recommendations will be forwarded to DND through the Operational Research Division.

According to some military theorists, "to date, most warfare has taken place within what Robert J. Bunker terms the 'human space,' meaning the traditional four-dimensional battlespace that is discernible to the human senses."[43] In this interpretation, warfare has been conducted with human beings doing their best to hit other human beings with projectiles who

are, in turn, doing their best to hit other human beings with projectiles. Advances are being made, however, that propose placing humans on the periphery of battle, as ever more capable machines take the place of humans in the battlespace.[44] These progressions include, most notably, computer-driven information gathering and synthesis systems, and the proliferation of autonomous tactical weapons systems (i.e., robotic systems). More and more elements of warfare are evolving beyond the realm of the human senses, and, more importantly, crossing outside the limits of human reaction and assessment times.[45] Logically, then, military systems, once integrated into the conduct of war, will eventually be "too fast, too small, too numerous, and will create an environment too complex for humans to direct."[46]

This process of replacing humans on the battlefield is deliberate, is well within the mandate of the two most recent US Quadrennial Defense Reviews, and is being explored by most Western armed forces, despite post-Cold War Western defence expense reductions.[47] In this process, knowledge is seen as the key to the successful achievement of an objective, speed and accuracy are seen as the keys to exploiting that knowledge, and computer-assisted decision making tools are an inevitable evolution of this process. Consequently, many envisage a steadily altered role for humans in decision making and operations as this century progresses.[48]

A fundamental development underlying the evolution (or devolution) of human control is that of automated information and networking systems. A recent US Army Training and Doctrine Command paper has claimed that:

> Advances in computer architecture and machine intelligence will have reached the point where intelligent agents can analyze the environment and current battle situation, search likely target areas, detect and analyze targets, assist in attack decisions, select and dispense munitions, and report results.[49]

Indeed, the difference between a machine that can do all of these things and actually make key decisions may only be a matter of programming. The citation above is a description of computers that can function autonomously to conduct asymmetric warfare at the tactical level. If anything, the description is an understatement. This author suggests that within our lifetimes, computers may be capable of planning, tasking, and assessing events at the operational level. During MNE III, the coalition planners for the EBP process will test a number of different software packages during each of the planning steps. Canada, in particular, has taken the lead for both the conceptual development and design of a technological tool that would enable planners to synchronize desired operational effects across time and space. This tool, to be tested in MNE III and subsequently analyzed by the Operational Research Division, is expected to adapt proposed effects to actions, to available capabilities in order to provide planners with a visualization of what the "best" course of action would be based on probabilities of success, resource constraints, action usage and required predecessors, as illustrated in Figure 3-4. Subject to experimentation and analysis, this tool may be worthy of further development for DND and other government department (OGD) crisis management and EBO.

There have been several recent defence science investigations into the marriage of technology to complex thinking and complex adaptive systems such as EBO. The Technical Cooperation Program (TTCP) JSA AG10 "Technologies for Effects-Based Operations," in which Canada has participated, focussed on modelling and analysis concepts and tools and techniques that would bring both analytical rigour and assistance to decision making in the complex environment of EBO.[50] Included in this exploration were physical models (such as the Canadian GEOPOL model, a global geopolitical database), in which physical networks are characterized by nodes and links with sources and sinks, plus material stocks and flows. Virtual network models, (including the Australian Analytica Model and the Danish Hugin model), in which networks of relationships can be listed hierarchically and assigned relative value, or which may bring an ability to build interactive causal networks for strategic indicators and warnings that aid operational planning were also explored. The US Situational Influence Assessments Module (SIAM) software application purports to streamline complex decision making by facilitating the construction and analysis of an influence net model. The net model depicts events and their causal relationships.

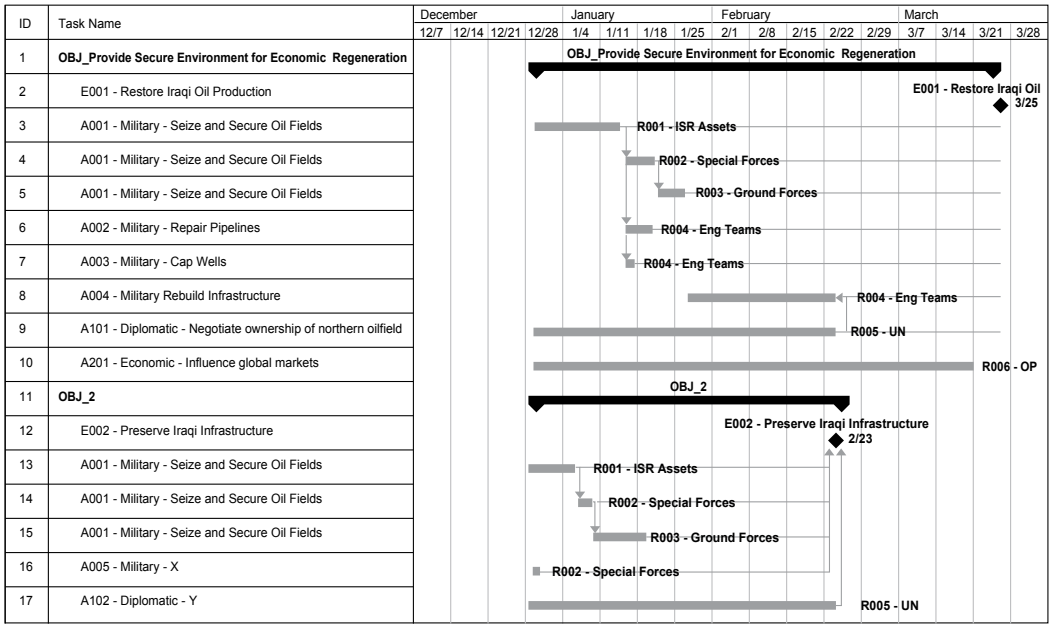

Figure 3-4. Effect Synchronization Example

Effects can be synchronized over time and space based on resource constraints, predecessors, action doubling and usage.

While these future uses of technology may seem far-fetched, we should recognize that current computer technology has not yet begun to approach its theoretical limits. In 1998 (a long time ago in computer terms), scientists at Los Alamos National Laboratory announced that they had been able to consistently manipulate subatomic particles, thus opening the way for computation systems an order of magnitude smaller and faster than

anything in existence.[51] In 1999, researchers at UCLA began work on a molecular computer with a processing power of 100 personal computers. In October 2001, the American company ASI revealed the development of its KARNAC suite, a software package that uses human "profiling" and data-mining techniques to sift through seemingly unrelated pieces of information in order to pre-empt terrorist attacks before they happen.[52] More recently, Professor Wilpen Gorr and researchers at Carnegie Mellon's Heinz School have created a computer program that forecasts "criminal" activity before it occurs. Gorr's programme is based on a sophisticated trend analysis of criminal activity combined with an ability to predict with some degree of accuracy future criminal activity.[53] The implications of such advances are almost unimaginable: inexpensive, ubiquitous supercomputing in minute machines so advanced that they can gather, assess, and analyze thousands of strands of complex information. This is not to suggest that there will ever be a conscious decision to remove humans from battlefield decision making; rather, in the future, soldiers might retain less control, whilst gradually leaning towards advanced systems when logic dictates that human control become less pronounced.[54] The implications of this technology for complex processes such as effects-based planning are equally fantastic, and raise the question of how one can effectively and efficiently plan for tasks in order to achieve a stated strategic objective?

As technology advances, one might expect the clarity of EBO computer models to improve exponentially. Of course, linear algorithms may never be able to replicate the non-linear and often unquantifiable logic of war. Indeed, the history of human conflict is littered with examples of how armed forces achieved results that no algorithm would have predicted.[55] EBO, however, might be executed completely outside of the human sphere of activity. For example, the concept of "net-war" assumes that conflict will eventually be waged virtually within and amongst computer systems attacking the full spectrum of opposing military and civilian information systems. By its very nature, then, the speed and accuracy of EBO may be limited only to the speed of the electronic circuit boards in which it develops. EBO is complex and adaptive, with operational moves often too pervasive for human intervention. In the end, both offence and defence might be completely automated, simply because humans will be far too slow and linear to participate. As a caveat, one might also assume that the panacea of technology may not appear as sufficient as one might expect. Indeed, there are several mathematical, engineering, technological, and temporal/spatial, not to mention ethical, issues that require attention before such an advance be considered an appropriate enabler of EBO. Nonetheless, one suspects that the future of EBO requires further investigation of the potential of technology.

Conclusion

This essay has been deliberately suggestive because future conflict is uncertain and complex and Canada must understand it. The essay has introduced the concept of EBO and argued that its planning and execution rely on an understanding of the complex nature of conflict and on theories of complex adaptive systems and causality. An acceptance of EBO demands a shift in mind-set, as well as the application of sophisticated technologies to the overall planning, decision making, execution, and assessment phases of an operation. The

effective management and manipulation of large quantities of evolving data is essential in order to achieve and maintain shared situational awareness both within and outside of an area of operations (or system of systems) and to gain an understanding of what effects may, or may not be, achieved with the available resources. If EBO are to function efficiently and with the appropriate level of accuracy and speed required in the future security environment, then there is a need for alternative methods to assist leaders and planners in recognizing where, and why, uncertainty exists.[56] Traditional linear methods of warfare are no longer suitable; neither are the traditional means of operational planning, decision making and command and control.

This study is the first in a series of monographs on the effects-based approach. It has introduced EBO as a concept that relies heavily on the injection of specific interagency, academic, corporate, diplomatic, economic and coalition intelligence knowledge for the formulation of an operational net assessment, as well as a recognition of the technological means needed to assist the decision maker in ascertaining the complexity of desired tactical end-states, or "effects," required for the attainment of a strategic objective. It has suggested that Canada pursue the exploration of this concept.

The advantages that the EBA may offer rely heavily on a shift in the psychological mindset of the decision maker, as well as a suitable application of technology to the overall planning, decision making, and analysis phases of an operation, be it humanitarian, developmental, defence or a combination thereof. If EBO are to function efficiently and with the appropriate level of accuracy and speed, there is a requirement for governments and armed forces to adopt alternative thought processes to assist operational planners in recognizing where challenges and uncertainty may exist. In Canada, this may require a series of shifts that include:

1. greater interagency cooperation *and* coordination of planning and operations;

2. greater inclusion of academia, IOs and NGOs, and private industry in planning for crises, mitigating threats, planning for "effects," and developing a robust ONA;

3. further exploration, both nationally and with international partners, of the complex nature of warfare generally and EBO specifically;

4. further exploration of the requirements needed to operationalize EBO; and

5. a cross-government appreciation of the advantages of adopting an EBA as a major operating concept of the future.

Taking the above shifts into account, the following recommendations should be considered:

1. continued Canadian involvement in the development of the EBO concept within a multinational environment, that is, specifically in terms of conceptual

refinement, what can Canada provide the international community, or what can the international community provide Canada?

2. continued Canadian involvement in the development of analytical tools and techniques that assist in the refinement, collation and visualization of complex systems;

3. an investigation into a suitable organizational framework for a Canadian headquarters structure and effects-based interagency C2 structure;

4. an exploration into the relative merits of Canada adopting the EBA. Is it feasible? Does it merit substantial organizational, functional, operational re-evaluation of the CF? Does it merit financial allocation?

5. an assessment of the EBA and its inclusion into a major Canadian defence paper or strategic concept.

Notes

1. This chapter originally appeared as a Department of National Defence, Operational Research Division, Directorate of Operational Research (Joint) Research Note RN 2004/01 published in January 2004.

2. "The Economist Global Agenda," *Economist* (2 July 2003), 1. Available at www.economist.com. Accessed 2 July 2003.

3. Ibid.

4. Edward Luttwak, "Digging out from disaster," *The Globe and Mail* (21 August 2003), p. A17.

5. Madeline K. Albright, "Bridges, Bombs, or Bluster?" *Foreign Affairs* 82, no. 5 (Sep-Oct 2003), 2-20.

6. The "traditional" method of warfare and its pursuit in Iraq has been analyzed further in several newspaper editorials. See for example "Comment and Analysis," *Financial Times* (30 June 2003), 13; R.W. Apple, "A New Way of Warfare Leaves Behind an Abundance of Loose Ends," *New York Times* (20 April 2003), pp. B1, B14; BBC News, "US Plans for Iraq 'Flawed,'" (26 June 2003). Available at www.bbc.co.uk. Accessed 26 June 2003; Jim Hoagland, "The War Isn't Over," *Washington Post* (22 May 2003), p. A35; and Thomas E. Ricks, "U.S. Alters Tactics in Baghdad Occupation," *Washington Post* (25 May 2003), pp. A1, A18.

7. Roger Lewin, *Complexity: Life at the Edge of Chaos* (New York, Macmillan, 1992).

8. Desmond Saunders-Newton and Aaron B. Frank, "Effects-Based Operations: Building the Analytical Tools," *Defense Horizons* no. 19, Center for Technology and National Security Policy, National Defense University (October 2002).

9. The threat of asymmetric retaliation and guerrilla warfare (slowly) persuaded Coalition forces to re-assess strategic options in Iraq in the spring of 2003. See, Edmund L. Andrews and Patrick E. Tyler, "As Iraqis' Disaffection Grows, U.S. Offers Them a Greater Political Role," *New York Times* (7 June 2003), p. A8.

10. Saunders-Newton and Frank, "Effects-Based Operations," 1.

11. This definition is derived from a recent multinational experiment definition. For example, see US J9 Experimentation, US Joint Forces Command (USJFCOM), working definition, 2002. See also draft of Effects-Based Planning concept for Multinational Experiment 3, a joint concept between the UK Joint Doctrine and Concepts Centre (JDCC), the Canadian Forces Experimentation Centre (CFEC), the German Bundeswehr, France, NATO ACT, Australian Defence Science and Technology Organisation (DSTO), (August 2003).

12. Paul K. Davis, *Effects-Based Operations: A Grand Challenge for the Analytical Community* (Santa Monica, CA: RAND, 2001), RAND MR-1477-USJFCOM/AF, 2001.

13. R. David Smith, "The Inapplicability of Principle: What Chaos Means for Social Science," *Behavioral Science* 40, (1995), 22; Steven Guastello, *Chaos, Catastrophe, and Human Affairs: Application of Nonlinear Dynamics to Work, Organizations, and Social Evolution* (Mahwah, NJ: Lawrence Erlbaum Associates, 1995).

14. Keith P. Curtis, *Multinational Information Sharing and Collaborative Planning Limited Objective Experiments*, MITRE Corporation, 2001, p. 3.

15. See Conference of Defence Association Institute, *A Nation at Risk* (Ottawa, ON: 2002).

16. Decision superiority is the application of knowledge by leaders to make the highest quality decisions directing assigned resources such that they maintain operational flexibility and agility. With its roots in the OODA loop, this concept includes psychological determinants such as will, capability and intent.

17. Saunders-Newton and Frank, "Effects-Based Operations," p. 3.

18. Paul Davis and Brian Michael Jenkins, "The Influence Component of Counterterrorism: A Systems Approach," *RAND Review* (Spring 2003). Available at www.rand.org. Accessed 7 May 2003.

19. For example, see arguments presented in Murray Gell-Mann, *The Quark and the Jaguar* (London: Abacus, 1994), 84-5. Note that Gell-Mann also considers the rarity of revolutionary scientific paradigm shifts (as defined and extrapolated by Thomas Kuhn in *The Structure of Scientific Revolutions*).

20. J. David Singer and Paul F. Diehl, eds., *Measuring the Correlates of War* (Ann Arbor, MI: University of Michigan Press, 1990).

21. United States, Department of Defense, *Quadrennial Defense Review Report* (30 September 2001), 14.

22. Ironically, it is rather late to arrive when compared to its use in fields such as economics, management, ecology, biology and physics. See for example, Dana Mackenzie, "The Science of Surprise: Can complexity theory help us understand the real consequences of a convoluted event like September 11?" *Discover* (February 2002). Available at www.discover.com/feb_02/featsurprise.htm. Accessed 8 July 2003.

23. Douglas Van Belle, "Unexpected Innovation: Lessons from Simulating Complex Anarchical Environments over the Internet," *International Studies Notes* 22, no. 2 (Spring 1997), 18.

24. Alvin Saperstein, "Chaos: A Model for the Outbreak of War," *Nature* 309 (24 May 1984), 303-5.

25. Robert Jervis, "Complex Systems: The Role of Interactions," in David Alberts, ed., *Complexity, Global Politics and National Security* (Washington, DC: CCRP/Institute for National Strategic Studies, 1997), 46.

26. Ibid.

27. David Alberts, *Complexity, Global Politics and National Security* (Washington, DC: CCRP/ Institute for National Strategic Studies, 1997), xiii.

28. M. Mitchell Waldrop, *Complexity: The Emerging Science at the Edge of Order and Chaos* (New York: Simon and Schuster, 1992).

29. This argument has evolved, in part, from a University of Maryland project on complex adaptive systems. See, Kiersten Blair Johnson, "The Development of Progressive and Sustainable Human Complex Adaptive Systems: Institutions, Organizations and Communities," 1999. Available at www.wam.umd.edu/ ~nafikiri/webcomplex.htm. Accessed 17 June 2003.

30. Robert Pool, "Chaos Theory: How Big an Advance?" *Science* 245 (9 July 1989).

31. Note a study on modelling civil violence in Joshua M. Epstein, John D. Steinbrunner, Miles T. Parker, "Modeling Civil Violence: An Agent-Based Computational Approach," *Center on Social and Economic Dynamics,* Working Paper, no. 20 (January 2001).

32. See also, Garrett Hardin, "The Cybernetics of Competition," *Perspectives in Biology and Medicine* 7 (Autumn 1963), 80.

33. Allan Beycheren, "Nonlinear Science and the Unfolding of a New Intellectual Vision," in Richard Bjornson and Marilyn Waldman, eds., *Papers in Comparative Studies* Vol. 6. (Columbus, OH: Center for Comparative Studies in the Humanities, Ohio State University Press, 1989).

34. Kenneth Waltz, *Theory of International Politics* (Reading, MA: Addison-Wessely, 1979); and Charles Perrow, *Normal Accidents* (New York: Basic Books, 1984.

35. Roger Beaumont, *War, Chaos, and History* (Westport, CT: Praeger, 1994).

36. These may be linkages but not necessarily logically causal ones.

37. Michael Doyle, "Michael Doyle on the Democratic Peace," *International Security* 19 (1995), 180-4. See also Robert Jervis, "Complex Systems," 52.

38. Jeffrey Cooper, "Diplomacy in the Information Age: Implications for Content and Conduct," *iMP Magazine* (July 2001). Available at www.cisp.org/imp/july_2001/07_02cooper.htm. Accessed 17 June 2003.

39. Recent exercises have included USJFCOM-sponsored multinational experiments such as Limited Objective Experiment 2 and the forthcoming Multinational Experiment 3.

40. William M. Arkin, "A New Mindset for Warfare," *Washington Post* (22 September 2001), 3. Available at www.washingtonpost.com/ac2/. Accessed 17 June 2003.

41. David C. Gompert and Irving Lachow, "Transforming US Forces: Lessons from the wider revolution," *Issue Paper,* RAND/National Defense Research Institute (2002). Available at www.randf.org/publications/IP/IP193/. Accessed 22 October 2002.

42. United States, Department of Defense, *Quadrennial Defense Review Report,* 30 September 2001.

43. Thomas K. Adams, "Future Warfare and the Decline of Human Decisionmaking," *Parameters* 31, no. 4 (Winter 2001-02), 57-71. See also Robert J. Bunker, *Five-Dimensional (Cyber) Warfighting* (Carlisle, PA: US Army War College, Strategic Studies Institute, 10 March 1998), 7-8.

44. There are numerous sources on this topic. Some of the more applicable to this article include, Dan Hunter and F. Gregory Lastowka, "To Kill an Avatar," *Legal Affairs* (May/June 2003). Available at www.legalaffairs.org/issues/July-August-2003/feature_hunter_julaug03.html. Accessed 3 July 2003; and Matthew Brzezinski, "Autopilot: Can the Next War be Fought with no Soldiers at All?" *New York Times Magazine* (20 April 2003), 38-40, 80.

45. Thomas K. Adams, "Future Warfare and the Decline of Human Decisionmaking," 58.

46. Ibid. Examples include the emergence of directed-energy weapons (DEWs) with capacities for engagement at the speed of light, developments in nano-, bio-, and quantum-technology, "digital army" initiatives such as the Land Warrior system, semi- and fully autonomous robotic systems, the first operational light-speed weapon, the US Air Force's Yal-la Attack Laser, microwave systems, and tiny Micro-Electro-Mechanical Systems (MEMS).

47. Kip N. Nygren, "Emerging Technologies and Exponential Change," *Parameters* 32, no. 2 (Summer 2002), 86-99.

48. This is a major philosophical issue unable to be explored further in this article. See Michael Ignatieff's excellent study on this topic, *Virtual War* (London: Vintage, 2000); John Leech, *Asymmetries of Conflict* (London: Frank Cass, 2002); Batya Friedman and Lynette Millett, "'It's the computer's fault': Reasoning about computers as moral agents," Department of Mathematics and Computer Science, Colby College, 1995. Available at www.acm.org/sigchi/chi95/Electronic/documnts/shortppr/bf2_bdy.htm. Accessed 17 June 2003.

49. US Army Training and Doctrine Command, "Concept of Employment for Unmanned Systems (Draft)," 24 August 1999, 4.

50. DRAFT Final Report of TTCP JSA AG10 "Technologies for Effects Based Operations," Unclassified, December 2003.

51. "Breakthrough Made in Subatomic Manipulation," Scripps-Howard Newspapers, 8 November 1998. Available at www.nandotimes.com. Accessed 17 June 2003.

52. Duncan Graham-Rowe, "Intelligence Analysis Software Could Predict Attacks," *New Scientist.com* (2 October 2001). Available at www.newscientist.com/news/print.jsp. Accessed 17 June 2003. See also the ASI Website at www.asinc.com for information on their PreAct® Libraries.

53. Wilpen Gorr, "Cloudy, with a chance of theft," *Wired* (September 2003), 79-80.

54. One should also note the development of computerized knowledge assessment (CKA), or brain fingerprinting, which analyzes brainwaves to predict terrorist attack. See Steve Kirsh, "Identifying terrorists before they strike by using computerized knowledge assessment (CKA)," www.skirsh.com (7 October 2001). Accessed 17 June 2003.

55. Charles J. Dunlap, Jr., "Technology : Recomplicating Moral Life for the Nation's Defenders," *Parameters* 29, no. 3 (Autumn 1999), 24-53.

56. Roger Lewin, *Complexity: Life at the Edge of Chaos* (New York: Macmillan, 1992).

Part III - Canadian Perspectives from the EBO Workshop

Chapter 4
Summary of Conclusions From the Effects-Based Operations Workshop

Howard Coombs and Allan English

General

This section reflects a summary of conclusions from a Canadian Forces Aerospace Warfare Centre (CFAWC) / Defence Research and Development Canada (DRDC) Workshop on Effects-Based Operations (EBO) that took place 27-28 November 2006 in the NAV Canada Training and Conference Centre at Cornwall, Ontario. The workshop proceedings will be available in a separate DRDC report.

The aim of the workshop was to identify issues related to EBO and to begin to establish the agenda for better understanding EBO in a Canadian context. The workshop consisted of a series of syndicate seminars and plenary sessions, based on selected readings, contemporary literature on EBO and personal experiences with EBO. Questions, created by the workshop organizers, were circulated in advance and were designed to guide discussion; therefore, not all questions were necessarily answered. This conclusion summarizes participants' perspectives so that we can have a clearer picture of what EBO means from a Canadian perspective.

Conclusions

All participants acknowledged that the idea of achieving certain effects through military, diplomatic, and other actions is a very old concept that has been evolving for a long time. There were a number of different ways of conceptualizing the term "effect," but the idea that an effect is a change, whether physical, moral or cognitive, that has been caused by an action or inaction" seemed to be acceptable to most workshop participants. It was noted by some, that the word "effect" infers that there is no finality to the result of a particular action and that there is always "more to come." This idea has implications for the concept of "end state" in operational art.

Despite its ancient roots, in its current context, the term "effects-based operations" was derived from the writings of twentieth century air power theorists, and the term EBO was first used by the US Air Force in the late 1990s. Because of this recent background and its technological focus, EBO is seen by some as a particularly air force approach to operations. Given the perceived air force origins of EBO, some at the workshop preferred to use the term "effects-based approach to operations" (EBAO), because, they argued, EBO

had become associated with a prescriptive, technologically-based, largely air force way of conducting operations, whereas EBAO conveyed the idea of a broader, more philosophical approach to operations.

Some workshop participants indicated that the term EBO had evolved since the mid-1990s, as the early twenty-first century military-strategic situation has caused some to emphasize the sociological as opposed to the technological aspects of EBO. For example, conflict in the post-Cold War era has shown that tactical victories can be achieved, but that they do not necessarily result in overall strategic success. Therefore, for some, a more human-focussed version of EBO is the best way to link tactical actions to strategic goals. Others acknowledged that EBO was a method that could help to understand the complex situations that are found in today's operational environments, but that current planning processes based on the operational art were flexible enough to incorporate EBO concepts without changing the processes radically. All workshop participants agreed that EBO was still an immature concept and had not enough explanatory power to be regarded as a theory.

Some at the workshop argued that Canada does not have the resources to fully practice EBO, and, therefore could only employ EBO as part of a larger coalition or with the United States. Nevertheless, most participants felt that Canada needed to both fully understand EBO as a concept and know how EBO might apply to Canadian operations if it was to be an effective alliance or coalition partner.

Conceptual Foundations. During the workshop a number of concepts were put forward as being fundamental to the practice of EBO. Despite the immaturity of EBO as a concept and the differing views on exactly what constituted EBO, there was some consensus among workshop participants that EBO should be a top-down, integrated approach that can be employed to make changes in the security environment to achieve one or more desired end states related to attaining strategic objectives. It was suggested that if EBO sought to produce change, whether physical, moral or cognitive, then changes should be observable and measurable, either by objective or subjective means. To be meaningful, the change being measured should also be considered in terms of outcomes as opposed to inputs or outputs. In this regard, an effects-based approach (EBA) encourages the consideration of the use of non-kinetic means to produce change, but it does not exclude kinetic means.

Another important concept that emerged during the workshop discussions was the importance, when using the EBO process in a Canadian context, of adopting a "Whole-of-Government" approach, in which there is greater interaction between the CF and other government agencies (e.g., the Department of Foreign Affairs and International Trade). All present acknowledged that EBO could be used to situate the use of the military instrument of power in a broader whole-of-government or Diplomatic, Informational, Military and Economic (DIME) context. In this whole-of-government approach, responsibility and authority would be delegated to the agency or government department, or perhaps even a non-governmental organization (NGO), to ensure that the right actor with the right expertise and capabilities was employed to deliver the desired effect. However, for an EBO whole-of-government approach to be feasible, clear definitions and terminology would be

required. This could be problematic at the moment given the diversity of ways of describing EBO.

Furthermore, implementing an EBO whole-of-government approach could be problematic if EBO is perceived to be a military-based concept rooted in military terminology. Some suggested that an innovative, multi-disciplinary process is needed to bridge the gap between various government organizations. This new approach would require a new vocabulary, based on language that could be understood by all involved, as opposed to the highly technical and culturally-specific DND lexicon that, when used, often inhibits cooperation across government departments.

Defining EBO. As we have seen, there are many approaches to and definitions of EBO. Some participants found Edward A. Smith's definition concise and relevant: "Effects-based operations are coordinated sets of actions directed at shaping the behaviour of friends, neutrals, and foes in peace, crisis, and war."[1] EBO in this context included, for them, the requirement to coordinate efforts among all the instruments of national power, as well as a requirement to emphasize psychological or cognitive, versus physical, effects across the spectrum of conflict.

Other participants noted that a US study of EBO emphasized the following points that were consistent with Smith's definition:

1. the importance of linking all actions (political, diplomatic, economic, and military) to operational and strategic outcomes;

2. the continuous assessment of the effect and adaptation, as needed, of plans and actions to the reality of conflict;

3. thinking about the implications of actions and operations in terms of their second-, third-, and n^{th}-order effects; and

4. thinking about the implications and consequences of effects over time.[2]

Applying EBO Today. There was a general consensus among the workshop participants that, in today's complex security environment, EBO should be applied in a comprehensive and holistic whole-of-government way. In the context of using EBO in a whole-of-government approach, some participants suggested examining the British "Comprehensive Approach (CA)," which refers to a means of coordinating government efforts to obtain particular outcomes during complex emergencies. In the "Comprehensive Approach" it is understood that the military may not be the lead agency in many cases and may have to conduct enabling or supporting operations for other government departments.[3] The British "Comprehensive Approach" requires military planners to examine and consider lines of operations other than military ones when planning international or domestic operations. Some felt that this type of approach to operations offered a means of inculcating a culture of information sharing and collaboration among various actors and optimized

parallel and integrated planning and execution with other government departments to attain government objectives. A major caveat to the use of EBO in this way is that it depends on clearly articulated strategic intent or government aims, and, historically, Western governments have been reluctant to clearly articulate their strategic intent or aims.

Linkages and Relationships Among EBO and Operational Art, NCW, NEOps, Information Operations, and Adversary Intent. There were a variety of opinions expressed during the workshop concerning linkages between EBO and other ways of thinking about military operations, such as Operational Art, network-centric warfare, Network Enabled Operations, and information operations (Info Ops), as well as more general concepts in the national security lexicon, such as strategic art and adversary intent. It was suggested that Canada needs to have a mechanism for strategic level coordination, akin to the US National Security Council, that could be used to implement Strategic Art by integrating the activities of many different actors in the whole-of-government approach, as well as determining which processes and concepts, (e.g., EBO, operational art, NCW, NEOps, Info Ops, and adversary intent), should be used in particular circumstances. Based on the notion that EBO is fundamentally an intellectual process, it was proposed that, in this context, EBO could elevate operational art to the level of "strategic art."

A difficulty in practicing both operational art and strategic art today, according to some at the workshop, is that that too much of the intelligence product now used is based on kinetic factors and the physical capabilities of the opponent, while not enough effort is devoted to understanding the adversary's culture and other non-physical factors. Some believed that an EBA could be used to try to better understand and predict adversary behaviour based on culture and other non-physical factors. However, to use this EBA successfully, a better understanding of the concept of "adversary intent" is required.

Some participants suggested that "adversary intent" could best be understood in the context of complex adaptive systems, using Basil Liddell Hart's analogy of the "Man in the Dark" where conflict was described as a fight between two men in a dark room and each combatant fights using very limited information about his opponent. However, this simple analogy assumes the adversary's only intent is to beat his opponent, whereas this may not be the case. The adversary may engage in combat as a way of influencing his opponent's future actions. Furthermore, the analogy does not take into account the fact that adversaries, and others we wish to influence, are complex adaptive systems, and that both the initiator and the target of EBO change during and as a result of the interaction. In these circumstances, the intent of one or both parties could change during the interaction, and, therefore the effects required to achieve subsequent change could vary as well.

This simple analogy also does not account for the fact that there are spectators to this combat, for example, an international audience to some conflicts created by global media. This complicates operations for an armed force because it needs to consider how its actions might be interpreted by various parts of the audience, as well as those present in the area of operations, in order to reduce potentially negative and unintended consequences of its actions.

EBO and CF Force Employment. There was general consensus among the workshop participants that EBO, if employed by the CF, would affect its force employment. It was noted that many of the CF's current effects-based capabilities, such as the capacity to conduct Info Ops through psychological operations, military deception, and computer operations has been relegated largely to the Reserve component of the CF. This situation was attributed to a culturally-based preference in the CF for kinetic approaches to operations, which has resulted, some claim, in Info Ops not being included in the planning process, because Info Ops and similar capabilities are seen as peripheral roles for the CF. The result is that these capabilities are not being developed in a coordinated fashion.

Using an EBA to force employment, many participants argued, would have significant advantages. An EBAO could conceivably underpin a new whole-of-government approach to Canada's actions domestically and abroad by ensuring better organizational structures, better use of resources, and better co-operation among government agencies and levels of governments, while at the same time avoiding unnecessary duplication of effort. Furthermore, EBO has the potential to give those involved in the whole-of-government" approach a clearer understanding of responsibilities, clearer lines of communications among all agencies involved, and the potential to be a catalyst for the creation of effective networks and linkages among those involved.

An impediment to an effective whole-of-government approach in Canada is that the CF, as the only organization in the Canadian government with a formal, yet flexible, planning process and a mission-focussed organizational culture, has often led multi-department planning teams even when the CF was not the lead agency. This situation has sometimes been described as "leading from behind." Some participants suggested that in these circumstances, the CF may need to adapt to other organizational cultures and accept that the inability of these other organizations to formulate and implement plans as skilfully as the CF, does not mean that the CF must assume responsibility for them. It was suggested that in these situations, the CF should encourage other government departments (OGDs) to assume the commensurate level of responsibility in their areas of expertise and lines of operation.

From a CF point of view, some participants argued that EBO could prove to be a better tool for ensuring that desired military effects are clearly articulated *before* forces are deployed. EBO could also help to ensure that effects are focussed on national priorities as opposed the needs of a single environment (i.e., army, navy, or air force) or group.

EBO and CF Force Development. As with force employment, there was general consensus among the workshop participants that EBO, if employed by the CF, would affect its force development. Force development was taken to include such issues as concepts, doctrine, force structure, and personnel development strategies. It was also noted that force development is a long-term process, whereas force generation occurs in response to short term needs. One way of looking at the difference between force development and force generation is that force development is about the structure of the force, while force generation is about the creation of forces to meet a specific need.

It was noted that with the defence, diplomacy, development and commerce (3-D +C) approach, CF force development issues and activities are evolving, but that this process is far from complete. For example, the CF has not yet addressed the issue of interoperability with NGOs, and EBO could be a tool to assist with addressing this and other deficiencies.

Among the force development options, it was suggested by some that the CF needs greater intelligence and analytical capabilities if EBO is to be used successfully.

A problem that has affected CF force development in the post-Cold War era is that doctrine and concepts, including those related to EBO, have not kept up with the pace of change in the CF; therefore, much of the change has been ad hoc.

EBO and CF Force Generation. Force generation, as noted above, was understood to involve the creation of forces to meet a specific need over a relatively short period of time. Force generation includes such issues as recruiting, selection, training and education. Solid force development principles and activities should serve as the base for force generation; however, as we have seen, force development in the CF has been hampered by deficiencies in doctrine and concepts. Therefore, many recent force generation activities have been ad hoc, with predictable adverse outcomes to the long-term health of the CF as an organization.

One immediate effect of EBO on force generation, if it is accepted by the CF as a philosophy, is that the CF will need to be able to obtain the right people with the right skill sets to use an EBA. EBO will require people with critical thinking skills, who are able to understand various cultures, and who are able to conduct analyses to foresee and avoid potential problems. If the CF is not able to meet these personnel requirements with people in uniform, it must devise ways to obtain the required expertise from outside the CF.

A vital part of force generation is a combination of military training and professional education. It was noted that not only will CF training and education institutions have to prepare CF members, and perhaps others, for work in an EBO environment, but also that the CF must collaborate with other partners, inside and outside of government, in developing appropriate training and educational experiences that adequately prepare personnel to work in an effects-based whole-of-government approach to Canada's security issues.

Summary. While workshop participants acknowledged that EBO is an evolving concept that is interpreted in different ways by different people, if Canada is to be an effective alliance or coalition partner, members of the CF need to both fully understand EBO as a concept and know how EBO might apply in a Canadian context.

There was some consensus among workshop participants that EBO should be seen as a philosophy, rather than a process, and that philosophy implied a top-down, integrated approach that could be used by a government to achieve a nation's strategic objectives. The idea that effects-based operations are "coordinated sets of actions directed at shaping the behaviour of friends, neutrals, and foes in peace, crisis, and war," based on Smith's definition,

seemed to many workshop participants to be a good working definition of EBO. However, many at the workshop felt that the term "effects-based approach to operations" (EBAO) was a better term to use than EBO, as EBO had become associated with a technologically-based, largely air force way of conducting operations.

If EBO was to be used as a means of achieving national strategic objectives, it was felt that EBO needed to be applied in a comprehensive and holistic whole-of-government way. Furthermore, the changes that were to be produced needed to be based on outcomes, as opposed to inputs or outputs, and the changes had to be observable and measurable. A number of obstacles were identified to implementing an effects-based whole-of-government approach in Canada, including different goals and aims, as well as cultural differences among government departments. The appearance that EBO was a military methodology where the military was expected to take the lead, and a failure by successive Canadian governments to clearly articulate their strategic goals or intent were also identified. Another impediment to introducing an effects-based whole-of-government approach in Canada is the lack of a clear and widely accepted definition of EBO and the relative immaturity of the EBA at the moment.

If EBO is to be successfully applied as whole-of-government approach in Canada, it was suggested that Canada needs to have a mechanism for determining how strategic objectives could be attained, determining which processes could be used to optimize the achievement of these objectives and then coordinating among various actors in the application of the selected processes.

The EBA could have a significant positive impact on force employment, force development and force generation, workshop participants concluded. If an EBA is used in a whole-of-government approach, however, OGDs might need to be brought into the CF force development process in order to incorporate their expertise at an early stage in the CF change process. Force development plans will need to address how to maintain the CF's kinetic capability while improving its non-kinetic capability. In terms of force generation, critical thinking skills, an appreciation of intelligence products and the importance of cultural factors will need to be important parts of CF training and education if the EBA is to be used by it. Using an EBA, force employment could have significant advantages if it were part of a whole-of-government approach linking the actions of various agencies to Canadian strategic objectives.

At the moment, the EBAO has a great deal of potential to make a useful contribution as a guiding philosophy for the achievement of Canadian strategic objectives. However, to be a useful tool in this process, much more refinement of the theory underlying EBO and related concepts is required. The utility of the EBA to the operational and tactical realms of operations will also be problematic until the theory of the EBA is developed enough so that its practical applications can be derived.

Notes

1. Edward A. Smith, Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis and War, (Washington, DC: U.S. Department of Defense, 2003), 108.

2. Colonel J.F. Cottingham, "Effects-Based Operations: An Evolving Revolution," unpublished paper written as part of the MA in War Studies program, Royal Military College of Canada, July 2004, 33-34.

3. *The Comprehensive Approach*, Joint Doctrine Note 4/05, (Shrivenham: UK Joint Doctrine and Concepts Centre, 2006), pp. 1-1 to 1-2.

Part IV - Assessing Effects-Based Approaches

Chapter 5
The History and Theory of Naval Effects-Based Operations

Commander Kenneth P. Hansen[1]

Naval writers have largely shunned the discussion of effects-based operations (EBO), with at least one authority rejecting the concept outright.[2] While airpower advocates and air-land battle theorists have had rich discussions about such things as whether the origins of the EBO concept date from the inter-war period or from the post-Vietnam war era, the best naval writers have been able to muster is to question the impact of network-enabled operations (NEOps) and network-centric warfare (NCW) on the application of operational planning processes (OPPs).[3]

Where is the naval discussion of EBO in relation to the historical principles of sea power? What is the relationship between networked naval information systems and naval warfare theory? The importance of history and theory to Canadian military professionals for gaining an understanding of NEOps as a useful tool was emphasized at a conference held in late November 2006. Interestingly, the discussion paper tabled at the conference stated: "… each service in a nation's armed forces have their own unique paradigm of how military operations should be conducted based on the physical environment in which they operate, their historical experience, and their culture." The paper recognized that the notion of a one-size-fits-all approach to command and control may not be advisable despite the desirability of increased jointness, and that there is no consensus between the services on the meaning of applicable terminology, nor is there a standard model for a networked command and control system.[4]

In effect, the Canadian discussions about EBO and the relevance of NEOps to joint warfare have, once again, highlighted the fundamental differences between sea power and land power.[5] However, EBO advocates are advancing the notion of its joint applicability without any reference to naval historical context and unsupported by an appreciation of the underlying theories of naval warfare. Before any commitment is made to the development of an EBO-based joint doctrine that would compel a common approach to conceptualizing missions, revising planning processes, and changing the traditional conduct of operations, at least a cursory knowledge of the roots of EBO in naval history and the theoretical purposes of NEOps is essential. Once so informed, the long history of deriving strategic effects from naval operations lends new credibility to the applicability of deriving effects through broadly-based operations, but the purely attritional nature of tactical naval warfare serves as a warning against replacing existing theory and methods with an effects-oriented approach to planning and conducting naval operations.

When, in 1911, Sir Julian Corbett set about to frame naval warfare theory in the joint context, he did so against the backdrop of major turmoil in British naval policy. With the "Dreadnought Revolution" as a backdrop and the First World War looming, Corbett's writings found very little support at the Admiralty, whose leaders were focussed on the notion of a single major fleet engagement deciding the outcome of the war. In a significant departure from the seminal works of Admiral Alfred Mahan, whose writings had captivated the imagination of navies worldwide, Corbett argued that war could not, except in the most rare of circumstances, be decided solely by naval action, and that its normal *effect* was always slow to be felt. Corbett knew that the diverse effects of naval power had their origins in antiquity. Because people live upon the land, naval power's purposes should always be aimed at either enabling or enhancing (or both) the strategic potential of land power, he said.[6]

Corbett's writings did not benefit from a unifying concept of war, such as Carl von Clausewitz's, which made no statement of any kind on naval warfare. Despite this limitation, most naval historians and theorists have borrowed extensively from Corbett's work as they refined their understanding of the relevance of sea power in joint operations, although some continue to question the applicability of Clausewitzian theory to all levels of war.[7] Corbett's grasp of history and theory allowed him to devise a broad view of the utility of sea power and how it may be exercised in the joint context. Although his theories rankled many flag-rank officers in his day, they were consistent with the fundamental principles of naval thought and seamanship that are the basis of naval doctrine.[8]

The very long developmental history of naval doctrine can be traced in the professional literature as far back as 1270,[9] but Corbett knew that naval forces have practiced the fundamental concepts and functions of maritime operations since warships were primarily oar-powered and their main weapon was the ram. Although the advance of technology meant that the sophistication of the equipments in warships increased phenomenally, the basic capabilities that dictate whether or not a warship can be assigned to various missions and tasks can still be described with the same terms as they were centuries ago, as shown in Table 5-1.

Whether warships were propelled by oars, sails, or screws, Corbett knew that there was a dynamic tension between the need for naval forces to concentrate to enhance their offensive and defensive powers, and the need to disperse over a broad area of ocean in order to gather the information needed for the commander to confidently carry out the assigned mission or task. The concept of "Sea Control" demanded that the assigned area be under the surveillance of a capable naval force, which had the inevitable effect of forcing the fleet to spread out. Nevertheless, within the assigned area, intensive concentration was safe and effective for the fleet locally, but in this situation, enemy naval forces could operate with impunity just outside of the assigned area away from any concentration of forces. Therefore, the area was not, strictly speaking, "under control." Excessive dispersion, on the other hand, allowed commanders to surveille their assigned areas effectively, but presented possibilities for defeat in detail of their forces, sometimes with an attendant loss of the all-important numerical advantage and the inability to achieve tasks due to disaggregating.[10] The ability to concentrate in a timely fashion in order to engage effectively was always the greatest challenge for naval operational-level and tactical-level commanders.

Roles	Concepts	Functions	Capabilities	Missions	Tasks
Military	Force Counterforce Sea Control Sea Denial Deterrence Lines-of-Communication Concentration Dispersion Interdiction Centre-of-Gravity Manoeuvre Poise Logistical*	Power Projection	Strike/Move/ Impose	Capture/Secure/ Invade/ Evacuate	Sink/Disable/Land/ Embark
		Fleet Engagement	Attack/Defend	Destroy/Protect	Engage/Patrol/Screen
		Fleet-in-Being	Attack/Defend	Contain/Protect	Distract/Patrol/ Engage
		Trade Warfare	Attack/Defend	Destroy/Protect	Sink/Escort/Patrol
		Exclusion	Prohibit	Exclude	Stop
		Support	Sustainment	Replenish	Provide
		Sealift	Movement	Transport	Embark/Disembark
			Command**		
			Coordinate**		
			Control**		
Constabulary	Domain-Awareness Sovereignty Stewardship	Safety of Life at Sea	Administer/ Respond	Facilitate/Monitor	Surveille/Search/ Rescue
		National Authority	Assert	Enforce/Facilitate	Surveille/Patrol/Stop
		Oceans Management	Enable/Assert	Facilitate/Enforce	Surveille/Patrol/Stop
		Aid to the Civil Power	Augment	Facilitate	Assist
Diplomatic	Rule of Law Human Rights Pride Reputation Credibility	Disaster Relief	Movement/ Respond	Facilitate/Direct	Assist/Provide
		Deterrence	Presence/Coercion	Prevent/Dissuade	Demonstrate/Show
		Evacuation	Movement/ Accommodate	Remove	Rescue/Protect
		Interception	Inspect	Enforce	Monitor/Stop
		Representation	Host/Visit	Facilitate	Demonstrate/Show
		Cooperation	Communicate***	Various	Demonstrate/Show

Logistical* - Includes: endurance (mechanical and human), range, reach (logistical in conjunction with combat-related functions), capacity, and rates of supply, movement, and consumption.

Command** - (as well as Coordinate and Control) are capabilities relevant to all roles in all functions.

Communicate*** - in the sense of relating intent in a comprehensible fashion.

Table 5-1. Maritime Operational Descriptive Terminology

Once opposing naval forces came into contact, the effects of gun-based firepower resulted in attrition that had a very predictable outcome based on the numbers of the two sides. In the symmetrical engagements that were predominant in Corbett's time, technological advantage almost never outweighed numerical advantage because force-on-force engagements resulted in attrition to both sides, and the side with a numerical advantage tended to slowly "erode" the combat power of its opponent, despite any technological advantage that the opponent might have. As the action wore on, the advantage tended to grow for the numerically superior side and the outcomes of extended engagements were typically disastrous for the inferior force. While the slow progress of erosive firepower gave opportunities for inferior forces to disengage from a potential calamity, the only way for an inferior force to defeat a superior force was to locate the opposition first, manoeuvre aggressively so as to concentrate what forces the inferior force could against a part of the superior force's fleet, and then to quickly exploit this temporary vulnerability in the superior force by striking first at the point of contact.[11] This happened only rarely in history.

Just as Corbett was writing, a major change began to take place in the way naval firepower was delivered in combat. Rather than erosive firepower from guns, a "pulsed" form of firepower from such weapons as torpedoes, aerial bombs, and eventually missiles, began to change the way that major fleet engagements and other minor tactical actions were conducted. Enormous amounts of destructive power could be delivered in a very brief span of time, which had the potential to destroy even major warships outright or to render them ineffective for further combat. As time progressed, the threat from torpedo boats and submarines, aircraft (including suicide attacks), and unmanned vehicles launched and controlled from shore or the air, challenged the two ancient standard methodologies of naval organization for combat. While concentration for attack and massing for defence could still be effective, the consequences of an enemy firing effectively first could be so instantaneously devastating that no opportunity to disengage and save the majority of the fleet from destruction existed. As the destructive potential of the attacker increased, the importance of scouting for information compelled further dispersion for both the attacker and defender, but weakened both the potential of their striking power and their counterforce defensive power.

What finally prompted a radical change to the traditional tension between the need to disperse (to gather information) and concentrate (for layered defence) in naval warfare was the Information Technology Revolution. This combination of information gathering, processing and display, and dissemination capabilities made it possible to simultaneously extend the information gathering network for the sake of area control, and allowed dispersed units to engage in an offensive fashion without the need to first concentrate to be effective. In this context, the question of massing for defence becomes a very complicated series of calculations that weigh the relative strength of the attacker versus the defender. To put it simply, when massing is expected to be effective for defence, the fleet should be concentrated, which implies a loss of effectiveness for scouting. If the aggregate defensive capabilities of the fleet are inferior to the attacking capabilities of the enemy, the fleet should be dispersed to prevent annihilation, which will surely occur if the enemy can penetrate the defender's anti-scouting and counterforce measures.[12] Thus, for the first time in naval history, a truly

revolutionary development changed the ways in which naval warfare theory is applied to the principal function of fleet engagement and how subsidiary forms of tactical actions are conducted in practice.

Level*	Aim	Methods	Concepts	Tasks	Effect Domains***
Strategic	Objective (Political)	Offensive/Defensive (DDD&C -Diplomacy, Development, Defence, & Commerce)	Maritime-Containment Land-Engagement	Determine End States / Major Operations**	Cultural, Cognitive, Informational, Physical
Operational	Objective (Conceptual)	Offensive/Defensive (Joint/Service/Other)	(M) From Table One (L) From Land Doctrine	Determine Major Operations** / Synchronize Capabilities	Informational, Cognitive, Cultural, Physical
Tactical	Objective (Physical)	Offensive/Defensive (Direct/Indirect/ Parallel)	Symmetric/ Asymmetric	Sequence Activities (Arising from Tasks in Table One)	Physical, Informational, Cognitive, Cultural

*Level is determined by the nature of the objective, not the size or capability of the forces involved.

**Determine Major Operations - historically, examples exist of major operations being determined at each level.

***Effect domains are listed in their approximate order of importance at each level.

Table 5-2. Relationship of Levels of Maritime Activity to Effects

With so much emphasis on the conduct of high-intensity combat, naval professionals are now, just as they were in Corbett's day, in danger of losing the broader view of naval effects due to the overwhelming importance of the attritional nature of naval combat. Although often overshadowed by the blindingly swift and horrifyingly destructive combat potential of fleet units, all of the other traditional functions of sea power within the naval military role, as well as the naval constabulary and diplomatic roles, remain as valid in the present age as they were in the ages of oars, sails, and the "big gun" battleships. Governments with naval capabilities are (or should be) aware that cognitive, cultural, informational, and physical effects can be derived from all levels of maritime activities, and that these missions and tasks are not, nor have they ever been, limited to naval warfare, as shown in Table 5-2. The centuries-long association of naval forces with trade warfare is the most obvious example of this truism, although maritime history is replete with a myriad of others. In complete accord with the attritional nature of naval combat, most tactical actions will have more immediate physical effects, but the more violent and decisive they

are, the more likely it is that they will also have effect in the other three domains. It is also completely consistent with naval theory that naval tactical operations are shaped against physical objectives, either directly or indirectly attacking enemy maritime capabilities. The employment of asymmetrical means to accomplish these sorts of objectives has been commonplace since just before the beginning of the twentieth century, the adherents of the *Jeune École* being among the most famous to seek strategic effect through this approach.[13]

The extreme breadth of the naval roles and their long history of application mean that sea power has always been linked to leveraging national strategic capabilities. Indeed, for maritime nations sea power has been the single most important lever, which has traditionally been used as part of a strategy of containment wherein like-minded nations formed alliances and used their collective dominance of the world's oceans to preserve their strategic advantage. Although EBO advocates claim that "focussing only on the degradation of an adversary's military combat power does not represent a holistic approach to future combat operations,"[14] sea power has always been founded on the swift and decisive application of tactical combat power against enemy fleet forces at the earliest possible juncture. Any scheme of action that imposes some other methodology is likely to result in delays and increased cost in the application of the other functions of sea power, which have been shown to be traditionally slow to take effect.

In the current context, plans to implement an effects-based approach to planning are inconsistent with the underpinning naval requirement for swift and decisive tactical engagement.[15] While naval operations in all three roles at all three levels of warfare have a long history of effects, both intended and unintended, and sea power is recognized as a robust network of associated capabilities, it is an anathema to naval logic to pause at any level of activity while attempting to ascertain whether or not an anticipated effect has been achieved. Corbett had it right when he said: "Unaided, naval pressure can only work by a process of exhaustion."[16] Sea power must be unrelenting in order for it to be effective, and it is most effective when the natural volumetric capacity and strategic speed of maritime force is used to deliver massive combat power with overwhelming effectiveness. This operational form of naval power projection is unique from the land conception of manoeuvre warfare and has been described as "power warfare." [17]

Recent analysis of the EBO approach to the planning and conduct of combat operations has produced further uncomplimentary assessments of the EBO approach. The main criticism has been that promises of achieving decisive "effects" earlier by less costly means resulted in confusion and loss of operational tempo when the desired effects could not be measured or were simply not achieved as anticipated. Secondary criticisms charged that, based on the promises of air power advocates using EBO concepts to buttress their claims, politicians authorized damaging reductions in army and navy force structures and readiness levels.[18] These observations conform to the warnings of the only naval theorist to venture into the debate and should serve as a caution to naval professionals that placing effects ahead of objectives in the planning process, or worse, replacing completely the achievement of objectives with effects, is foreign to the way that sea power has been, and continues to be, applied across the spectrum of conflict. While it is perfectly acceptable and usual to discuss

the effects of naval operations at all levels of planning, true jointness cannot be achieved by compelling naval experts to depart from a style of warfare that is both centuries old in its formulation and is in the midst of the single greatest transformation in its long history.

The signpost of only the second-ever revolution in naval affairs will be whether or not the dawning "age of robotics" will affect the traditional requirement of warships to concentrate for defensive effectiveness. Will the anti-scouting and counterforce capabilities of traditionally-disposed fleet forces be strong enough to defeat a "swarming" attack by unmanned vehicles that are both unflinchingly "courageous" and absolutely expendable? Or will networked forces develop the ability to engage collectively while still dispersed? Certainly, a suicidal willingness to press an attack to point-blank range is not new in naval warfare. New assessments claim that swarming will be a tactic employed in the near future.[19] However, modern warships are no longer built with the same degree of armour and inherent durability that was once a common physical feature of them. Likewise, the speed, range, and lethality of modern defensive and offensive weapons are much greater than ever before. When these features are combined, it will likely serve as yet another example of how the tactical conduct of naval warfare will achieve strategic effects by forcing completely new methodologies for the practical application of the ancient and still valid functions of sea power.

Notes

1. The views presented in this paper are attributable solely to the author and are not to be construed in any way as declarations of policy by the Government of Canada, the Department of National Defence or the Canadian Forces, or any member of the Canadian Forces other than the author. The author wishes to acknowledge the timely assistance provided by Prof. Milan N. Vego, US Naval War College, Newport, R.I., in locating the references by Amos Harel and Fariborz Haghshenass.

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10. Canadian Forces College, *Naval Doctrine Manual* (MCP 1) (Toronto, ON: Maritime Component Programme, 2006), Chapter 4, pp. 21-3. See also: Hughes, *Fleet Tactics and Coastal Combat,* 73-4.

11. Hughes, *Fleet Tactics and Coastal Combat*, 40.

12. Ibid., 286-90.

13. Arne Røksund, "The *Jeune École*: The Strategy of the Weak," in Rolf Hobson and Tom Kristiansen, eds., *Navies in Northern Waters, 1721-2000* (London: Frank Cass, 2004), 117-50. See also: Erik J. Dahl, "Net-centric before its Time: The Jeune École and Its Lessons for Today," *Naval War College Review* 58, no. 4 (Autumn 2005), 109-36.

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Chapter 6
Don't Drink the Kool-Aid – Effects-Based Operations

Lieutenant-Colonel Colin Magee

> "…when we speak of destroying the enemy's forces…nothing obliges us to limit this idea to physical forces: the moral element must also be considered."
>
> Clausewitz

Recent events have seen a resurgence in the desire to embrace Effects-Based Operations (EBO) as the solution to the perceived shortfalls in the current operational design and planning construct. [1] Yet despite the drive to replace contemporary elements of operational design and the Canadian Forces operational planning process (CFOPP) with EBO, there remains a level of confusion surrounding it - specifically what EBO actually is. This confusion is compounded by the fact that a large number of Canadian officers are using terms like EBO without a clear understanding of what they actually mean, or without a common agreement—doctrinally approved or otherwise—on how the concepts the terms represent should be employed. The result is a perception amongst a growing number that EBO is a commonly understood and accepted construct, which has, or is replacing the current operational design methodology. In short, they have drunk the Kool-Aid without fully understanding the implications. This perception has led some to suggest that the current construct for operational design and planning is no longer valid. The danger is that the perception is based on some false assumptions, for example, that the contemporary elements of operational design are kinetic and linear in nature. The reality, however, is that many proponents of EBO lack a firm understanding of current doctrinal concepts and that their speech and writing are filled with an unintelligible "effects-speak," which adds to the confusion and misunderstanding of both the contemporary elements of operational design, as well as EBO.

The lack of a clear understanding and consensus on what EBO is and what it is not, within a Canadian context, was highlighted at the EBO conference in November 2006, whose conclusions are summarized in Part III. Even amongst a group knowledgeable in the area of EBO, there was little agreement on either the utility of EBO or on what it actually means. Obviously, choosing an inherently imprecise term presents a range of dangers for a profession that requires precision and clarity in language to avoid misunderstandings that might lead to confusion in battles and operations.[2] While there is a great deal of literature on the subject of EBO, most seems to be "thought pieces" with little in the way of actually explaining how to apply or operationalize EBO. The foundational piece used by the participants of the conference was Colonel J.F. Cottingham's "Effects-Based Operations, An Evolving Revolution" (see Part III); therefore, for ease of reference, his work will be used in this paper as the foundational piece in relation to EBO.

EBO originated as an airpower theory that suggested an enemy could be defeated by affecting systems rather than simply servicing targets. Cottingham notes that the early proponents of airpower suggested that attacking and destroying specific targets "would result in a collapse of the enemy's economy and strategic war making ability."[3]

The early proponents used the term "destroy," which is generally associated with attritionist or old-think warfare, and not "applying effects" when describing their early version of EBO. Additionally, their focus was—and many today would argue continues to be—at the strategic level of war. The maturing of the theory saw a shift to the destruction of key nodes, which if successfully destroyed would have the maximum effect on the overall conduct of the war. This basic philosophy of key nodes is seen throughout the evolution of EBO, including that of Warden. However, Cottingham suggests that the central thesis of EBO is best captured by this statement from Force Transformation, Office of the US Secretary of Defense:

> In the …effects based contest, the objective is to break the will or otherwise shape the behaviour of the enemy so that he no longer retains the will to fight, or to so disorient him that he can no longer fight or react coherently. Although physical destruction remains a factor in EBO, it is the creation of such a psychological or cognitive effect that is the primary focus of the effects-based approach.[4]

It is from this perspective that EBO is often proposed as an alternative to attrition-based or kinetic warfare, seen by EBO proponents as the logical outcome of the contemporary operational design construct. But as General Fastabend points out, this has never been the true basis of operational design doctrine. Citing the fundamentals of campaign plans found in US Joint Doctrine Publication 5-00, Fastabend reminds us that:

> …campaigns are not isolated from other government efforts to achieve national strategic objectives. Military power is used in conjunction with other instruments of national power — diplomatic, economic, and informational — to achieve strategic objectives. Depending on the nature of the operation, a military campaign may be the main effort, or it may be used to support diplomatic or economic efforts. A campaign must be coordinated with nonmilitary efforts to ensure that all actions work in harmony to achieve the ends of policy.[5]

To realize this aim, the campaign plan seeks to achieve unity of effort with air, land, sea, space, and special operations forces, in conjunction with interagency, multinational, nongovernmental, or United Nations (UN) forces, as required. On a similar note, current Canadian Forces doctrine states, "a campaign is the integration and sequencing of operations and engagements to achieve a desired strategic effect."[6] In discussing campaign planning, the Canadian Forces College (CFC) Combined and Joint Staff Officer's Handbook (CJSOH) describes campaign design as "the Joint Force Commander's vision...of how actions and effects will be sequenced."[7] According to doctrine, there are several operational concepts

that are fundamental to the design and conduct of campaigns. Of particular interest for this paper are the end state and the decisive point. As will be shown below, these classical elements of operational design, ideas currently enshrined in doctrine, have always generated effects.

Current instruction at the CFC emphasizes "end state planning." That is, commanders and their staffs must identify the desired strategic end state and from that end state, plan how the military element of power can be applied to deliver desired effects needed to help set the conditions necessary for achieving the end state. The end state is defined as "the political and/or military situation to be obtained at the end of an operation, which indicates that the objective has been achieved."[8] B-GJ-005-500/FP-000 (*Canadian Forces Operations*) adds that the "end state includes the required conditions that, when achieved, attain the strategic goal."[9]

B-GJ-005-500/FP-000 further defines a decisive point as "a battlespace condition that must be achieved in order to threaten or attack the adversary's center of gravity."[10] The manual adds, "A sound determination of decisive points indicates the conditions that must be set."[11]

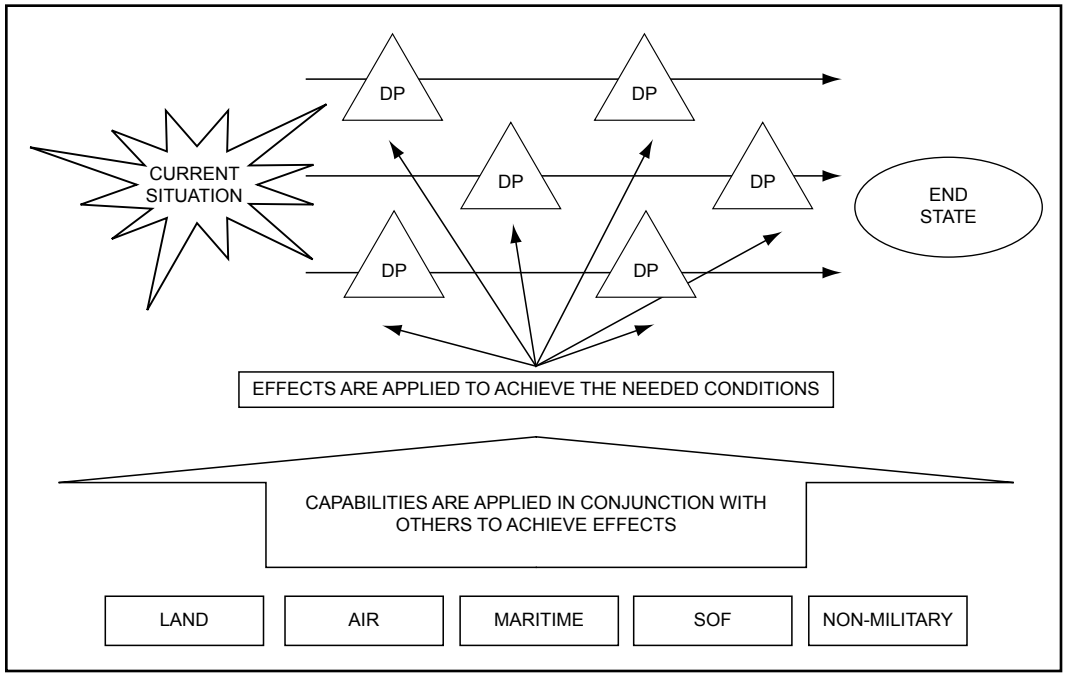


Figure 6-1. A Depiction of Aspects of the Canadian Forces Operations Planning Process

Therefore, as shown by these examples, extant Canadian Forces doctrine tells us that commanders and planners should be thinking in terms of those conditions that are desired in order to achieve the strategic goal. Furthermore, CF doctrine also says that "the essence of operational design for a campaign is in its ability to mass joint effects."[12] Thus, doctrinally,

conditions are realized by applying effects in the battlespace. The identification of those battlespace effects needed to achieve the desired conditions is listed as a task—orientation—under stage two of the CFOPP.[13] As the process progresses from operational design to operational planning, in discussing targeting, doctrine states that the prioritized target list includes "the desired effects."[14]

In short, in order to achieve the desired end state a number of conditions must be met (decisive points). In order to achieve the desired conditions, effects must be applied, and effects are generated from capabilities available to the joint force commander (JFC). Figure 6-1 illustrates this process in the current operational design and planning construct.

In examining Antulio Echevarria's ideas, Cottingham concludes that unlike "traditional army views," Echehevarria's argument focusses on the objective and effects and in so doing "shifts the emphasis of analysis from destruction to creation of a condition or an effect."[15] It would seem from this statement that EBO is partly based on the assumption that until the arrival of EBO, military leaders have been unconcerned by "effects." As indicated by the discussion of the current operational design and planning construct above, however, this assumption is incorrect, because the idea of effects has been clearly articulated within current CF doctrine and being taught at CFC. The reality, as expressed by Deptula, is that "the idea of targeting systems to achieve strategic results is not a new one."[16] In fact, his "emphasis on the end-state or the objective and the search for ways to create desired effects"[17] in order to achieve the end state is a consistent theme within current CF doctrine.

However, Cottingham notes that EBO has evolved from its origins, and the "second version of EBO" is, one could argue, in essence a return to doctrinal basics in which all elements of national power need to be integrated in order to achieve success. The other perspective that could be taken from Cottingham's analysis is that while EBO version 1 provides an element of success in conventional force-on-force operations—the first Gulf War and early stages of Operation Iraqi Freedom clearly being excellent examples—it is not effective in asymmetric warfare. The apparent failure of EBO version 1 was clearly demonstrated in both the Korean and Vietnam Wars, a fact that, as Cottingham points out, EBO enthusiasts generally choose to ignore.

The main weakness with EBO is that it is largely based on a reductionist approach to understanding enemy systems. That is, EBO seems to work reasonably well with systems that have low interactive complexity, but they will fall flat against systems with high interactive complexity, such as social, military, governmental, political, and economic systems. As Fastabend argues, "there are differences between structurally complex systems—such as integrated air defense systems and power grids—and interactively complex systems—such as economic and leadership systems."[18] Given that the entire Air Force planning model is focussed on targeting, and for the most part on physical systems, EBO is eminently sensible for the Air Force. However, conflict, especially at the operational level, occurs in more than the physical domain. In the physical domain, the world of cause and effect, EBO might work, within the limitations discussed above. In the information domain, the realm of decision-making, not only by military commanders but also by populations

and whole societies, the causal effects of action are far less clear. Those causal linkages disappear completely in the moral domain, the realm of belief, conviction, and motivation.[19] It is, therefore, dangerous to pretend that databases and science drive the moral domain.[20] Operational planners can understand the physical domain using the reductionism of systems analysis; however, they can only understand the second and third type of domains holistically.

In an apparent attempt to keep the concept alive, some participants at the DRDC workshop suggested that EBO is entering into, or is actually in, its third stage of evolution, or "third version." This third version is one that posits not only the integration of all elements of national power, but also a renewed focus on the moral as well as the physical plain. There is a great deal of literature that equates EBO to operations using all elements of national power, often referred to as joint, interagency, multinational and public (JIMP) operations. But the JIMP approach is also embedded in existing doctrine; this is clearest in US Joint doctrine, which states:

> All JFCs [Joint Force Commanders] are responsible for unified actions that are planned and conducted in accordance with the guidance and direction received from senior authorities (i.e., NCA [National Command Authority], alliance or coalition leadership, and superior commander). JFCs should ensure that their joint operations are integrated and synchronized in time, space, and purpose with the actions of other military forces (multinational operations) and nonmilitary organizations (government agencies such as the Agency for International Development; nongovernmental organizations (NGOs) and the UN).

The limitations of a solely military solution to complex problems are also highlighted by the CJSOH, when describing peace support operations. In this type of operation, the military campaign "is not conducted with the aim of achieving the end state, but of setting the conditions within which diplomatic, humanitarian and developmental agencies can successfully achieve this objective."[21] This is a clear acknowledgement of the need for a whole-of-government or JIMP-like approach. There is a consensus that the joint force must be better at integrating all instruments of national power and broaden its perspective beyond just military force, resources and actions. EBO does set a higher premium on integrating the other instruments of national power and calls for a better understanding of the operational environment. But perhaps EBO brings with it, not a newer and more effective design and planning construct, but rather a less intimidating lexicon. Military planners, particularly Army planners, consistently underestimate how the fundamentals of military planning can be intimidating to those not in the military, "and sometimes to other services," as Fastabend jokes. Many can be intimidated by terms like "mission," "objective," "end state," and "assumptions," as used in the military planning context because of a perceived focus on lethal means; therefore, a lexicon that moves away from the perceived focus on lethal means is desirable. What is also clear is that the language of effects, either from EBO or from extant doctrine is more suited to working with interagency, other government agencies, and non-governmental organizations.[22]

Yet despite EBO's shortcomings, its proponents continue to push it as "the way ahead" and in doing so fail to acknowledge that many of the fundamental aspects of EBO are already incorporated within contemporary operational design. While this difference of professional opinion can lead to a series of thought-provoking debates, it has resulted in diverting intellectual efforts from clearly refining existing concepts, while identifying those opposed to EBO as dinosaurs or anti-transformationalist.

In summary, we do not need another label that on the surface suggests a newer, better method of solving complex operational problems, but in reality only serves to confuse an already complex environment. Words have consequences, outcomes, and "effects," and the military should think carefully about what those effects are. The joint force is dealing with operational art – the linkage of tactical means to strategic ends. As US Army General Wallace is quoted as saying: "It's kinda sort of important!"[23] There is no reason to reinvent the wheel, as the current doctrine and concepts explicitly and implicitly point the commander and planner to thinking effects. Joint doctrine effectively describes current constructs for planning and operations; therefore, this doctrine should not be wholly supplanted by EBO concepts and methodologies. But there is some room for improvement in current doctrine. This could be accomplished by integrating a few of the elements of EBO into current processes, or by clarifying some of the extant doctrine to ensure a better integration of other instruments of national power with military power; a better, systemic understanding of the operational environment; and a better assessment of the effects of our actions against the achievement of objectives and the end state. But these actions should occur using the current constructs for design and planning, thereby reducing confusion and providing the joint force with improved capability. Put down the cup of Kool-Aid and read, and then apply existing doctrine.

Notes

1. Current operational design and planning consist of a number of elements. For the purposes of this paper the term "contemporary elements of operational design" will be the overarching term used to include centre of gravity, decisive points, and lines of operation.

2. Taken from a briefing package presented by Major-General David Fastabend, Commander US Army Training and Doctrine Command (TRADOC) Futures on 31 Jan 2006. In possession of the author.

3. Colonel J.F. Cottingham, "Effects-Based Operations: An Evolving Revolution," unpublished paper written as part of the MA in War Studies program, Royal Military College of Canada, July 2004, 8.

4. Original quote from United States, *Military Transformation: A Strategic Approach* (Washington, DC: Director, Force Transformation, Office of the Secretary of Defense, Fall 2003), 36.

5. Fastabend presentation.

6. DND, *Canadian Forces Operations*, B-GJ-005-300/FP-000 (2004), p. 3-1.

7. Canadian Forces College (CFC) Combined and Joint Staff Officer's Handbook (CJSOH), p. II-1-3/16.

8. *Canadian Forces Operations*, B-GJ-005-300/FP-000, p. 3-1.

9. Ibid., p. 2-2.

10. Ibid., p. 3-1.

11. Ibid., p. 2-3.

12. Ibid., p. 2-8.

13. Ibid., p. 4A-1.

14. Ibid., p. 5-9.

15. Cottingham, 33.

16. Ibid., 20.

17. Ibid., 21.

18. Fastabend presentation.

19. Ibid.

20. The dissatisfaction with EBO has resulted in a growing interest in Systemic Operational Design, developed by Israeli Brigadier (Reserve) Dr Shimon Naveh, which moves from a science-based predictive approach to a philosophical-based approach for analysis.

21. CFC, CJSOH, p. II-1-6/16.

22. Fastabend presentation.

23. Ibid.

Chapter 7
Putting Lipstick on a Pig: The Effects-Based Approach and Strategic Art

Lieutenant-Colonel Craig Dalton

> The practitioners of EBA (effects-based approach) profess many assertions and defend their methods at the level of doctrine. However, the deep theory of the effects-based approach rests on several philosophical mistakes – metaphysical, epistemological, and logical mistakes…We should expect mostly mistakes as a result of a practice resting on a mistaken theory, for only by accident and not by design could anything good come out of it.[1]
>
> Dr. Tim Challans

In a 1995 article entitled "Strategic Art: The New Discipline For 21st Century Leaders," Major-General Richard A. Chilcoat issued an appeal for strategists to "match success in the development of operational art and joint doctrine with an equally comprehensive approach to strategic art as a distinct discipline…."[2] Considering the complex challenges confronting practitioners of strategic art in the contemporary operating environment, as evidenced by the ongoing conflicts in Iraq and Afghanistan, Chilcoat's appeal may be more pressing than ever. While this paper does not in any way attempt to fully answer his appeal, it does intend to contribute in a small way to the development of strategic art by considering the following question: Could application of the effects-based approach enhance the practice of strategic art in a Canadian context?

In order to consider whether or not application of the effects-based approach could enhance the practice of strategic art, one must address two seemingly simple, yet in reality somewhat difficult, questions. First, what is strategic art? Second, what is the effects-based approach? The intent is for this simple, yet logical approach to shed light on both concepts and to lead to some relevant conclusions regarding the potential application of the effects-based approach to the practice of strategic art.

To define and develop an understanding of strategic art as a discipline, one must take a step back and first consider the meaning of the term "strategy." When doing so one should bear in mind the words of Arthur F. Lykke, Jr., who observed that strategy has "no universal definition, nor even the approximation of a consensus."[3] Lykke further contended that a plethora of definitions and loose application of the term "strategy" detracts from sound consideration of this important and complex subject.[4] Mindful of Lykke's observation and hopeful to avoid detracting from sound consideration, it therefore seems prudent to begin by defining the following terms: "national strategy," "military strategy," and the associated concept of "strategic art."

Fortunately, Canadian Forces doctrine is quite helpful in this regard. B-GJ-005-300/FP-000 – *Canadian Forces Operations* considers military strategy and the application of the military instrument of power within the context of national security strategy, noting that "a nation employs all of its resources - political, economic, scientific, technological, psychological and military - to achieve the objectives of national policy." Canadian doctrine further defines military strategy as "that component of national or multinational strategy that presents the manner in which military power should be developed and applied to achieve national objectives or those of a group of like-minded nations."[5] From these passages, one can see that the CF perspective on national strategy (the application of all instruments of national power in pursuit of national objectives) and military strategy (the co-ordinated application of the military instrument of power in support of national security interests) is consistent with the commonly accepted western strategic paradigm of co-ordinated ends, ways and means. Of note, from the perspective of strategic art, is the emphasis that CF doctrine places on the requirement to co-ordinate the various instruments of national power and to consider the multinational perspective.

Canadian doctrine is less helpful in defining or addressing the concept of strategic art. Presently, Canadian doctrine does not acknowledge strategic art as a practice, nor does it discuss strategic art from a theory or process perspective, suggesting that perhaps Chilcoat's appeal has gone largely unanswered in this country. Therefore, in the absence of a Canadian definition, this paper employs Chilcoat's definition of strategic art, which is consistent with the CF's definition of strategy. He defined it as follows: "Strategic art entails the orchestration of all the instruments of national power to yield specific, well-defined end states. Strategic Art, broadly defined, is therefore: The skilful formulation, co-ordination, and application of ends (objectives), ways (courses of action), and means (supporting resources) to promote and defend the national interests."[6] Armed with suitable definitions for the terms "strategy" and "strategic art," it is time to consider the environment in which they are practiced.

In a 2002 article entitled "Operational Art for the Objective Force," Colonel James K. Greer identified the challenges posed by the contemporary operating environment, highlighting its increasingly complex and adaptive nature and suggesting that the evolving security environment demanded a new approach to operational and strategic art.[7] Citing examples of what he termed "full spectrum operations," Greer argued that the traditional approach to the application of the military instrument of power was of little benefit to commanders and planners in their efforts to design campaigns and major operations beyond conventional force-on-force scenarios. In short, traditional approaches failed to address two key characteristics of the contemporary operating environment: the demands associated with functioning in a complex adaptive systems environment, and the requirement to integrate, to a new degree, all the instruments of national power in considering problems in a broader context. While Greer focussed specifically on the operational level of warfare, his insights—shared by numerous military theorists and practitioners of strategic and operational art—applied equally to the strategic level of war and to the practice of strategic art. Greer not only identified the challenge posed by the contemporary operating environment, he also identified a number of emerging concepts that offered potential benefit to practitioners of operational

and strategic art. One of the concepts identified by Greer, the effects-based approach, has since been the subject of considerable research, experimentation and development. Recently, versions of the effects-based approach have been incorporated, to varying degrees, into both US and UK joint doctrine, which prompted this inquiry into the potential application of the effects-based approach to the practice of strategic art in a Canadian context.

In examining the effects-based approach, one must be aware that there is no single, commonly accepted definition of the term. Rather, there are numerous versions of the effects-based approach and at least 12 different definitions.[8] Moreover, while the different definitions and versions of the effects-based approach share some common themes, debate abounds as to the theoretical and logical soundness of the concept in general, as well as the many varied processes associated with particular versions. J.P. Hunerwadel, a proponent of the effects-based approach, noted: "there are as many opinions about what EBO actually is as there are people who have written on the subject….We talk effects, we teach effects, we claim to 'do' effects, but we've come to no definitive conclusions concerning what effects and effects-based means."[9] The intent in exposing this fact here is not to critique the effects-based approach, as satisfying as that temptation may be. Instead, the intent is merely to set the stage for further discussion below and to serve as a caution for subsequent consideration of its potential utility as an enabler of strategic art.

From its beginnings in the US Air Force as a targeting methodology, to its development (in concert with the concept of network-centric warfare) as a theory of war, to its present existence as an enabler of operational and strategic art (in US joint doctrine), and a philosophy (in some UK joint doctrine), the effects-based approach has generated considerable debate amongst theorists and practitioners of operational and strategic art. Proponents suggest that the effects-based approach "is a mind-set …that should be inherent in all military operations" and contend that adopting this "mind-set" will "ensure that military strategy, if successfully completed, will achieve or contribute to the political goals set before it."[10] Proponents of EBO also argue that "conceptually, EBO may enable desired aims to be achieved without the need for attritional warfare…."[11] Furthermore, US Joint Doctrine on Effects Based Planning prescribes particular processes based on the premise that the effects-based approach holds the key to addressing the challenges posed by complex adaptive systems.[12] At the less deterministic end of the spectrum is the British effects-based philosophy which suggests that "the military instrument needs to act in harmony with the diplomatic and economic instruments of national power in taking a long-term view to address both the underlying causes and the overt symptoms of a crisis," and that the effects-based approach "…considers the whole environment, recognising that it is complex, unpredictable and adaptive…."[13] On the surface, this broad range of claims suggests that the effects-based approach holds much promise; however, there are many who dispute these claims and question the uniqueness and/or validity of the effects-based approach.

Critics of the effects-based approach range from those such as Ralph Peters (who suggests that "EBO isn't a strategy. It's a sales pitch…"),[14] to those such as Tim Challans (who argues that the effects-based approach fails to accommodate moral concerns), to those such as J.P. Hunerwadel (who, while ultimately a supporter of the effects-based approach,

takes a much more reasoned and balanced view of what it is and is not, thereby countering those who "worship at the altar of Effects").

Peters captures a number of common criticisms of the effects-based approach, including the contention that it is really nothing new. Rather, the effects-based approach is merely the latest example of a "recurring American delusion – the notion that, if only we can discover it, there must be a formula for winning wars on the cheap."[15] Peters also suggests, as have many other critics of the effects-based approach, that warfare has always been about achieving effects, thus countering the rather simplistic and difficult-to-accept argument that, somehow, objective-based and effects-based operations are mutually exclusive. Finally, Peters addresses the plethora of opinions and definitions of the effects-based approach and suggests that if a concept cannot be clearly and simply defined or explained then it will not work.

In a 2006 presentation to a joint services conference, Challans addressed the moral implications of adopting the effects-based approach. In the process, Challans presented an insightful and sound critique of the effects-based approach from a scientific and theoretical perspective, and contended that the effects-based approach "rests on several philosophical mistakes – metaphysical, epistemological, and logical."[16] More specifically, Challans revealed how proponents of the effects-based approach mistakenly contend "that something as complex as human activity can be rendered and reduced and mutilated to fit the procrustean bed of behaviourism, choking the mental realm into lifelessness with their chains of cause and effect." Challans suggests that the pseudo-science-informed hubris of strategy-makers led to the conclusion that instituting democracy in Iraq was simply a matter of causality: the action of regime change would result in the effect of a democratic, less threatening Iraq. Further, Challans challenged the logic of the effects-based approach and its teleological underpinnings, observing that "imposing telos into a so-called scientific process is to misunderstand the whole enterprise of modern science."[17] Challans' thought-provoking work should give caution to any organization considering the adoption of an effects-based approach, an approach he quite accurately describes as "pseudo-scientific and pseudo-philosophical."[18]

So, in light of the dozen or more definitions of the effects-based approach in existence and the very polarized debate regarding its theoretical soundness and utility, how does one move forward in an attempt to first determine exactly what the effects-based approach is, and second, whether or not it is applicable to the practice of strategic art? The short answer is: cautiously. The long answer involves a degree of selective consideration (sorting through the noise associated with the many different versions and definitions), a more detailed analysis of some of the different versions of the effects-based approach, and an awareness of the potential pitfalls associated with adopting unsound emerging theories and practices. While detailed discussion of individual definitions and approaches is beyond the scope of this paper, the UK effects-based approach is discussed briefly below in order to consider its utility as an enabler of strategic art.

The UK effects-based approach actually comprises three interrelated concepts: the comprehensive approach, the effects-based approach, and the effects-based philosophy. The emergence of these three concepts is a result of British analysis and reaction to the emerging

realities of the twenty-first century security environment and represents acknowledgement of many of the challenges identified by Greer above. In particular, the UK effects-based approach reflects an effort to come to grips with two prominent characteristics of the contemporary operating environment: the complex adaptive nature of today's security challenges and the demand for a co-ordinated, broad, whole-of-government approach to strategy formulation.[19] Accordingly, the effectiveness of the UK approach and its potential applicability to the practice of strategic art can be examined against these two characteristics.

UK Joint Discussion Note 4/05 "The Comprehensive Approach," was a direct response to the evolving international security environment of the post-Cold War era and reflected the benefit of experience gained in the Balkans, Afghanistan, and Iraq. In short, "The Comprehensive Approach" acknowledged the complex security challenges the UK faced and more importantly, recognized the need for a comprehensive and collaborative approach to applying the "3 (diplomatic, military and economic) national instruments of power" to achieve the goals of national policy.[20] Joint Doctrine Note 7/06 "Incorporating and Extending the UK Military effects-based approach" built on "The Comprehensive Approach" and established it as a cornerstone of the UK effects-based philosophy. Joint Doctrine Note 7/06 defined the UK effects-based approach and effects-based philosophy as follows:

> *Effects-Based Approach*. The way of thinking and specific processes that, together, enable both the integration and effectiveness of the military contribution within a CA [Comprehensive Approach] (collaborative, i.e., integrated whole-of-government context) and the realization of strategic outcomes.[21]
>
> *Effects-Based Philosophy*. The UK effects-based philosophy recognises that the military instrument needs to act in harmony with the diplomatic and economic instruments of national power in taking a long-term view to address both the underlying causes and the overt symptoms of a crisis.[22]

These largely underwhelming definitions suggest that there is nothing revolutionary about the UK effects-based approach. Indeed, there is not. However, the degree to which Joint Doctrine Note 7/06 incorporates the principle of the comprehensive and collaborative approach throughout, suggests that the underlying intent is to inculcate the "whole-of-government" approach as a response to the demand to think more broadly about contemporary security challenges, both in terms of framing and understanding a problem and in formulating strategy. In this regard, the UK effects-based approach is noteworthy and potentially of great benefit to practitioners of strategic art.[23]

Unfortunately, the sections of Joint Doctrine Note 7/06 that deal with "The UK Approach to Warfare" as well as "Planning" and "Execution" merely represent a repackaging of the existing approaches to the conduct of these activities. Further, despite efforts of the author(s) to assign mystical powers to the term "effects," and attempts to convince the reader that the "new" construct based on "thematic lines of operation" and "decisive conditions" is somehow different and superior to the traditional "logical lines of operation" and "decisive

points" construct, it offers no substantial improvement over traditional approaches. Further, it lends credence to those opponents of the effects-based approach who suggest that the concept contains no new thought. In summary, the UK effects-based approach should be lauded for its forthright efforts to institutionalize the "comprehensive approach" in response to the demands of the contemporary operating environment. However, it falls short in addressing the challenges posed by the complex adaptive systems environment that confronts modern-day practitioners of strategic art, therefore suggesting that the effects-based approach is of limited utility.

The intent of this paper is to contribute, in a very modest way, to the development of strategic art. More specifically, this paper considers whether or not the effects-based approach could enhance the practice of strategic art in light of the challenges posed by the contemporary operating environment, and in particular, the demands associated with functioning in a complex adaptive systems environment and the requirement to integrate, to a new degree, all the instruments of national power.

In response to the first challenge, posed by the complex adaptive nature of the contemporary security environment, the effects-based approach comes up short and offers no improvement over existing methods. Indeed, despite the claims of effects-based approach advocates who suggest that their approach views warfare as "a clash of complex adaptive systems,"[24] the responses to this first challenge are surprisingly linear, mechanistic and teleological in nature. To suggest that talking "effects" (taking action to achieve an effect vice taking action for action's sake) is somehow the key to addressing the challenges of strategy formulation in a complex adaptive environment is simply silly. There are other approaches to confronting complex adaptive systems, such as the Israeli Defence Forces' Systemic Operational Design, that might offer greater potential and are certainly less "pseudo-scientific" than the effects-based approach.

As demonstrated by the brief discussion of the UK approach above, the effects-based approach has achieved far greater success and offers far greater potential for addressing the second challenge associated with the contemporary operating environment, that of advancing the whole-of-government or "3-D" approach. The UK's "Comprehensive Approach" and "Effects Based Philosophy" are quite forceful in this regard and serve as good examples for practitioners of strategic art. Nevertheless, one should recognize that instituting a comprehensive approach to broaden problem framing and strategy formulation as well as improving interagency cooperation is not exclusive to the effects-based approach. Rather, it could and should be pursued independently of a particular approach to warfare.

In the end, the effects-based approach (in whichever form or definition) does not enhance the practice of strategic art. It is, in my opinion, no better or worse than existing approaches, which should come as no surprise, for it is largely a repackaging of these same approaches. Indeed, one could consider the development of the effects-based approach as an exercise in "putting lipstick on a pig." The Canadian Forces should, notwithstanding the need for interoperability, therefore avoid being seduced by concepts like the effects-based approach, and should instead invest efforts into the development of a viable alternative to enable the practice of strategic art.

Notes

1. Dr. Tim Challans, "Emerging Doctrine and the Ethics of Warfare," presentation to the Joint Services Conference on Professional Ethics on Emerging Doctrine and the Ethics of Warfare, 2006. Available at http://www.usafa.af.mil/jscope/JSCOPE06/Challans06.html. Accessed 6 Sep 2007.

2. Major-General Richard A. Chilcoat, "Strategic Art: The New Discipline for 21st Century Leaders" in Joseph R. Cerami and James F. Holcomb, Jr, eds., *The US Army War College Guide to Strategy*, (Carlisle Barracks, PA: US Army War College, 2001), 203. Available at http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?PubID=362. Accessed 6 Sep 2007.

3. Arthur F. Lykke, Jr., "Toward an Understanding of Military Strategy" in Cerami and Holcomb, eds., *The US Army War College Guide to Strategy*, 179.

4. Ibid., 179.

5. DND, *Canadian Forces Operations*, B-GJ-005-300/FP-000 (2004), p. 1-4.

6. Chilcoat, "Strategic Art," for 21st Century Leaders" in Cerami and Holcomb, eds., *The US Army War College Guide to Strategy*, 205.

7. James K. Greer, "Operational Art for the Objective Force," *Military Review* 82, no. 5 (September/October 2002), 26-27.

8. J.P. Hunderwadel, "The Effects Based Approach to Operations: Questions and Answers," *Air & Space Power Journal* 20, no. 1 (Spring 2006), 54.

9. Ibid., 54.

10. Steven D. Carey and Robyn S. Read, "Five Propositions Regarding Effects-Based Operations," *Air & Space Power Journal* 20, no. 1 (Spring 2006), 63-74.

11. Robert Vermaas, Future Perfect: *Effects Based Operations Complexity and the Human Environment*, Department of National Defence Canada, Operational Research Division, DOR (Joint) Research Note RN 2004/01, January 2004, 4.

12. Edward A. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War* (Washington, DC: DoD Command and Control Research Program, 2002), 231.

13. *Incorporating and Extending the UK Military Effects-Based Approach*: Joint Doctrine Note 7/06, (Swindon, UK: Ministry of Defence, 2006), p. 1-2.

14. Ralph Peters, "Bloodless Theories, Bloody Wars: Easy-Win Concepts Crumble in Combat," Armed Forces Journal 143, no. 9 (April 2006), 34-36. Available at http://www.armedforcesjournal.com. Accessed 17 December 2006.

15. Ibid.

16. Challans, "Emerging Doctrine and the Ethics of Warfare," np.

17. Ibid.

18. Ibid.

19. *The Comprehensive Approach*, Joint Doctrine Note 4/0, (Swindon, UK: Ministry of Defence) 2006, pp. 1-1 to 1-4.

20. Ibid., p. 1-1.

21. *Incorporating and Extending the UK Military Effects-Based Approach*, p. 1-3.

22. Ibid., p. 1-2.

23. This whole-of-government theme reflects similar views in Canada (the 3-D approach) and in the US, where recent experiences in Iraq have underscored the requirement for coordinated whole-of-government strategy and led to calls for a "Goldwater-Nichols for the interagency."

24. Robert S. Dudney, "It's the Effect, Stupid," *Air Force Magazine Online* 89, no. 11 (Nov 2006). Available at http://www.afa.org/magazine/nov2006/1106edit.asp. Accessed 21 December 2006.

Part V - Applying Effects-Based Approaches

Chapter 8
The Canadian Land Force and Effects-Based Operations

Robert H. Vokac

Introduction

During 2005 and 2006 I observed battle-staff training throughout the Canadian Land Force (hereafter called the Canadian Army). The battle-staff training I observed was conducted by all three formed brigade staffs and a handful of battalion/battle group/task force headquarters, and was conducted in a simulation-supported environment. Additionally, I supported numerous exercises for students attending the Army Operations Course conducted by the Land Force Command and Staff College in Kingston, Ontario. Lastly, I assisted in the design, development, and execution of the capstone land environmental exercise for students attending the Command and Staff Course, now the Joint Command and Staff Programme, conducted by the Canadian Forces College in Toronto, Ontario.

This paper's aim is to describe, not to evaluate or assess, the use of effects-based operations (EBO) within the Canadian Army by both formed staffs in the field and students during professional military education (PME) exercises. There is no attempt made to describe EBO as planned or executed during actual operations. Before describing selected aspects of EBO as observed in the training environment, some historical and doctrinal background is necessary.

Background

Effects-based operations, or EBO, has gradually found its way into the lexicon of Canadian Army officers. As is often the case with new terms, it was and is used without a common understanding amongst those employing the term. There are, as we have seen from previous essays in this volume, numerous definitions of EBO. Within the Canadian Forces (CF) there are some working definitions, or at least descriptions, of EBO. For example, a draft *Canadian Forces Strategic Operating Concept* (dated 21 May 2004) describes EBO as:

> …an effort to leverage the soft and hard power assets of a nation or coalition, including its political, economic, technological, and social resources, in order to achieve a set of desired outcomes. It seeks to establish influence over the mind of an adversary to affect his will to act while, at the same time, keeping collateral damage to a minimum.[1]

One can argue that the working definition above reflects status quo or that it is truly revolutionary. Regardless of one's opinion, it does provide an authoritative foundation on which to further explore the concept.

Not surprisingly, EBO, as a defined concept and philosophy, migrated north from the United States military. While the general concept and philosophy migrated north with sufficient robustness to ensure a place in Canadian lexicon, it did not appear with an agreed upon application or employment methodology. Furthermore, the United Kingdom and Australia, two prominent Canadian allies, developed their own versions of EBO, pieces of which found their way to Canada. Current Canadian Army thinking, as described by Director General Land Combat Development Draft Doctrinal Note 001/06, "An Effects Based Approach to Operations," recognizes that the contemporary operating environment has undergone significant change and, as such, "[t]o succeed in this environment commanders must recognize that the military is but one instrument of power available. A more comprehensive *approach* that co-ordinates the resources provided by a range of individuals, groups and agencies will be required [emphasis added]." [2] An effects-based approach, a maturation of the original military-centric EBO philosophy, implicitly recognizes, therefore, that effects are best achieved using the full resources available to a commander and to a government, the military instrument of power alone being insufficient to achieve the effects necessary to reach the desired end-state. Consequently, an effects-based approach, to be useful and relevant to the Canadian Army, should complement existing doctrine.

Integration with Existing Doctrine

The Canadian Army is doctrinally based. As a guiding principle "[t]he Canadian Army has adopted Manoeuvre Warfare as its doctrinal approach to warfighting."[3] The objective of manoeuvre warfare is "[t]o defeat the enemy by shattering his moral and physical cohesion, his ability to fight as an effective co-ordinated whole, rather than destroying him physically through incremental attrition."[4] Manoeuvre warfare requires a command philosophy that decentralizes decisions and fosters initiative. That command philosophy is called "mission command," which requires commanders to "tell subordinates what *effect* they are to achieve and the reason why it needs achieving [emphasis added]."[5] Therefore, an effects-based approach appears to complement the doctrinal fundamentals articulated above.

Furthermore, a 2004 Canadian Army force employment document embraces EBO:

> EBO is the natural extension of our departure from the attritional approach of attacking physical targets. It is a strategy that does not necessarily depend upon physical force for attaining a desired outcome or effect on an enemy…This will be accomplished by achieving a full range of effects, both non-lethal and lethal…In sum, the focussed use of national assets, independently or as part of a coalition, will produce cascading, systemic effects as the tactical, operational and strategic levels.[6]

Accordingly, EBO appears to fit within the concepts of an army defined by manoeuvre warfare and mission command. While, at the time of the writing of this essay, EBO, or an effects-based approach, had yet to make its appearance in approved Canadian Army doctrine, it has reached a receptive training audience. The EBO-related training

observations noted below provide an anecdotal look at the current state of EBO within the Canadian Army.

Training Observations

Formation and unit commanders, and those who role-play formation and unit commanders, adhere to the principles of manoeuvre warfare and mission command. Moreover, commanders who so choose, supplement the assigned mission and commander's intent by describing desired effects. Given the increasing complexity of planning as one moves from sub-unit, to unit, to formation level, an effects-based planning approach, within a training environment, appears to work better at higher levels. This is because it is at the higher levels that the resources necessary to implement an effects-based approach exist. It is at formation or higher where the need to integrate and synchronize efforts with other elements of national power is brought to the fore. However, while the overall utility of an effects-based approach is quite clear at the formation level, there are times when the approach seems "forced" at lower levels.

Senior commanders often choose to emphasize an effects-based approach during training exercises. This, of course, tends to focus the senior staff and subordinate commanders on this approach and is typically accompanied by operational-level language such as "end-state" and "objectives." The top-down emphasis on an effects-based approach, if not properly tempered by experienced subordinate commanders and staff has, at times, led to confusion and planning inefficiencies. Suddenly, the casual observer sees all command levels swirling about, attempting to define their own effects while concurrently losing the important linkage that connects subordinate activities (tasks) to the achievement of higher effects.

Another observation related to using the effects-based approach during training exercises is that almost all exercises do an excellent job replicating the physical domain, but are much less successful replicating the moral or cognitive domain. Physical activities are typically manifested in exercises by direct effects, in that the effects are usually immediate and easily recognizable. While physical activities in the operational world may generate indirect effects (those removed in time or purpose from the initial activity), the typical exercise rewards physical activities (e.g., kinetic attack), while virtually ignoring those activities directed at the moral and cognitive levels. Therefore, while an effects-based approach is often planned, its execution is virtually impossible to simulate. And yet, even effects-based planning is hard to replicate given the inherent difficulties in developing relevant measures of effectiveness. One senior commander, for example, mentioned that he thinks of effects in terms of weeks, months, years, and even generations. If one accepts his view, how is this reality effectively translated into the exercise environment?

Well, for all practical purposes, it isn't. Commanders and staff are comfortable visualizing the effects produced by physical activities, and to a large degree this comfort zone is a product of their own experience and the experience of their mentors. For example, experienced commanders and directing staff (DS) have, over time, developed the "critical

eye" necessary to evaluate and assess a plan or order to determine its probability of success. This "critical eye" wavers ever so slightly when evaluating or assessing a plan emphasizing a sophisticated effects-based approach. Why? Clearly, it is easier for commanders, DS, and exercise controllers to assess and evaluate a potential force-on-force engagement than to assess and evaluate the effects of, for example, psychological operations directed against an enemy commander.

One way of overcoming the limitations of using the effects-based approach during training exercises is to incorporate outside participants, specifically non-military participants, because an EBA to operations is "predicated on a sound understanding of the battlespace and the actors within it."[7] Therefore, sophisticated training scenarios with a wide range of actors allow for a more comprehensive (i.e., effects-based) planning approach by commanders and staff. The best exercises recognize the requirement to take into account other instruments of national power, the stated and unstated agendas of other government departments (OGDs), non-governmental organizations (NGOs), and international organizations (IOs), and the requirement to achieve a whole-of-government approach. To be clear, the need to work with others (OGDs in particular), the need to integrate and synchronize military actions with the efforts of other actors, and the recognition that the achievement of required effects requires more than a purely military solution, begins with the participation of a wide variety of actors in complex, demanding, and innovative scenarios.

A final observation related to using the effects-based approach during training exercises is that commanders typically emphasize the necessity to minimize so-called collateral damage. This is prudent guidance as commanders and staff recognize that collateral damage, no matter how it is caused, creates a negative effect, one that can significantly hinder the execution of an effects-based operation. However, within the training environment, this guidance is often emphasized to the point that force is not applied even when permissible, hence increasing the risk to the friendly forces. Using force is a delicate balancing act that requires difficult decisions, and it may be that the difficulties surrounding these decisions could be more accurately portrayed in exercises.

Conclusion

The Canadian Army's evolving draft doctrine on an effects-based approach to operations reflects the reality of the contemporary operating environment, which resists simple solutions to difficult problems resident within a complex environment. Gone are the days when the proper application of the military instrument of power was sufficient to achieve the desired end state.

An effects-based approach to operations requires that commanders and their staffs exhibit a sound understanding of the battlespace. Knowledge requirements are greater than ever as it is virtually impossible to plan or execute an effects-based approach to operations without understanding the existing linkages and relationships resident amongst all the actors in the battlespace. Knowledge of the complete battlespace environment allows a commander

and staff, knowing the desired end state, to properly identify objectives, identify the effects required to achieve the objectives, and select those activities required to create the effects.

An effects-based approach to operations is consistent with existing doctrine and does not appear, at this point, to be a revolutionary approach to the planning and conduct of operations. And it is in the training environment, through the design of demanding and complex scenarios, that our current and future commanders and staff will learn to maximize all resources available to them.

Notes

1. DND, *Canadian Forces Strategic Operating Concept*, draft 4.4. (dated 21 May 2004), 17.

2. DND, Director General Land Combat Development Draft Doctrinal Note 001/06, "An Effects Based Approach to Operations," 3.

3. Canada, Department of National Defence, *Land Force Command*, B-GL-300-003/FP-000 (dated 21 July 1996), 27.

4. Ibid., 28.

5. Ibid., 30.

6. DND, *Purpose Defined: The Force Employment Concept for the Army - One Army One Team One Vision*, (np, 31 March 2004), 38-9.

7. Canada, Land Force, Draft Doctrinal Note 001/06, "An Effects Based Approach to Operations," 8.

Chapter 9
Effects-Based Professional Military Education

Colonel Randall Wakelam

Introduction

As the title of this essay might suggest, the following paragraphs examine where the study of effects-based operations would seem best situated within the continuum of professional military education (PME). The other possible interpretation of the title would have us look for the most effective options for PME. Indeed, the paper attempts both tasks, first situating the current construct of the effects-based approach to operations (EBAO) described elsewhere in this volume with like elements of military studies, and then examining how such studies are best conducted. In so doing, it considers a number of approaches to PME that have been proposed or used by the Canadian military over the past 70 years. It comes to the conclusion that some of the previous education strategies may well serve the purpose of helping the profession understand and build upon the effects-based philosophy.

EBAO: Education – and a Bit of Training

If we start by accepting—as postulated elsewhere in this volume—that the maturity and precision of the EBAO concept is such that it falls more into the category of a philosophy of war than that of a technique to be learned, mastered and employed, then it is reasonable to say that EBAO should be studied using education, not training practices. Education, it has been widely accepted, allows the student to develop intellectual skills – critical thinking, creativity, and the like – which in turn allow the individual to come up with reasoned solutions to unanticipated problems. Training, on the other hand, permits an individual to respond in a predictable way to anticipated conditions.[1] Given the still-evolving nature of EBAO, an education-based approach, one which permits and encourages debate about the essence and validity of various new and old notions, is definitely the more suitable method of studying EBAO for the time being.

This is to say, that should the philosophy become concept, and the concept lead to doctrine and procedure, it could eventually be appropriate to include EBAO practices in a range of PME courses and programmes which concentrate on practical issues. It has been shown that EBAO is likely to be practiced at the higher levels of military and security operations. If EBAO becomes a practice, it should be taught primarily at the operational and high tactical levels; that is, in staff and war college programs, or Development Periods 3 and 4 (to use Canadian Forces terminology). This is not to say that EBAO doctrine should not be introduced, at least in passing, to officers and senior non-commissioned members attending tactical-level courses, but this would be done more so to allow them to know that the concept exists than to allow them to become practitioners of EBAO.

EBAO – Two Versions of Learning

Learning about the first version of EBAO – that which Colonel Jim Cottingham portrays at the operational level of war[2] – would take place in what is termed in Canada as Development Period 3. This period encompasses professional education for majors/lieutenant-commanders and lieutenant-colonels/commanders, and focusses on the use of military forces at this level of war. These linkages seem to make good sense, for it is at the staff college that officers are given the time to find their way through philosophies of war, and also to develop their understanding of the operational level of war and campaigning. Lectures and seminars on philosophers of war already examine such theoreticians as Sun Tzu and Clausewitz, as well as the early and contemporary air power thinkers.[3] In particular, the current Command and Staff program taught at the Canadian Forces College gives students ample opportunity to test the relevance of operational-level concepts through the Master of Defence Studies thesis.

At the same time that they learn to test theories and concepts, students taking this program are also taught how to use the Canadian Forces operational planning process (CFOPP), which is the primary planning tool used by the CF to design campaigns and major operations. The process already includes such EBAO-related elements as information operations and command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR), and it is not hard to envisage teaching the contribution of EBAO to the campaigning process as described in Lieutenant-Colonel Colin Magee's chapter in this volume. At the same time, however, students on this course are introduced to the notion that military solutions are not always kinetic and not always appropriate by themselves to the resolution of security concerns. The Command and Staff program therefore contains curriculum, which deals with the contributions of other government departments and NGOs, and major tabletop exercises include peace support and domestic operations scenarios that do not involve force-on-force solutions.

An even greater opportunity to test the concept of EBAO and to explore the possibilities of linkages between version one and version two presents itself in the form of the Advanced Military Studies Program, which is designed for more senior officers (generally colonels/captains (navy) or officers destined for those ranks) who are likely to find themselves either commanding at higher tactical or operational levels, or acting as senior planners in operational- and strategic-level headquarters.[4] This program of study affords additional opportunities to practice campaigning concepts and techniques, this time from the perspective of a commander, while more importantly providing opportunities for more rigorous analysis and evaluation of warfare philosophies, concepts and doctrines. It is during this program that many students begin to display a mastery of the profession of arms that one would expect of its senior practitioners. Here, too, students consider effects-based solutions to problems and work with civilian analysts during tabletop exercises.

Programs of study focussed on the second version of EBAO fall clearly in the category of the war and defence colleges – these being learning institutions that look beyond the application of kinetic solutions in resolving security problems. (This is not to say

that the previous programs are only about "warfighting," but their emphasis has been and currently remains the study of the use of military forces.) Senior colleges, at least in the Commonwealth, also tend to focus on "all of government" examinations of national and international concerns. Student bodies are frequently a mix of domestic and foreign military officers (usually senior colonels/captains (navy) and flag officers who are likely to find themselves working in national and/or strategic headquarters), public service executives, and occasionally senior private-sector executives.

Currently, Canada's senior program is the six-month National Security Studies Program, while there is also the two-week Canadian Security Studies Program that provides a rapid *tour d'horizon* of national security issues. This shorter program, formerly known as the National Security Studies Seminar, tends to attract a wide range of participants. However, since its inception in 1998, the longer course has experienced difficulty attracting officers from other countries, as well as Canadian public service and senior private sector executives. This latter problem may have been unique to the past decade and may now be changing given the Canadian government's renewed interest in national and international security. If so, future program focus and student enrolment may fall more in line with past practice.

All of Government Professional Education in the Twentieth Century

Prior to the Second World War, Canada sent selected senior officers to Britain for both staff and war college education. At the senior level, Britain operated the Imperial Defence College (IDC), now called the Royal College of Defence Studies, which looked at defence issues, but from a broader perspective than just the use of military courses of action. The experience of one Canadian officer, General Maurice Pope, in the late 1930s is indicative of the value of this sort of programme. He found himself "in the company of senior sailors, soldiers, airmen and civil servants, enjoying the rare privilege of studying the strategy, as well as the wider aspects of defence of the British Commonwealth and Empire." While he went on to say that studies focussed on "hypothetical wars," he also noted that: "In these studies I was much struck by the attention paid to the economic side of warfare….Wars, in our day, had considerably overrun the comparatively narrow province of the professional sailor, soldier, or airman."[5] Particular studies during the program included the formulation of a framework for imperial defence including the parsing of defence and security responsibilities for Britain's global alliances as well as the associated resource issues. In another case, students were to turn their criticism of the contemporary British foreign policy into viable alternatives. Students were sent away in syndicates and given two weeks to prepare their alternative policies. Pope's group sought to expand the Treaty of Locarno in order to stop Hitler by a "superior show of force."[6] Thwarting the Nazi regime through a show of force rather than a kinetic campaign can easily be qualified as an effects-based solution, which implicated the most senior levels of government. In this case in particular, the IDC was clearly focussing its learning on what Cottingham calls "version-two effects."

With the coming of peace in 1945, Canada established its own war college. Opened in 1949, the National Defence College (NDC) at Kingston originally was intended to be a joint warfare program that would seek to maintain the hard-won knowledge about joint

service operations. When the college did open its doors it had morphed into a Canadian version of the IDC. Until it closed in 1995, the college's curriculum looked at a wide range of international strategic and security issues: culture, economy, politics, and security and defence. Students spent much time visiting all the major regions of the globe and reflecting on what they had seen. The student body comprised not only a mixture of Canadian military officers and their NATO and Commonwealth counterparts, but also a significant number of senior public servants. This was very much an all-of-government program looking at the complexity of state, regional, and global interconnections.

All-of-government education was also a prominent component of a seminal study into officer professional development commissioned in the late 1960s by General Jean Victor Allard, first Chief of the Defence Staff of the newly-unified Canadian Forces. Allard tasked Major-General Roger Rowley to examine the nature of the unified officer corps and to define the professional education needs and mechanisms that would ensure that officers were adequately educated for the challenges of the day. As part of his education continuum, Rowley proposed the establishment of a National Security College (NSC) as a replacement for the NDC. While the NDC had a number of shortcomings related to student selection and assessment, Rowley did underscore its strength: "the [NDC's] chief virtue is its interdepartmental approach to national security issues."[7] And he continued:

> The National Security Course would build on this strength.
> The National security college [sic] should not be designed solely to meet the needs of military officers. It should serve all departments of government and other civil sectors that contribute significantly to national security. It should have within it a research group that would analyse national security problems, and should, in the process, assist in maintaining a suitable orientation in the teaching programme of the National security college.[8]

Rowley's study team further emphasized that the NSC would contribute to the development of a military-executive ability within the senior leadership of the profession:

> Military-executive ability implies a knowledge of the nation in which the force is raised, paid for and equipped; and of the international environment in which force must be applied or its application threatened. It involves a knowledge of the context in which the officer will apply his executive ability and military expertise and give his advice to government. It includes economic, political, sociological, ideological, scientific and technological, as well as military factors.[9]

In other words, the NSC was intended as a capstone in formal PME that would give a senior leader the knowledge and mindset to operate effectively in developing all of government effects-based solutions to complex security challenges.

Ultimately Rowley's NSC was not established, but much of his thinking was applied to the NDC. The deputy commandant of the college was an ambassadorial-

level appointment from the Department of External Affairs, and a Centre for National Security Studies was established to conduct government-level research into security issues.[10] Therefore, Rowley's intention that the program be "interdepartmental in terms of staff [and students], but DND administered," was largely met.[11]

Effects-Based PME for the Twenty-First Century

Since 2001 and the realization that national security is more than just a defence matter, the public service in Canada has been more focussed on looking for all of government strategies both domestically and internationally. The currently favoured defence, diplomacy, development and trade (3D+T) is an example of this approach. It was applied in 2006 in Afghanistan, but as the recently returned Canadian commander of the Multi-National Brigade (Regional Command South) has said, this approach needs to be taught and understood in senior professional programs.[12] He has perhaps said this because the all-of-government approach taught in Western war colleges in the twentieth century has not been as effectively taught in Canada for the past decade. But, just as the requirement is being identified "in the field" by people such as Fraser, so too, in recent months, the interest in the National Security Studies Program by senior bureaucrats and by the federal public service as a whole is seemingly on the rise. At the time of the writing of this essay, public service enrolment for the 2007 National Security Studies Program was up from one student to four and Canada's Department of National Defence had mandated that all of its executives at the EX-2 level and above would attend the two-week Canadian Security Studies Program, as well as the one-week Executive Leadership Program, normally attended only by newly promoted brigadier generals and commodores.[13] At the same time as there has been a move towards civilian attendance on military programs, senior officers have been participating, admittedly in small numbers, in graduate-level education. Arguably, the most avant-garde example of the latter was the selection in 2003 of Major-General Mike Ward, currently Chief of Force Development, to attend the Yale World Fellowship.[14] All of this suggests that the mechanisms for learning about all of government solutions for security problems may soon return to the relatively effective delivery systems of the past – a sort of effects-based education for version two effects-based approaches to security.

Conclusion

In the preceding discussion we have seen that the mechanisms for the study of effects-based approaches to operations already exist within the domain of professional military education. Ample opportunity exists, as it has for many years, to look at the implications of classical and emerging philosophies of security and defence stratagems, as they apply both at the warfighting and all-of-government levels. Where theory becomes practice, the military education and training continuum has the necessary processes in place to design and conduct the appropriate learning activities. If we accept for a moment the premise that there is nothing fundamentally new about effects-based approaches to operations, then we need also to recognize that the current professional education system—while relatively young by comparison to the profession of arms—has the flexibility and the inclusiveness to deal with this and other concepts which emerge from time to time. While

there are those who would quip that military education, like the much-reviled military intelligence, represents an oxymoron, there is much to be said for an education system that prepares members of the profession to seek all possible solutions for the challenges of the new defence and security environment.

Notes

1. This construct has been attributed to BGen (Ret'd) Don Macnamara, a long time member of the faculties of the Canadian Forces College and the now-closed National Defence College. Macnamara indicates that the concept was one that predates him and believes that it may have its origins with the US Marine Corps. Email from Macnamara to Wakelam dated 27 August 2007. See also Canada, Department of National Defence, "Final Report of the Officer Development Review Board" (Ottawa: DND, 15 September 1995), xiv, xvi.

2. Colonel J.F. Cottingham, "Effects-Based Operations: An Evolving Revolution," unpublished paper written as part of the MA in War Studies program, Royal Military College of Canada, July 2004, 40.

3. The syllabus for the Joint Command and Staff Programme (formerly the Command and Staff Course) of the Canadian Forces College can be found at http://www.cfc.forces.gc.ca/DP3/CSC_Syllabus/cfc300-34_e.pdf. Accessed 7 Sep 2007. Also available from this site are the syllabi of the other programmes described in this chapter.

4. These senior positions would range from Chief of Staff through the principal planning appointments – J3, J5, and J7.

5. Maurice Pope, *Soldiers and Politicians, The Memoirs of Lt.-Gen. Maurice A. Pope* (Toronto: University of Toronto Press, 1962), 98.

6. Pope, *Soldiers and Politicians*, 101-2.

7. Canada, Department of National Defence, *Report of the Officer Development Board,* Vol. 1(Ottawa: DND, 1969), 85.

8. Ibid., 99.

9. Ibid., 40.

10. See Randall Wakelam, "Officer Professional Education in the Canadian Forces and the Rowley Report, 1969," *Historical Studies in Education/Revue d'histoire de l'éducation* 16, 2 (2004), 287-314.

11. *Report of the Officer Development Board,* Vol. 2, 259.

12. BGen David Fraser, Presentation to the Advanced Military Studies Program at the Canadian Forces College, 6 December 2006.

13. Email from Senior Staff Officer Professional Development, HQ Canadian Defence Academy, to Wakelam, dated 28 August 2007. The ELP is a short workshop to prepare executives for appointments in strategic-level positions dealing with security and defence.

14. Yale World Fellows Program, 2003 Yale World Fellows. Available at http://www.yale.edu/worldfellows/fellows/alum_2003.html. Accessed 15 December 2006.

Chapter 10
A Bridge Too Far?: The Theory and Practice of the Effects-Based Concept and the Multinational Interagency Role[1]

Robert Grossman-Vermaas

Conflict is no longer limited to linear battlefronts and mass manoeuvre. As clearly demonstrated during recent events in Afghanistan and Iraq, the historic focus on achieving military superiority at the operational or tactical levels would be better seen as perfunctory steps towards the achievement of strategic military, economic, diplomatic and developmental aims.[2] Increasingly, conflict has become more akin to a complex and adaptive system that operates within and between the progressively challenging environments of war, terrorism, peace support operations, and regime change. Conflict has shifted from being primarily a mechanically linear system in which military powers smash away at each other until one is far too bloodied to continue. It has become a system of fluid, increasingly adaptive and often unpredictable situations in which specialized, usually multinational, armed forces function alongside civilians in order to achieve shared and desired tactical and systemic effects that lead to a shared strategic aim. Operations to attend to such threats will, therefore, require an equally adaptive approach.[3]

In multinational Effects-Based Planning (EBP), success relies on being able to identify the desired and achievable strategic endstates that might inform campaign planning and the deployment of the optimum mix of civilian and military capabilities with which to achieve a range of long- and short-term *effects*. Therefore, future multinational operations will include complementary diplomatic measures such as sanctions, financial incentives, and trade-offs, as well as military measures, like the deployment of an infantry brigade, a wing of aircraft or a squadron of ships. Alternatively, effects-based actions may include the military option at a level equal to or greater than the use of developmental aid and reconstruction assistance. The challenge for the effects-based concept lies with the integration, or "bridging," of such efforts externally between coalition partners and internally by large, institutionally independent military and civilian levels of government. But is this "bridging" feasible? Today, in several states, a military "defensive" capability is but one component of a multi-dimensional principle of statecraft that includes diplomacy, defence, and development. In Canada, this is known as the interagency 3-D policy.[4] But can such principles translate into action? This paper explores the effects-based concept within the context of the Multinational Experiment (MNE) series, and specifically analyses the interagency "role" under the Coalition Interagency Coordination Group (CIACG) as it contributed towards an experimental EBP cycle.

What is the Effects-Based Concept?

In order to properly understand the effects-based concept, it is important to begin with taxonomy. There are several characterizations of the effects-based concept and of its "operationalized" form, effects-based operations (EBO). One definition states that EBO be considered as a process for obtaining a desired outcome or effect from an adversary, friendly, or neutral through the synergistic and cumulative application of military and non-military capabilities at the tactical, operational, and strategic levels.[5] Other definitions consider EBO as operations conceived, planned, and executed within a systems framework that considers the full range of direct, indirect, and additional cascading effects that may be achieved by the application of political, military, diplomatic, or psychological instruments.[6] There are, to date, no less than two-dozen definitions of EBO. In order to encapsulate and refine some of the key concepts in these definitions, the following definition of EBO is proposed:

> Operations designed to influence the long- or short-term ***state of a system*** through the achievement of desired physical or psychological effects. Operational objectives are sought to achieve directed policy aims using the integrated application of ***all applicable*** instruments of ***hard or soft*** power. Desired effects, and the actions required to achieve them, are concurrently and reactively planned, executed, assessed (and potentially adapted) within a ***complex and adaptive system***.[7]

This definition notwithstanding, the effects-based concept is still immature, and while EBP has demonstrated some potential, it has not yet progressed to a mature experimentation or prototype phase.[8] Prototyping the EBP concept will require the maturation of the appropriate theoretical and analytical framework, both of which consider conflict as a holistic spectrum of political, military, economic, social, legal and ethical, and infrastructure and information segments. This framework and associated methodologies will enable decision makers to plan for operations more effectively, and then to adapt plans as situations evolve. That said, future operations that reflect the principles of the effects-based approach (EBA) will, by their very nature, require political and military leadership to both *anticipate* and *understand* the consequences of actions. Ultimately, decision makers will require a framework that integrates processes that link strategic aims to operational effects, effects to networks and nodal relationships, actions to resources and organizational mandates and accountabilities, resources to the appropriate actions required to achieve the desired effect(s), and resources to supporting processes and capabilities.

In order to achieve a long-term strategic aim, effects-based operational planners must develop a better appreciation of increasingly complex human networks and the dependency linkages that connect communities of interest, as shown in Figure 10-1. They also require a highly sophisticated understanding of culture and the human values of time and space, as well as a multidimensional analysis of primary, secondary, and follow-on actionable "nodes," "targets," networks, or dependency relationships between nodes, that are to be influenced during the course of operations.[9]

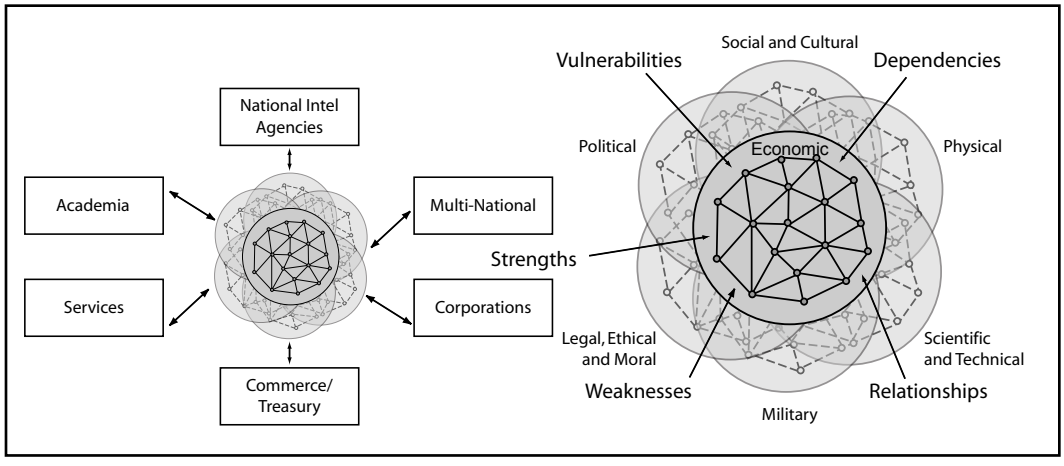


Figure 10-1.[10] Networks and Linkages Connecting Communities of Interest

Theoretically, an operational net assessment (ONA) for EBO requires inputs from a wide range of political, economic, social, intelligence, technological, and infrastructure specialists in order to make an assessment of strengths and vulnerabilities within a "system of systems." The weaknesses and vulnerabilities within the system are then exploited to induce effects.

It is worth underscoring that EBOs are outcome-focussed and involve a broad range of activities, of which military action is only a subset. For example, if a state or coalition has as one of its strategic aims the establishment of a democratic regime within a failed state, there may be an infinite or permutated number of possible actions and resources available to produce the necessary desired effects, including diplomatic, developmental, international organization (IO), intergovernmental organization (IGO), and non-governmental organizations (NGO) ways and means.[11] Unfortunately, as will be seen below, conventional military planning staff have made little more than superficial gestures to incorporate the so-called "other" instruments of power into multinational planning and command and control (C2) processes. Moreover, few attempts have been made to integrate these levels of influence into a prototypical effects-based operational headquarters. It is imperative that planners think rigorously about how best to synchronize and orchestrate effects, and about the proposed actions and resources needed to achieve the desired effects. This process involves a strong, transparent civilian and military information-sharing and knowledge-management process that reacts to the potential propagation of effects. However, if EBO are to include the combined direct and indirect use of *any* means at the nation's disposal, applied in a synergistic manner, in order to elicit a desired strategic outcome based on the achievement of cumulative effects, then there is a long way to go before operationalization of the concept is complete.

EBO, MNE 3 and the Interagency Role

Background. The evolving international security environment and subsequent changing role of armed forces is an essential backdrop to our discussion. Understanding this

environment is key to the effective civil-military implementation of effects-based planning and execution. This understanding also reflects the desire to move away from the traditional realist view of war as a tool of state, to the desire to view conflict's entirety (pre-crisis, crisis, and post-crisis) inclusive of a civil-military domain. There are historical precedents that demonstrate the shift in civil-military relationships. For example, during and immediately following the first Gulf War, there was a marked shift in civil-military relationships. This shift was most evident during operations under the UN flag in Cambodia and the former Yugoslavia, and the NATO war in Kosovo. Peacekeeping operations emerged from the new security environment of the post-Cold War era reflecting these new demands and new challenges. Between 1989 and 1999 there were well over 40 instances of UN-sponsored intervention around the globe.[12] Significantly, during this period, not only did multinational missions multiply, but they were complex, innovative, and multi-levelled.

The Centre for Defence Studies at King's College London recently identified five communities whose participation is critical to the successful resolution of future international crises. These are, in no particular order: donor governments, armed forces, multilateral agencies, NGOs, and private industry.[13] As the ONA concept has demonstrated, this list might benefit from the addition of academia and national and international intelligence agencies, as these communities have become significant players in the pursuit of regional and global stability through trend analysis and indicator measurement. However, this union of several seemingly disparate players has had a long and turbulent history. As Mike Duffield argues, in adapting to the new security environment of the post-Cold War era, each of these communities was, in turn, driven to revisit fresh issues such as how and in what manner they would be involved in multinational military operations. This acclimatization to new geopolitical realities underwent several iterations, impacting organization, process, and, above all, policy. In the 1990s, the integration of development and security, along with the privatization of these responsibilities gradually produced more effective ways and means to achieve a common objective. Parties that were autonomous throughout the Cold War era now found new forms of "synergy, overlap and mutual interest."[14] However, the question remains as to whether this integration can translate effectively to a transformational EBP concept and doctrine.

EBP Experimentation. The following sections will explore the integration of military and non-military organizations (NMOs) in the conduct of EBP and operations, and they will introduce Multinational Experiment 3 as a case study on coalition EBP. The analysis is critical, but it is not intended to denigrate the efficacy of multinational experimentation as it relates to the EBA; on the contrary, it is designed to explore gaps in our collective understanding of what components are required for the practical application of the conceptual issues related to the EBA, and to explore avenues for further exploration.

Multinational representation and association with US Joint Forces Command (USJFCOM) has expanded since its inception. From the outset, the joint experimentation plan at USJFCOM was intended to provide the transformation framework for interservice (and multinational) conceptual, experimentation, and doctrinal development, interoperability, and integration. The USJFCOM Joint Experimentation Directorate (J9)

thus sought (and still seeks) to envisage, develop, explore, test and then validate twenty-first century warfighting concepts such as rapid decisive operations (RDO), ONA and the effects-based concepts of EBP and EBO. These concepts are seen as transformational, driving both thought and technology, with prior civil-military demarcations less visible. Furthermore, the experimentation process sought (and still seeks) to provide a way to ensure that the US and its allies could operate effectively and interoperably in the complex security environment of the future. To this end, J9 has initiated several experiments since 2001. At the time of the writing of this essay, there were four scheduled transformational multinational experiment series events that include the Multinational Interoperability Council (MIC) nations. The first, LOE 1 (November 2001), investigated coalition military planning. The second, LOE 2 (February 2002), explored the development of the ONA. MNE 3 will be discussed below and MNE 4 was scheduled to occur in 2006.

Multinational Experiment 3. A US-directed and US-sponsored exploratory experiment, Multinational Experiment 3 attempted to examine the processes, organization(s) and technologies required for an ad hoc coalition to plan an EBO within a representative complex system. The third in a series of four experiments related to coalition planning, information sharing and the EBA, MNE 3 was a "virtual" (i.e., internationally dispersed yet technologically networked) experiment on a series of sub-concepts under the general mantle of EBP. These "sub-concepts" included, amongst many others, the CIACG in the EBP process, a construct designed, in part, to explore the necessary co-ordination and integration of the defence and development communities.

The US experiment design team intentionally opted to explore the EBP concept within the construct of a Coalition Task Force Headquarters (CTFHQ), which mirrored the US Standing Joint Forces Headquarters (SJFHQ) organizational structure. There were several persuasive, and some not so persuasive, reasons for the inclusion of the SJFHQ component into the experiment design. The most important for this discussion, however, was that it afforded the six MIC participants (Australia, Canada, France, Germany, United Kingdom, United States), as well as the nascent NATO Response Force the opportunity to observe and evaluate the efficacy of the US SJFHQ (and CTFHQ) C2 prototype within an experimental EBP framework. It also offered USJFCOM proponents the opportunity to observe the multinational reception of the SJFHQ core element within a controlled and documented experiment.

The experiment operated within a collaborative information environment (CIE). The CIE involves: the establishment of a multinational information sharing domain, hardware and software tools enabling information exchange across a classified network, and a, thus far, relatively immature knowledge management process that would allow for the posting and exchanging of relevant operational information. MNE 3 was successful in providing the CIE medium by which national planners could share information whilst refining the EBP process and drawing on information within an ONA database in order to plan operations.

The SJFHQ construct, or core element, is now entering the prototype phase in the US. The model consists of a small team of operational planners (about 60 people) and

information command and control specialists attached to and complementing a regional combatant command (RCC) headquarters.[15] These specialists form the core for the joint task force (JTF) command structure.[16] The construct envisages four specialist teams (Knowledge Management, Plans, Operations, Information Superiority) working collaboratively towards the development of an operational EBP for the commander. Although guided and commanded by the JTF Commander (or in the case of MNE 3, a Coalition Task Force Commander), the four specialist teams are detached from the traditional hierarchical C2 relationship in order to provide the Commander with fully comprehensive operational plans. In early 2005, the SJFHQ construct was to be fielded, augmenting several RCCs by developing pre-crises knowledge bases and providing guidance.

The SJFHQ is expected to provide each US geographic commander with an informed C2 capability and enhanced appreciation of the operational environment, therefore facilitating a more efficient ONA and EBP process capable of delivering "a rapid, decisive operation."[17] Theoretically, the expertise provided by the SJFHQ affords the commander better pre-crisis planning, more timely situational awareness, and a more holistic understanding of the operational "system of systems" that would thereby enable decision superiority. Using the CIE (or some comparable portal), the SJFHQ is expected to develop and maintain knowledge of the crisis environment through the establishment of habitual working relationships with interagency coleagues. In practical—or at least in experimental—terms, the hopes for a coalition-friendly SJFHQ construct are equally high. The experiment design for MNE 3 envisaged each national participant being involved (or in some cases embedded) in the SJFHQ experiment equivalent, which was a CTFHQ.

Perhaps the most ambitious assertion by proponents of the construct is that it will inherently maintain "established habitual relationships through the combatant commanders to the interagency community."[18] Presumably, the reasons for this maintenance of relationships are several. The most important is the recognition that it is necessary to aid the headquarters in making appropriate decisions based on a more holistic understanding of the crisis or pre-crisis environment as an adaptive system, and more significantly, in the longer term, on a more strategic understanding of the potential cascading effects that may occur at the operational level.

Non-Military Organizations, the CIACG and MNE 3. At the outset, the injection of a functional interagency planning group into the experiment design for MNE 3 was considered a fundamental conceptual priority.[19] This group would help to integrate, co-ordinate, and facilitate military and non-military components in the development of effects-based plans. It was also essential for validation of the effects-based concept at its most holistic level.

The CIACG "sub-concept" was incorporated into the design and play of MNE 3 and, as it turned out, CIACG was one of the more stimulating aspects to be played. The CIACG construct had its genesis in USJFCOM discussion papers and concept evaluations related to the SJFHQ, although each national participant presented issues related to its own historical understanding of the multinational interagency approach to pre-crisis and crisis decision making. But for USJFCOM, the construct originated as a quasi-integrated,

although unfortunately not integral, advisory facility for the commander and planners in the course of campaign planning. Known as the Joint Interagency Coordination Group (JIACG), the concept aimed to "establish operational connections between civilian and military departments and agencies that will improve planning and co-ordination within the government." At the national—or JIACG—level, the group was envisaged as a "multi-functional, advisory element that represents the civilian departments and agencies and facilitates information sharing across the interagency community."[20] In sum, it was expected to serve as a liaison between civilian and military actors and to support the SJFHQ planners by advising on civilian agency operations and plans. It was also to provide a so-called "third-party" perspective on civilian agency approaches, capabilities and limitations that would inform the development of an EBA and enable the co-ordination of national instruments of power. Presumably, when a JTF is formed and deployed, a JIACG would extend this support to the commander's staff through the joint forces headquarters political-military planning staff. This would then become the mechanism to optimize planning and ensure the best use of capabilities to achieve the desired effects that would include the range of Diplomatic, Informational, Military and Economic (DIME) interagency activities, which was the conceptual basis for the CIACG.

Throughout 2002 and 2003, the issue of disjointed operational planning amongst agencies was addressed through the US Joint Chiefs of Staff initiative, which was designed to establish a JIACG directorate for crisis intervention within the regional combatant command headquarters. In hindsight, prior to implementation, the JIACG concept would have benefited from further refinement at the national level, but also—ideally—at the multinational level. Granted, this concept is breaking new ground, and, at the date of writing, no model exists to help with its development. Moreover, no coherent operational planning structure exists that is multi-agency in nature or that extends planning and co-ordination into the multilateral spheres that are involved in complex crisis response and action. The attempt to address this challenge within MNE 3 through the inclusion of the JIACG concept was, therefore, sensible and timely.

The JIACG concept was also expanded to include civilian agency representatives of the participating coalition countries. In accordance with the concept of operations (CONOPS), the emergent CIACG was to focus on coordinating and harmonizing operational planning between the coalition military planners and the relevant civilian agencies or departments of their respective governments.[21] Thus, in both theory and practice, any difficulties envisaged for the establishment of a national interagency model were now magnified.

Afghanistan in 2003-2005 provided the experimental scenario for MNE 3. The scenario included, in its pre-experiment stages, a United Nations request for Coalition Task Force (CTF) intervention in order to stabilize a volatile situation in southern Afghanistan. Experiment injects posited that MNE 3 players should establish a CTFHQ that was prepared to conduct a pre-crisis EBP procedure in co-ordination with a CIACG. The CTF was to proceed though specific, although conceptual, EBP steps, culminating in an effects tasking order (ETO). The ETO would flow from and reflect the previous steps in the EBP process and would outline the effects-based ways and means to enable the EBO.

Theoretically, the steps of the EBP process replicate the operational "steps" required to perform EBP within a "real world" coalition environment, as shown in Figure 10-2. The process begins with the CTF gaining an understanding of the strategic context, aims and direction. This understanding emerges from the operational-level Focussed ONA, which incorporates national and multinational information and intelligence related to the environment (in the case of MNE 3 it was Afghanistan). Collation, in turn, enriches the analysis and contributes to derivation of a multinational appreciation of threats and opportunities. During MNE 3, this was replicated in slow time (i.e., the experiment steps were designated into specific time slots). The CTFHQ would then proceed through a series of EBP steps towards producing an ETO. In MNE 3, these steps were replicated, with limited success.[22] What is particularly significant for our purposes was the "role" of the CIACG. The MNE 3 multinational EBP CONOPS clearly underscored the relative importance of the CIACG in the EBP process and particularly in the penultimate steps.[23] However, the experiment also highlighted the conceptual frailties of the concept itself.

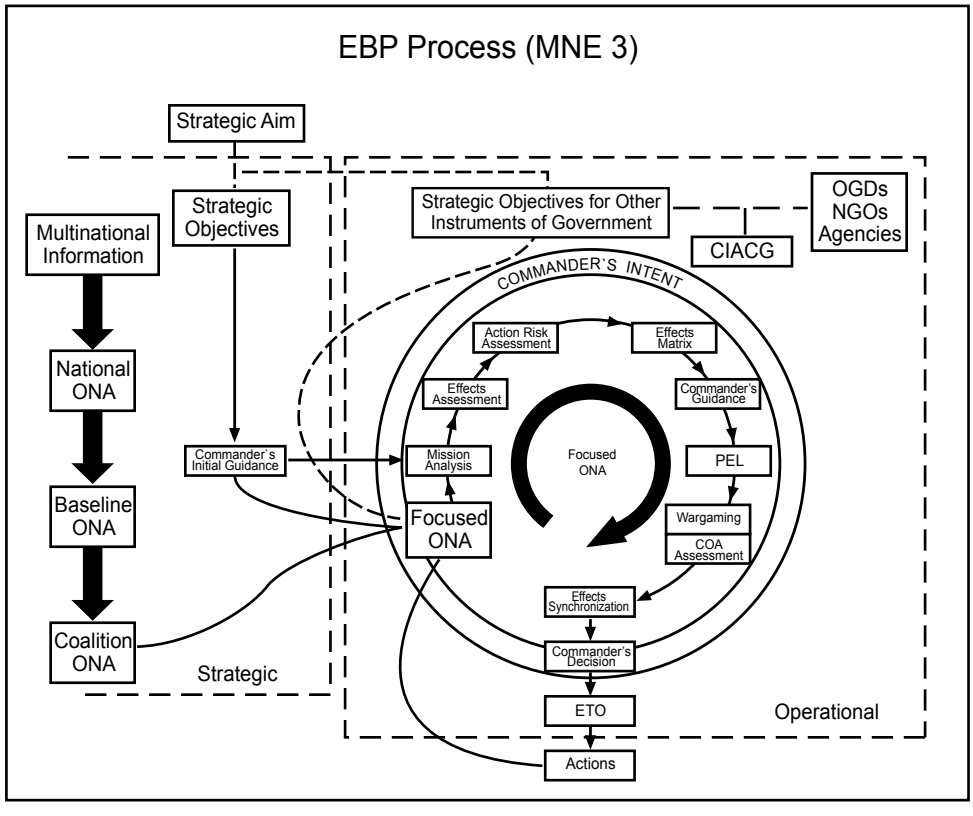


Figure 10-2. The EBP process steps for MNE 3

The CTF participants were to proceed through the operational steps (right side) in order to consider the appropriate effects, nodes, actions, and resources that would sufficiently enable the coalition strategic aim. This process was to include several points where assistance,

guidance, or advice could be offered by the CIACG, although this was not successfully achieved.

MNE 3 and the CIACG: More Questions than Answers. MNE 3 confirmed that the CIACG is an evolving and potentially useful concept in need of further refinement. If anything, the CIACG piece in MNE 3 highlighted the requirement to integrate, co-ordinate and facilitate the activities and capabilities of multinational military, and other organizations and agencies, with those of the CTF. It also highlighted the necessity to incorporate military and non-military perspectives, sensitivities, and support requirements and, insofar as possible, to reconcile competing demands. Indeed, the CONOPS for MNE 3 suggested aspirations for a more holistic crisis planning process than had previously been the case in multinational operations with a military strategic bias, and these expectations were given a greater weighting by the choice of the Afghan stability operation scenario.

Still, portions of the CIACG CONOPS for MNE 3 reflected inconsistencies attributable to its genesis in national concept development and this affected the experimental EBP process. At first glance, the CIACG appeared to emulate the role of the US JIACG for the Regional Combatant Commander. For a national commitment, and a US national commitment in particular, this approach may have been satisfactory. However, MNE 3 was specifically designed as a discovery experiment relating to a coalition planning process. During play, it became clear that the role of CIACG was more complicated and its links to the CTFHQ more intricate than the US-derived complement, the JIACG.

Conceptually, EBP prescribes a level of adaptability that mitigates some of the complexities of conflict. These complexities necessitate a dynamic EBP process, requiring a cognitive shift from linear, or sequential, plans and operations, to adaptive and distributed plans and operations to keep pace with (if not anticipate) both contextual changes and the tempo of operations. The CIACG is not yet a mature "enabling" concept, so there is a natural tendency for the CIACG (and its several multinational components) to react strongly to immediate military circumstances in order to better define its own relationship with the CTF (i.e., as planner, guide, liaison, or some other relationship). At this stage of conceptual development, a more rigourous review and analysis of CIACG integration into CTFHQ activities may be required. On one level, the CIACG provided liaison between OGDs, IOs, IGOs, and the CTFHQ; on another level the CIACG offered specific guidance to the CTF Commander during phases of the EBP process; and at yet another level, the CIACG provided planning and assistance though subject matter experts (SMEs). This latter "role" was perhaps the most contentious one during the experiment. The specific issue was: at what stage does a multinational interagency group limit its "co-ordination" activities to those of advice rather than assistance? Perhaps non-military organization and interagency roles need refinement for each CTF contingency. However, core functions should be identified in common doctrine with the assumption that additional functions could be added as required.

Other questions to emerge from the experiment were: should some or all multinational military commands and non-military organizations (NMOs) be fully integrated into the CTFHQ to provide EBP advice and/or contingency options? If

only some are selected, what criteria should be used in selecting representation? Should multinational NMOs always be present during CTF planning phases in order to provide "another" perspective, external advice, and expert guidance on the probabilities of cascading effects, and therefore, on the success of the mission?

During MNE 3, it became obvious that a CIACG was required to operate at a much higher level than anticipated - both strategically and temporally. This was not appreciated in either the EBP or the SJFHQ CONOPS. Similar to interactions associated with Allison's organizational process model, the CIACG perceived itself as a conduit, or as a translator or champion of higher strategic objectives.[24] This being the case, the CIACG felt particularly responsible for developing perspectives on how best to achieve the desired strategic end-states for the coalition. Discussion and debate often ensued regarding the direction and longevity of the stability operation. For example, was it to end after a sixty-day combat operation or was it to include developmental activities, humanitarian efforts, and the so-called "soft" objectives that may take years to achieve? Prior to and during stability operations, such issues are routinely considered by NMOs; however, during EBP and EBO, any uncertainty as to civil-military options and end-states may actually be counterproductive. For example, the decision to avoid the pursuit of immediate combat tactical effects because they might damage physical infrastructure, may actually preclude their use as "enabling effects" requisite for long-term "soft" operational and strategic aims, such as stability.

Finally, a concept that integrates multinational military organizations and NMOs in a construct such as the CIACG, presumably reflects the values of the nation or nations that develop it. National, cultural, sociological, organizational, and even psychological issues will be reflected in the composition, roles, and proposed actions of the CIACG. This is a delicate balancing act, particularly at the multinational level. If the CIACG is to be a truly coalition construct, and therefore a reflection of many national and international interagency relationships combined, then there is a need for a rigorous examination of these relationships prior to further experimentation.

The Effects-Based Concept, NMOs, and MNE 3 – Conceptual Observations

The EBP process, as theoretically conceived and as developed for MNE 3, requires the establishment of a coalition military and NMO group for planning effects-based operations, but future concept development and refinement is required. The CIACG played a considerable role in MNE 3. Indeed, the experiment design and process steps were augmented throughout the two-week experiment to reflect the increasing import of the CIACG sub-concept. The impact of the CIACG on EBP was most apparent during the following process steps, as illustrated earlier in Figure 10-2:

1. *Commander's Initial Guidance* – the aim of the CIACG was to provide specific advice to the CTF Commander in order to frame the Commander's guidance in acceptable terms for multinational NMO and interagency sensitivities and co-ordination. This is an important insight (albeit somewhat contrived, given the

artificiality of the experiment). One conclusion drawn from the experiment's CIACG After Action Report was that integration of the CIACG in all planning developments should be initiated prior to the outset of the EBP process. There should be a clear role established for the CIACG and a clear relationship to the Commander outlined in full. How this is to be achieved requires further investigation.

2. *Effects Assessment, Actions Assessment, and Priority Effects List (PEL)* – the CIACG played an active role in the assessment phases. During these phases CTFHQ planners consider what effects would prove most valuable and what actions would be required to enable these desired effects. The CIACG played an integral part in establishing the causal links and weighing the relative priority of one effect and/or action over another. This sort of injection is essential to 3-D policy projection and the integration of DIME instruments by posing these questions: Why kill when you can create? Alternatively, why aid when you can degrade, damage, or depose? These questions are critical to the conduct of EBP and EBO in a complex environment, yet they are not easily resolved without some associated risk.

3. *Wargaming/Course of Action/Synchronization* – Ideally, these steps would require active co-ordination and reach-back through the CIACG, which was not successfully achieved during MNE 3. In order to maximize the synchronization of effects, however, CIACG subject matter expert (SME) input is critical. Effect "blowback," or at least the consideration of probable cascading effects and unwanted or unintended effects, can only be determined with CIACG involvement in the planning process.

If the effects-based concept is to prove practicable, the CTF (and the coalition) must appreciate fully the status and authority of each associate member of the interagency group assigned to it. In practice, it may be that governments choose to issue their members credentials formally outlining their authority bounds - within the CTF and between members of the CTF. Similarly, suitable arrangements are required to ensure that accountability for CIACG actions is commensurate with its allocated role. Military and NMO injects into a CTFHQ are essential; equally, they too must be held accountable for their input to planning decisions.

The MNE 3 CIACG was designed in part to stimulate thought and to act as a catalyst for effects-based dialogue and knowledge management. It was envisaged that the CIACG should, and would eventually, assume the same sort of role with respect to non-official entities (e.g., NGOs and the media), which are major sources of information and influence in theatre. This role is, however, a sticking point, because in a volatile military theatre, perceptions of overt NMO influence on military operations may seriously cripple command and control relationships. On the other hand, perceptions of military influence on IOs and NGOs operating in theatre for long-term developmental planning must also be avoided. During MNE 3, this relationship was strained several times, an issue that remains

to be addressed.

In a complex conflict environment, multinational military and NMO roles are likely to remain situationally dependent, and the ad hoc nature of the CIACG offers both advantages and disadvantages. Clearly, coalition civil-military and interagency co-ordination mechanisms for regions frequently in crisis will be further developed and better maintained than arising areas of interest that are not frequently in crisis; therefore, NMO roles will need to be clarified for each operation. However, emergent, minimum core functions could be entrenched in common doctrine with the assumption that additional functions could be added as required. In this regard, several national MNE 3 CIACG After Action Reports tabled options regarding the role of the CIACG.

In MNE 3, the CIACG role was designed to meet experimental demands for EBP that do not envisage NMO control and/or direction over a stability operation. Indeed, the US concept developers for the MNE 3 CIACG construct have stated that the primary role of a CIACG is to provide civilian advice and subject matter expertise to the CTF Commander and effects-based planners regarding civilian agency operational-level activities during the planning stages of an operation. Naturally, this advisory role could evolve over time, as requirements and circumstances demand. This begs the question: at what point in the EBP and execution process is the decision made to forego routine multinational civil-military liaison in favour of a CIACG complement?

Several issues regarding roles remain unanswered and require exploration within the context of the effects-based concept:

1. What should the operating relationships be like between the interagency or NMO group(s) and their respective national governments? Is there such a thing as one CIACG that operates within, or amongst, the CTFHQ? Should it maintain the higher (strategic) level of interest? If so, how should this translate to the operational level? How best are communities of interest represented, established, and sustained?

2. Assuming that there is an agreed upon end, ways, and means strategy for EBO between the civil-military actors, what ethical issues need consideration? Clearly, should an NMO lead group be tasked as liaison between CTF and NGOs, IGOs, and IOs in the area of concentration, there is the potential for an ethical dilemma. At what point does the NMO lead group risk precipitating a conflict of interest when it acts as a conduit between humanitarian and relief organizations and the armed forces tasked by the Commander to pursue tactical effects? Does the NMO lead group recommend and then co-ordinate relief and humanitarian activities under the helm of the CTF? Presumably not.

3. What, then, should the composition of a CTF interagency, or NMO, group look like? During MNE 3, several debates on the composition of the CIACG were initiated. Clearly, civilian SMEs should be involved in EBP, and for MNE 3 they were chosen from a wide range of OGDs, foreign offices, and depart-

ments of state. However, inclusion of members for the purposes of "human intelligence" from IGOs and NGOs may also be necessary in practice. As mentioned above, this raises both practical and ethical challenges. Where and how does one receive, evaluate, and use expert advice in an area of concern? How can immediate tactical, and possibly physical, effects be reconciled with long-term strategic, and possibly psychological, end-states?

Finally, if NMOs are expected to make a strong contribution to the development of the EBA, then a strong, identifiable civilian champion is needed for whatever form the interagency group takes. This leader would presumably come from the lead nation, although there is a strong argument to be made that this leader should come from another coalition nation to provide greater legitimacy.

The discussion above implies some balance to effects-based decision making:

1. The relative value of the NMO group is greatly increased if members can readily reach back to national networks. This is not easily accomplished, however, as current security and information-sharing practices may preclude secure national communications systems from operating in both the NMO and CTF area.

2. During operations, it may be appropriate to transfer CTF subordinate leads from military to civilian command. Conceptually, an effects-based operation will eventually require the transition of authority to a civilian lead. Effects, if properly chosen, will require a civilian administration to ensure any action taken is directed properly and considers all humanitarian, social, economic, and political cascading effects.

3. Should EBP be restricted to focussing on a military objective, it is recommended that a military liaison officer be posted as a permanent member of the generic NMO co-ordination group, or the CIACG.

The following points challenge the extant SJFHQ (or CTFHQ) model and open for discussion the proposed civil-military EBO C2 structure illustrated below in Figure 10-3:

1. Analysis of MNE 3 suggests that concept development and experimentation efforts recognize and accept the primacy of coalitions as the most probable paradigm within which nations may participate. These efforts should therefore explore alternative C2 processes and organizations, some of which include the injection of a truly multinational NMO into the EBP planning structure. Should a CTF be required, a complementary co-ordinated multinational NMO, or Interagency Command Group, should be available to provide strategic and operational advice (not guidance) to the CTF Commander. To adapt to each contingency, the composition of this Command Group should be ad hoc; however, members could be national representatives at the ambassadorial level chosen by their respective states. This approach has recently been explored by US Pacific Command.[25]

2. The CTF Commander could be augmented by a civilian equivalent, capable of serving to achieve the strategic objective through an effects-based plan, and providing the military commander with rational and objective advice *and* planning guidance. This civilian would not provide military operational advice; rather he or she would provide guidance on the area of operations; operations and coalition unity of effort; diplomatic and interagency feedback to contingent nations; and NMO liaison services.

3. An NMO liaison would act between the deputy commander and the four collaborative subject-matter areas in order to provide feedback to the Interagency Command Group, as well as to maintain the fluidity of options available to the SJFHQ.

4. Each of the four SJFHQ areas would also have one NMO liaison to provide input to help ensure that strategic objectives are being met when effects-based planning has been initiated

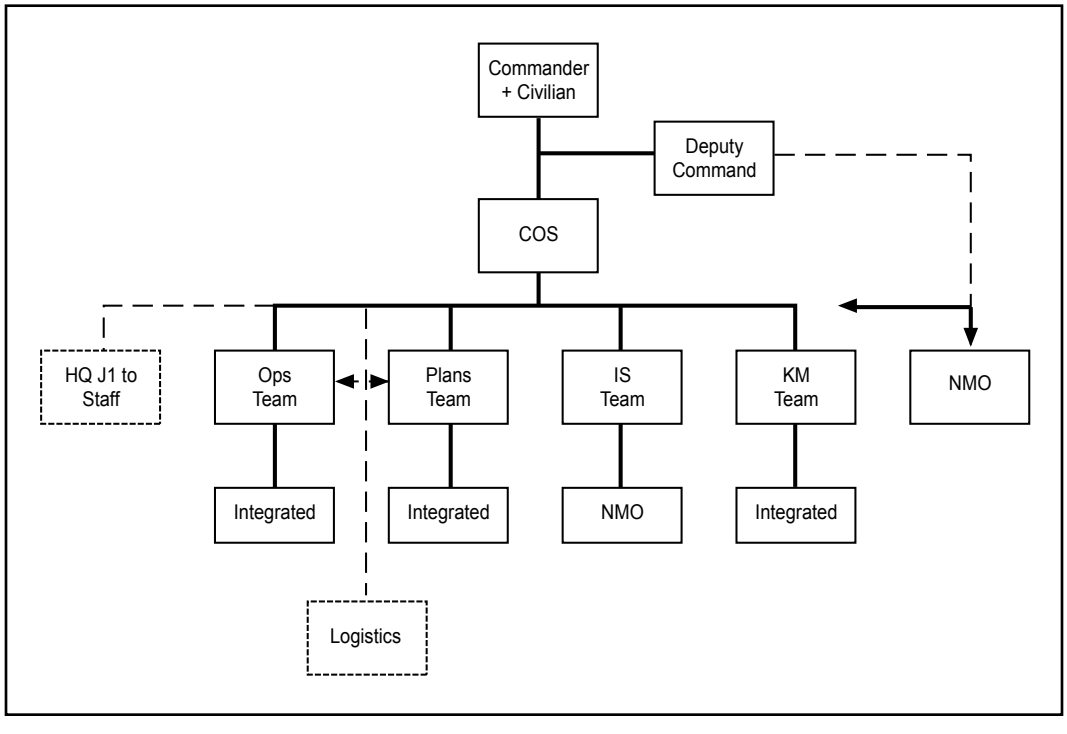


Figure 10-3. A Proposed CTFHQ Conceptual Organization

It is based on the more holistic inclusion of multinational Military and NMO, and interagency components. Each of the four pillars, Operations, Plans, Information Superiority and Knowledge Management, are augmented by an NMO liaison; there is an added NMO component attached to the Information Superiority cell; there is a distinctly separate NMO component for advice to the CTFHQ; and most importantly, there is a

civilian equivalent to the CTF Commander embedded within the command chain, which may act as guide, liaison to civilian agency counterparts, or advisor.

Most importantly, in addition to the points raised above, there would be a non-military advice chain provided to the Information Superiority cell of the SJFHQ. There are several reasons for providing this non-military advice chain. First, NMO input is not only critical when information on an area of interest or operation is collected, collated, and assessed, but it is also essential for the maintenance of a fluid and adaptive information assessment. Second, prior to the initiation of operational planning, this NMO cell would be required to assist in the exploitation of information from the assessment through to the development of an operational (military) campaign plan. Third, this cell would provide advice and guidance on proposed follow-on effects and the avoidance of unwanted and unintended social, developmental, legal, economic, and governance effects.

The construct in Figure 10-3 is presented for review and comment. It is not intended to supplant any effort to promote the current SJFHQ prototype; however, it is intended to provide a more holistic representation of what positions might be necessary for an ad hoc coalition task force headquarters, should it be necessary to develop and plan for a multi-disciplinary effects-based operation.

Conclusions and Challenges

The above discussion on the theoretical requirements for interagency participation in EBO, as well as experimental observations on coalition EBP, have provided some support to the notion that future effects-based processes and structures will utilize both military and non-military organizational components. Indeed, strategic and operational errors may result from the failure to integrate, or at the very least, co-ordinate military, non-military and interagency roles, perspectives and obligations.

Evidence thus far has indicated that in the days and months following the Coalition military invasion of Iraq, actions were not driven by an interagency effects-based plan that might have included a civil-military, outcome-based mission analysis; effects and action assessment; and effects-based course-of-action requirements. There was also scant attention paid to potential cascading short- and long-term effects, or what has been termed "blowback," that might result from crushing military force.[26] One suspects that there was little integrated civil-military thought given to the Iraqi theatre as being a complex adaptive system of systems with interacting nodal behaviour. As experienced at the experimental level, there was little practical evidence of the inclusion of non-military organizations in the operational decision making processes and organizations that cultivated the war in Iraq.[27] Indeed, months before the invasion, Office of the Secretary of Defense and Pentagon planning staff repeatedly dismissed interagency efforts to prepare plans for the combat and post-conflict phases in Iraq. Advice from the US Agency for International Development (USAID) and several other NGOs was rebuffed along with advice from more traditional government bodies such as the Central Intelligence Agency and the National War College. The interagency Iraq Working Group, hastily formed to explore post-war reconstruction

and social efforts, was successively resisted by Secretary of Defense Donald Rumsfeld and his deputy, Paul Wolfowitz, because, the Group was told, "the President has already spent an hour on the humanitarian issues."[28] As Dayton Maxwell, Special Advisor to the Administrator of USAID and former advisor to the Coalition Provisional Authority, has recently claimed, in the context of the Global War on Terror, non-military organizations have been largely absent from the planning and execution of events.[29]

At the beginning of military operations in Iraq, there were over 80 non-military organizations operating alongside thousands of military personnel from several nations. Five independent groups formed the Joint NGO Emergency Preparedness Initiative (JNEPI) to serve as a "command post" for NGOs.[30] JNEPI activities were focussed and adaptable to include everything from planning, pre-positioning of equipment and supplies, to co-ordination and information sharing. A significant source of funding for JNEPI was USAID; however, one of the five JNEPI groups, the International Medical Corps, warned its members and other NGOs to avoid the appearance of being "with the occupiers."[31]

Combat operations in Afghanistan and Iraq, while tactically successful, appear to have been temporally short-sighted.[32] In some way they have suffered what some civil-military professionals have termed "the tyranny of the immediate," in which short-term tactical gains are sought over the more difficult long-term end-states.[33] During the Global War on Terror and the subsequent war in Iraq, the symbiosis between military- and NMO-outcome planning diminished. Why this occurred has yet to be sufficiently analysed and is beyond the scope of this study; suffice it to say that civil-military planning by regional combatant commands may, in fact, be anathema to very conceptual pillars of the effects-based concept and its interagency "role." Furthermore, this form of military governance by regional combatant commands does not translate easily to coalition partners.[34]

These operational challenges mirror those identified during MNE 3, and raise the question, at what point do NMOs and military organizations agree that cooperation and collaboration might be more effective at producing a shared, desired operational effect than segregation of effort and disagreement? Or, at what point do NMOs and military organizations agree that collaboration is, instead, not applicable at all and that unity of effort would be tantamount to an ethical dilemma, especially for the NMOs? This is an important ethical issue that cannot be resolved here. There is, however, a compelling need for effects-based planners, both civilian and military, to consider these questions. Alternatively, there are arguments for recommending that regional combatant commands include liaison with the NMO community and vice versa. This idea parallels some of the recommendations made earlier in Figure 10-3, as well as examples explored within the Pacific Command Multinational Planning Augmentation Team on-line "exercises." This team focusses on short-term planning for operations other than war, and includes test-case multinational crisis planning efforts with NGOs and ad hoc civil-military networks.[35]

Presumably, the end-state of an effects-based plan is one that is holistic in all respects, one that promotes the integration and realization of the 3-D principle. That being the case, effects-based operational planners must resolve the failures in communication and

co-ordination that might jeopardize the achievement of shared strategic outcomes; however, there are, as yet, few effective means (or the desire) to communicate through the EBP process. The addition of liaison personnel, specific to the tasks (or end states), could enable a faster and more effective transition to a stable post-conflict environment. The opportunity for co-ordination through liaisons should not, however, infer control.

The "interventionist years" of the immediate post-Cold War era were notable for the widespread inclusion of developmental, social, and humanitarian affairs into defence policy, not to mention the widespread inclusion of security issues in the planning stages of regional development and reconstruction efforts. This phenomenon may provide us with some guidance as we refine the effects-based concept. It is now generally accepted that international organizations and national or international OGDs should be made aware of conflict and its effects, and they should be party to the pursuit of objectives designed to promote regional and global security.

Based on results from MNE 3 and consideration of the past, present, and future security environments, this paper contends that national and international NMOs and interagency partners should be directly involved in the operational planning and execution stages of a coalition effects-based effort. IOs and NGOs need to be aware of the potential effects of military intervention, and, if possible, align their capabilities and efforts towards stability, development and resolution. Ironically, the ultimate outcome of intervention, then, would be to avert future violence and post-conflict instability.[36] These sentiments are well expressed in the policy statements of several leading IOs, UN agencies, non-partisan think-tanks, NGOs and financial institutions.[37] Indeed, NMOs have expanded their mandates to include working directly with national and international armed forces. Following recent events in Afghanistan and Iraq, there have been strong calls within the US legislature for the establishment of a civilian reconstruction service to work closely with military elements towards an effects-based operational objective. Ideally, this work would occur within an integrated strategic planning environment that takes into consideration conflict and post-conflict planning sources; however, this form of planning cell requires more study and experimentation prior to implementation.[38]

Conflict is complex in nature and armed forces must adapt to the environments with which they are faced. Security and stability operations today require concepts, processes and tools that have never before been considered. The diverse means used by some to perpetuate conflict (e.g., child soldiers, eco-terrorism, computers, weapons of mass effect, and terror against civilians) implies that in order to address these means, one must be prepared to explore all necessary ways to stop the propagation of conflict, including the integration of civilian and military roles, functions and processes. Threats can emanate from anywhere and the armed forces tasked to address them collect intelligence from civilians; deliver humanitarian aid; protect NGOs; and eliminate the threats' funding sources. At the same time, armed forces can be killing and protecting, destroying and rebuilding. Information and intelligence to aid armed forces in these tasks comes from a variety of indicators, including population, religion, economic spending, and resource allocation. Obscure indicators such as the cost of weapons, the price of brides, and the nature of tribal blessings can also foreshadow conflict. The sources of knowledge about these

indicators, or nodes, are most assuredly not the armed forces, but NMOs and interagency partners. Finally, generic civil-military training by itself is not enough to give armed forces the necessary awareness of cultural, social, and economic issues or how to optimize the capabilities of NMOs and OGDs in understanding these issues. MNE 3 highlighted the fact that these areas require legitimate "bridging" between civilian and military values and perspectives before implementation of the effects-based concept is possible.

Notes

1. This essay was originally published in David Carment and Martin Rudner, eds., *Peacekeeping Intelligence: New Players, Extended Boundaries* (London: Routledge, 2006), 188-209.

2. The threat of asymmetric retaliation and guerrilla warfare (slowly) persuaded Coalition forces to re-assess strategic options in Iraq in the spring of 2003. See for example E. L. Andrews and P. E. Tyler, "As Iraqis' Disaffection Grows, U.S. Offers Them a Greater Political Role," *New York Times* (7 June 2003), p. A8.

3. R. Grossman-Vermaas, *Action Group 10 Operational Briefing* (Dalhgren, VA: The Technical Cooperation Program (TTCP) Joint Systems Analysis Group, Joint Warfare Analysis Center, 29 April 2004).

4. The 3-D approach is endorsed by the Department of National Defence, the Department of Foreign Affairs and International Trade, and the Canadian International Development Agency, (i.e., the defence, diplomacy and development sectors of the Canadian government bureaucracy). See the CIDA website at www.canada-afghanistan.gc.ca/menu-en.asp. Accessed 15 July 2004.

5. US J9 Experimentation, US Joint Forces Command (USJFCOM), working definition, 2002. See also draft of "Effects-based Planning concept for Multinational Experiment 3," (August 2003) which is a joint concept agreed to by the UK Joint Doctrine and Concepts Centre (JDCC), the Canadian Forces Experimentation Centre (CFEC), the German Bundeswehr, France, NATO ACT, the Australian Defence Science and Technology Organisation (DSTO), and US Joint Forces Command.

6. P.K. Davis, *Effects-Based Operations: A Grand Challenge for the Analytical Community*, RAND MR-1477-USJFCOM/AF, 2001 (Santa Monica, CA: RAND, 2001).

7. Robert Vermaas, "Future Perfect: Effects Based Operations, Complexity and the Human Environment," DOR (Joint) Research Note RN 2004/01, Operational Research Division, Department of National Defence, January 2004, which appears as Chapter 3 in this volume.

8. It should be noted that while the EBO concept requires further refinement, there are a number of multinational and Canadian initiatives in place that are investigating the "sub-concepts" involved in the effects-based approach. Canada has been involved in the conceptual development, analysis, technological development, experiment design, and participatory phases of Limited Objective Experiment II (LOE II) and Multinational Experiment III (MNE III). The former experiment was conducted in February 2002 and addressed multinational information sharing in "real-time" over a secure collaborative information environment (CIE) and the development of a multinational ONA database. The latter, which took place in February 2003, explored the technological, organizational and process requirements for multinational Effects-based Planning (EBP) and coalition development of a robust ONA database. MNE 4 was scheduled for the spring of 2006 and was planned as an experiment on the conduct of an effects-based operation in a stability operation environment.

9. S. Guastello, *Chaos, Catastrophe, and Human Affairs: Application of Nonlinear Dynamics to Work, Organizations, and Social Evolution* (Mahwah, NJ: Lawrence Erlbaum Associates, 1995); and R. D. Smith, "The Inapplicability of Principle: What Chaos Means for Social Science," *Behavioral Science* 40 (1995), 22.

10. Figure from USJFCOM, *Rock Drill Draft, Concept of Operations for Multinational Experiment 3*, 3 Nov 2003.

11. An example of an IO is the United Nations; an example of an IGO is the Association of South East Asian Nations (ASEAN); an example of an NGO is Amnesty International. The distinctions between an IO and an IGO are sometimes blurred.

12. W. Durch, *UN Peacekeeping, American Policy, and the Uncivil Wars of the 1990s* (London: Macmillan, 1997); and L. Freedman, *Military Intervention in European Conflicts* (Oxford: Blackwell, 1994).

13. K. von Hippel, *Democracy by Force: US Military Intervention of the post-Cold War World* (Cambridge: Cambridge University Press, 1999); and M. Duffield, *Global Governance and the New Wars* (London: Zed Books, 2001).

14. Duffield, *Global Governance and the New Wars*, 52.

15. The RCC construct is unique to US C2 structure. In future, this anomaly may create difficulties for multinational partners who wish to integrate into the SJFHQ construct.

16. United States Joint Forces Command (USJFCOM), *Standing Joint Forces Headquarters* (2003). Available at www.jfcom.mil/about/fact_sjfhq.htm. Accessed 24 Mar 2004.

17. Ibid.

18. Ibid.

19. USJFCOM, *MNE 3 Experiment Directive*, Version 2.6 (2003).

20. Ibid.

21. USJFCOM, "Improving Cooperation Among US and Coalition Military and Civilian Operational Planners in Crisis Intervention," in Draft *Combined Inter-agency Coordination Group (CIACG) Concept of Operation for MNE 3*, Revision 1.1, dated 4 Sep 2003.

22. The analysis for MNE 3 was released in two forms: a Canadian national contingent report and a full USJFCOM report. Both are unclassified.

23. USJFCOM, *MNE 3 Experiment Directive.*

24. G. T. Allison, *Essence of Decision: Explaining the Cuban Missile Crisis* (New York: Little, Brown and Co., 1971), 4-5, 10-11.

25. North Atlantic Treaty Organization (NATO), *Coalition Warfare: Coordination and Planning Options*, Draft NATO White Paper (2003).

26. C. Johnson, *Blowback* (New York: Henry Holt and Co., 2000).

27. J. Fallows, "Blind into Baghdad," *The Atlantic Monthly* 293, no. 1 (Jan-Feb 2004), 52-74.

28. Ibid., 69.

29. D. Maxwell, Keynote Address to the NATO ACT/USJFCOM CD&E annual conference, 3 November 2004.

30. NATO, *Coalition Warfare: Coordination and Planning Options*.

31. International Medical Corps (IMC), "Press Release," dated 12 Mar 2003. Available at www.imc-la.com. Accessed 24 Mar 2004.

32. L. Diamond, "What Went Wrong in Iraq?" *Foreign Affairs* 9, no. 10 (2004), 34-56; and "The Right Plan for Iraq," *The Economist* (25 September 2004), 13.

33. D. Maxwell, Keynote Address to the NATO ACT/USJFCOM CD&E annual conference.

34. As of mid-2004, there were some indications from within the US DoD recognizing the need for further changes to its "way of war." See K. Costa, "Pentagon Kicks off Effort to Re-examine the Basic Principles of War," *Inside the Pentagon* (1 July 2004), 1; and T. Ricks, "US Army Changed by Iraq, but for Better or Worse?" *Washington Post* (6 July 2004), p. A10.

35. Multinational Planning Augmentation Team (MPAT) (2004). Available at www2.apan-info.net/mpat. Accessed 7 November 2004.

36. R. Read, Address to the NATO ACT/USJFCOM CD&E annual conference, 3 November 2004.

37. These, for example, include the Organization for Security and Cooperation in Europe, the European Union, the World Bank, the United Nations Development Program, the United Nations High Commission for Refugees, and the Carnegie Commission.

38. D. Maxwell, Keynote Address to the NATO ACT/USJFCOM CD&E annual conference.

Part VI - Concluding Material

Chapter 11
Concluding Remarks from the Editors

Allan English and Howard Coombs

As noted at the beginning of this volume, there are currently three major theoretical approaches that dominate analyses and descriptions of military operations: Operational Art, network-centric warfare (or network-enabled operations in the Canadian context), and effects-based operations. While the concept of EBO is having a significant influence on the other concepts, as well as how operations are conceptualized today, there are many variants of EBO and each alternative has been shaped by national and organizational cultures. Because of the importance of the concept of EBO today, this volume has presented some aspects of Canadian approaches to EBO so that we might get a clearer picture of what this concept means in a Canadian context.

Descriptions and accounts of approaches to EBO are emerging through discussions and papers within Defence Research and Development Canada (DRDC) and jointly with other players in the Department of National Defence (DND); however, there are many ways of describing EBO in the literature and in practice. In order to fully understand the nature of EBO today and how it might evolve in the future, it is vital to understand the theoretical and historical origins of this subject, as well as how EBO is conceptualized and practiced by the Canadian Forces (CF). Since there has been no comprehensive examination of these concepts in a Canadian context, the Command Effectiveness and Behaviour Section at DRDC Toronto co-sponsored, with the Canadian Forces Aerospace Warfare Centre (CFAWC), a two-day workshop, held in November 2006, to identify issues related to EBO and to begin to establish an agenda for better understanding EBO. The proceedings of the workshop documented the origins, context, and various aspects of EBO taken from Canadian experience with EBO. This summary of the proceedings and other Canadian writings on EBO attempts to capture the diversity of current Canadian views on EBO as a first step towards achieving a more comprehensive and integrated Canadian approach to EBO. Because of the immaturity of the concept of EBO and its continually evolving nature, no attempt was made here to reconcile differences among viewpoints. Rather the differences are presented so that readers can get a better idea of how effects-based terminology is currently being used by Canadians.

This final chapter, based on the works that appear in this volume, summarizes the following viewpoints related to aspects of EBO: origins, concepts and context; Canadian perspectives from the EBO workshop; assessing effects-based approaches; and applying effects-based approaches.

Origins, Concepts and Context

A key resource for the workshop was the essay, reproduced above, by Colonel Jim Cottingham, commanding officer of the CFAWC, which described in detail the evolution

of EBO.[1] He concluded that there are two versions of EBO, one that seeks success in armed conflict and one that seeks success in a much broader application. The earliest notions of EBO are quite old, but in a modern context date to First World War aerial bombing. The central idea in this first version of EBO is that there is a better, cheaper, and in the long run, a more humane way of winning than to wage the long drawn out land and sea campaigns that characterized much of twentieth-century warfare. Up until the 1990s, however, the means to implement this idea in practice did not exist, and it was really not until the Persian Gulf War (or first Gulf War) 1990-91 that the potential of this version of EBO was realized when it was mated with new technology in the form of stealth and precision weaponry. Based on the promising results of aerial bombardment during the first Gulf War, US Air Force General David Deptula declared that this new approach to fighting represented a fundamental change in the nature of war and coined the term "effects-based operations" to describe it.

This optimism was dampened by the character of the post-Cold War security environment at the beginning of the twenty-first century when conventional military operations were not seen to be as effective as hoped in bringing long term peace and stability to troubled regions of the world. In this context, EBO, as it was originally conceived, was perceived to be a less revolutionary concept than its advocates claimed. This perceived failure of the first version of EBO to resolve complex security problems gave rise to the second main version of EBO, which is intended to broaden the application of EBO into areas other than armed conflict between nations. Cottingham argues that this second version of EBO is evolutionary and has been built on the original thinking that shaped the development of airpower theory, plus other ideas, to create a new way of thinking about how to manage the attainment of national objectives in peace and in war. He characterizes this second version of EBO as going beyond just using military force to achieve national objectives by employing a holistic approach to achieve them. However, he concludes that, like the first version of EBO prior to the 1990s, this second version of EBO must wait for the development of new concepts and technologies to be effective.

Other aspects of EBO were examined in another workshop resource, the essay by Robert Grossman-Vermaas, a Canadian defence scientist, which explored concepts related to the developing theory of the effects-based approach (EBA) and examined how EBO could be applied to strategic and operational planning processes and to the implementation of plans devised by these processes.[2] He also discussed possible applications of the effects-based approach and explored the implications of its use the in the human and virtual environments of the future.

Grossman-Vermaas notes that conflict today has many diverse elements, such as terrorism, peace support operations, and regime change involving the complex environments of cyberspace, the nano-dimension, space, and the biological and chemical environments. Given these varied elements, he argues that conflict has begun to resemble a complex adaptive system, and that conducting operations in such conditions will require an equally adaptive approach.

In this context, Grossman-Vermaas visualizes EBO in three different ways. First of all, he asserts that EBO is linked to the effort to leverage a nation's (or a coalition's) strategic capabilities at the political, economic, technological, and information networking levels in order to achieve politically satisfactory outcomes for a nation or coalition. It is, at the same time, an intrinsically psychological concept, linking proposed actions to achieve physical and psychological results at the operational level. Secondly, he argues, EBO seeks to control the duration and gravity of a crisis or conflict, allowing nation-states to achieve strategic objectives at a minimal cost. Thirdly, EBO may be seen as a process for obtaining a desired outcome or effect from an adversary, friend or neutral through the synergistic and cumulative application of military and non-military capabilities at the tactical, operational and strategic levels. Consequently, Grossman-Vermaas emphasizes that EBO involves a broad range of activities, of which military action is only a subset.

In his analysis, Grossman-Vermaas contends that users of the effects-based approach will require a firm understanding of complexity theory, causality, networking and complex adaptive systems theory. They will, he maintains, also need to move away from the linear cause-and-effect Newtonian paradigm that underlies most current military planning processes and embrace a new paradigm based on non-linear systems, where inputs and outputs are not proportional, where the whole is not quantitatively equal to its parts, and where cause and effect are not immediately visible. In addition to a shift in mindset, Grossman-Vermaas tells us that an effects-based approach will also demand the application of sophisticated technologies to the overall planning, decision making, execution, and assessment phases of an operation due to the complexity of the approach and the volume of specific information from interagency, academic, corporate, diplomatic, economic and coalition intelligence sources.

In summary, Grossman-Vermaas says that EBOs are a co-ordinated set of actions (or inactions) directed at shaping the behaviour of foes, friends and neutrals during times of peace, crisis and war. These actions rely primarily on the exploitation of cognitive and kinetic weaknesses rather than the traditional practice of simply massing power against power. This approach to the achievement of a long-term strategic aim requires planners to develop a better appreciation of increasingly complex human networks. It also requires a significantly more sophisticated understanding of human values and mindsets over time and space as well as a multidimensional analysis of the primary and secondary "nodes," or "targets" to be affected during the course of an effects-based operation.

Grossman-Vermaas acknowledges that EBO is a concept still in its infancy, and that making EBO a reality will require the maturation of the appropriate theoretical and analytical frameworks to consider a holistic spectrum of conflict that includes political, military, economic, social, legal and ethical, and infrastructure and information segments.

Canadian Perspectives from the EBO Workshop

All participants in the DRDC-CFAWC workshop acknowledged that the idea of achieving certain effects through military, diplomatic, and other actions is a very old concept

that has been evolving for a long time. They conceptualized the term "effect" in a number of different ways, but the idea that an effect is "a change, whether physical, moral or cognitive, that has been caused by an action or inaction" seemed to be acceptable to most participants. It was noted by some, that the word "effect" infers that there is no finality to the result of a particular action and that there is always "more to come." This idea has implications for the concept of "end state" in operational art and campaign planning.

Despite its ancient roots, in its current context, the term "effects-based operations" was derived from the writings of twentieth century air power theorists, and the term EBO was popularized by the US Air Force in the late 1990s. Because of this recent background and its technological focus, EBO is seen by some as a particularly air force approach to operations. Given the perceived air force origins of EBO, some at the workshop preferred to use the term "effects-based approach to operations" (EBAO), because, they argued, EBO had become associated with a prescriptive, technologically-based, largely air force way of conducting operations, whereas EBAO conveyed the idea of a broader, more philosophical approach to operations.

Some workshop participants indicated that the term EBO had evolved since the mid-1990s, as the early twenty-first century military-strategic situation has caused some to emphasize the sociological as opposed to the technological aspects of EBO. For example, conflict in the post-Cold War era has shown that tactical victories can be achieved, but that they do not necessarily result in overall strategic success. Therefore, for some, a more human-focussed version of EBO is the best way to link tactical actions to strategic goals. Others acknowledged that EBO is a method that could help to understand the complex situations that are found in today's operational environments, but that current planning processes based on the operational art were flexible enough to incorporate EBO concepts without changing the processes radically. All workshop participants agreed that EBO was still an immature concept that did not have enough explanatory power to be regarded as a theory.

Some at the workshop argued that Canada does not have the resources to fully practice EBO, and, therefore could only employ EBO as part of a larger coalition or with the United States. Nevertheless, most participants felt that Canada needed both to fully understand EBO as a concept and to know how EBO might apply to Canadian operations if Canada was to be an effective alliance or coalition partner.

Conceptual Foundations. During the workshop a number of concepts were put forward as being fundamental to the practice of EBO. Despite the immaturity of EBO as a concept and the differing views on exactly what constituted EBO, there was some consensus among workshop participants that EBO should be a top down, integrated approach that could be employed to make changes in the security environment to achieve one or more desired end states aimed at attaining strategic objectives. It was suggested that if EBO sought to produce change, whether physical, moral or cognitive, then changes should be observable and measurable, either by objective or subjective measures. To be meaningful in an EBO context, the change being measured should also be considered in terms of outcomes as opposed to inputs or outputs. In this regard, an effects-based approach encourages the consideration of the use of non-kinetic means to produce change, but it does not exclude kinetic means.

Another important concept that emerged during the workshop discussions was the importance, when using EBO processes in a Canadian context, of adopting a whole-of-government approach, in which there is greater interaction between the CF and other government agencies (e.g., the Department of Foreign Affairs and International Trade). All present acknowledged that EBO could be used to situate the use of the military instrument of power in a broader "whole-of-government," sometimes referred to as Defence, Diplomacy, Development (3-D) or Diplomatic, Informational, Military and Economic (DIME), context. In this whole-of-government approach, appropriate responsibility and authority would be delegated to the agency or government department, or perhaps even a non-governmental organization (NGO), with the right competencies and capabilities to ensure that the right actor was employed to deliver the desired effect. However, for a whole-of-government EBO approach to be feasible, clear definitions and terminology would be required. This could be problematic at the moment given the diversity of ways of describing EBO.

Implementing an EBO whole-of-government approach could also be problematic if EBO is perceived to be a military concept rooted in military terminology. Some suggested that for a whole-of-government approach to be successful, an innovative, multi-disciplinary process is needed to bridge the gap between various government organizations. This new approach would require a new vocabulary, based on language that could be understood by all involved, as opposed to the highly technical and culturally-specific military lexicon that, when used, often inhibits cooperation across government departments.

Furthermore, if EBO is to be successfully applied as whole-of-government approach in Canada, it was suggested that this country needs a mechanism for determining how strategic objectives could be attained, then determining which processes could be used to achieve these objectives, and finally determining how to co-ordinate the application of the selected processes among various actors.

The effects-based approach could have a significant positive impact on force development, force generation and force employment in the CF, workshop participants believed. If an effects-based approach used in a whole-of-government approach, however, other government departments might need to be brought into the CF force development process in order to incorporate their expertise at an early stage in the CF change process. In an EBO environment, force development plans would need to address how to maintain the CF's kinetic capability while improving its non-kinetic capability. In terms of force generation, critical thinking skills, an appreciation of intelligence products and the importance of cultural factors would need to be important parts of CF training and education if the effects-based approach is to be used by it. Using an effects-based approach, CF force employment could have significant advantages if it were part of a whole-of-government approach linking the actions of various agencies to Canadian strategic objectives.

At the moment, the effects-based approach to operations has a great deal of potential to make a useful contribution as a guiding philosophy for the achievement of Canadian strategic objectives, many workshop participants concluded. However, to be a useful tool

in this process, much more refinement of the theory underlying EBO and related concepts is required. The utility of the effects-based approach to the operational and tactical realms of operations will also be problematic until the theory of the effects-based approach is developed enough so that its practical applications can be derived.

Assessing Effects-Based Approaches

In his assessment of EBO from a naval perspective, Commander Ken Hansen, the Defence Fellow at the Centre for Foreign Policy Studies, Dalhousie University, tells us that there is a long history of deriving strategic effects from naval operations, but that the purely attritional nature of tactical naval warfare and the naval requirement for swift and decisive tactical engagement serve as a warning against replacing existing theory and methods with an effects-oriented approach to planning and conducting naval operations. He notes that despite the fundamental differences between sea power and other types of military power, advocates of EBO are advancing the notion of its applicability to all forces without any reference to naval historical context and without an appreciation of the underlying theories of naval warfare.

Hansen warns that placing effects ahead of objectives in the planning process, or worse, replacing completely the achievement of objectives with effects, is foreign to the way that sea power has been—and continues to be—applied across the spectrum of conflict. He concludes that, while it is perfectly acceptable and usual to discuss the effects of naval operations at all levels of planning, success in joint and integrated operations cannot be achieved by compelling naval experts to depart from a style of warfare that is both centuries old in its formulation and is in the midst of the single greatest transformation in its long history.

Lieutenant-Colonel Colin Magee, an Army officer and head of the military plans and operations department at the Canadian Forces College, takes a different view from Hansen. Magee argues that current doctrine and the contemporary operational design process, including the Canadian Forces operational planning process (CFOPP), explicitly and implicitly oblige commanders and planners to think in terms of effects. He concedes that current doctrine and planning processes can be improved, but that these improvements should be accomplished by a better integration into the planning process of other instruments of national power; a better, more systemic understanding of the operational environment; and, a better assessment of the effects of actions on the achievement of objectives and the desired end state.

The main weakness of EBO in its current form, according to Magee, is that it is largely based on a reductionist approach to understanding enemy systems, which works reasonably well with systems that have low interactive complexity, but will not work well with systems with high interactive complexity, such as social, military, governmental, political, and economic systems. Magee claims that many proponents of EBO lack a firm understanding of current doctrinal concepts and that their speech and writing are filled with an unintelligible "effects-speak" which adds to the confusion and misunderstanding

of both contemporary elements of operational design as well as EBO. He contends that we do not need another label, which on the surface suggests a newer, better method of planning complex operations, but in reality only serves to confuse an already complicated environment. In the end, Magee concludes that EBO has little to add but confusion to an already proven operational design and planning process.

Lieutenant-Colonel Craig Dalton, an Army officer and a member of the CF's Strategic Joint Staff, considers whether the effects-based approach could enhance the practice of strategic art. Like Magee, he notes that some critics of EBAO believe that it is fundamentally flawed as a methodology in this regard because it attempts to make simple cause and effect links in an environment that is too complex for these simple links to have much explanatory value. Nevertheless, Dalton observes that many varied versions of the effects-based approach exist. He selects the UK effects-based approach for evaluation because of its potential to be of great benefit to practitioners of strategic art. According to Dalton, the UK effects-based approach actually comprises three interrelated concepts: the comprehensive approach, the effects-based approach, and the effects-based philosophy. Taken together, he tells us that they form a UK effects-based framework whose underlying intent is to infuse a "whole-of-government" approach into British security and defence efforts. This framework is also designed to get decision makers and their advisors to think more broadly about contemporary security challenges, both in terms of framing and understanding problems and in formulating strategy. Despite its merits, especially in institutionalizing the "comprehensive approach" to deal with problems in the contemporary operating environment, Dalton concludes that the UK effects-based approach falls short in addressing the challenges posed by the complex adaptive systems in the contemporary operating environment that confront modern-day practitioners of strategic art. Therefore, because it is no better or worse than existing approaches, he suggests that the effects-based approach currently has limited utility for the practice of strategic art.

Applying Effects-Based Approaches

Few observers have described, in written form, how the Canadian Army has been applying the EBAO concept. Therefore, despite their limitations, these comments by Bob Vokac, a retired US Army lieutenant-colonel who has observed battle-staff training throughout the Canadian Land Forces during 2005 and 2006, provide us with valuable insights into how Canada's Army uses EBAO while preparing for operations.

Vokac notes that the Army's force employment concept, published in 2004, embraces the effects-based approach:

EBO is the natural extension of our departure from the attritional approach of attacking physical targets. It is a strategy that does not necessarily depend upon physical force for attaining a desired outcome or effect on an enemy…. This will be accomplished by achieving a full range of effects, both non-lethal and lethal…. In sum, the focussed use of national assets, independently or as part of a coalition, will produce cascading, systemic effects at the tactical, operational and strategic levels.[3]

He also notes that parts of British and Australian EBO doctrine have been incorporated into the Canadian Army approach to EBAO. This new hybrid Canadian Army EBAO philosophy represents an evolution from the original military-centric EBO philosophy and implicitly recognizes that effects are best achieved using all the resources available to a commander and to a government, because the military instrument of power alone is insufficient to achieve the effects necessary to reach the desired end-state, according to Vokac.

He observed that, based on the Canadian Army EBAO philosophy, senior commanders often chose to emphasize an effects-based approach during training exercises. This approach had its drawbacks, however, as the infusion of the operational-level terms (like end-state) into tactical-level exercises, if not properly tempered by experienced subordinate commanders and staffs, has, at times, led to confusion and planning inefficiencies. Vokac observed that in these situations all command levels struggled to attempt to define their own effects, but often lost the important linkage that should have connected subordinate activities (or tasks) to the achievement of higher level effects. Furthermore, he noted that while almost all exercises do an excellent job of replicating the physical domain, they are much less successful at replicating the moral or cognitive domain. Therefore, while an effects-based approach is often planned, its execution is virtually impossible to simulate.

In fact, Vokac reported, even effects-based planning is hard to replicate given the inherent difficulties in developing relevant measures of effectiveness. In addition, because commanders and their staff, as well as those who design and assess exercises, are more comfortable visualizing the effects produced by physical activities, they tend to focus on force-on-force engagements rather than on psychological operations directed against an enemy commander.

Vokac concludes that an effects-based approach to operations is consistent with existing doctrine and does not appear, at this point, to be a revolutionary approach to the way the Canadian Army plans and conducts its operations. However, to use EBAO successfully, commanders and their staff must have a sound understanding of the battlespace, including the linkages and relationships among all the actors in their area of responsibility. It is only with this knowledge that commanders and their staff, knowing the desired end state promulgated by higher headquarters, can properly identify objectives, then identify the effects required to achieve the objectives, and finally select those activities required to create the effects. Vokac believes that the necessary knowledge and skills to use EBAO well can be imparted within the training environment, through the design of demanding and complex scenarios.

Another way to ensure that CF personnel understand effects-based approaches would be by studying them within the continuum of professional military education (PME), according to Colonel Randall Wakelam, the Director of Curriculum at the Canadian Forces College. He argues that, given the relative immaturity of the EBAO concept and the lack of precision in descriptions of it, EBAO is more a philosophy of war than a technique to be learned, mastered and employed. If one accepts this argument, then students can best

be prepared to use EBAO by developing their intellectual skills, critical thinking abilities, creativity, and the like, through education, not training.

In Canada, Wakelam argues, the best time to introduce the study of EBAO as a philosophy of war is in Development Period (DP) 3 which encompasses professional education for majors/lieutenant-commanders and lieutenant-colonels/commanders and which focusses on the use of military forces at the operational level of war. More advanced study of EBAO should then occur at the DP 4 (colonels/captains (Navy) or officers destined for those ranks) level. Wakelam notes that, in the past, both Britain's Imperial Defence College (now called the Royal College of Defence Studies) and Canada's National Defence College at Kingston (which operated from 1949 to 1995) examined national security issues from a broader perspective than just the use of military courses of action. Their curricula included a whole-of-government approach to defence and security issues in a global context. Wakelam concludes that, based on the historical record, there is nothing fundamentally new about effects-based approaches to operations; however, in order to use EBAO effectively military professionals need relevant advanced PME to develop their intellectual capabilities to the level required. The types of capabilities necessary for the successful application of EBAO are evident from ongoing operations that use an effects-based approach.

In his second essay in this volume, Robert Grossman-Vermaas argues that, to be successful, multinational effects-based operations must be based on desired and achievable strategic end-states that should then guide campaign planning. Once the plans are made, the optimum mix of civilian and military capabilities must be deployed to achieve a range of long and short-term effects aimed at achieving the strategic end-states. The challenge in this process, according to Grossman-Vermaas, lies with the integration, or bridging, of such planning efforts externally among coalition partners and internally among large, institutionally independent, military and civilian levels of government.

Like most other commentators, Grossman-Vermaas acknowledges that the effects-based concept is still immature; therefore, while effect-based planning has demonstrated some potential, it has not yet progressed to a mature experimentation or prototype phase. Nevertheless, Grossman-Vermaas contends that future operations that employ the principles of the effects-based approach will, by their very nature, require political and military leadership to both anticipate and understand the consequences of actions. He also emphasizes the fact that effects-based approaches are outcome-focussed and involve a broad range of activities, of which military action is only a subset.

Consequently, Grossman-Vermaas believes that to be successful in employing the effects-based approach, planners must develop a better appreciation of increasingly complex human networks and the dependency linkages that connect communities of interest. He goes on to say that to achieve their desired results, planners must have a sophisticated understanding of culture and human values, the relationship between time and space, and the ability to conduct a multidimensional analysis of primary, secondary and follow-on actionable "nodes," "targets," networks, or dependency relationships between nodes, that are to be influenced during the course of operations.

The end-state of an effects-based plan, Grossman-Vermaas argues, should be holistic in all respects and one that promotes the integration and realization of the 3-D principle. Based on results from recent multinational and interagency exercises and consideration of the past, present and future security environments, Grossman-Vermaas maintains that national and international non-military organizations and interagency partners should be directly involved in the operational planning and execution stages of coalition effects-based efforts. He concludes that to make this involvement viable, a "bridging" between civilian and military values and perspectives must occur. This "bridging" is not simply a case of generic civil-military training, however, and can only be accomplished by activities that achieve a deep understanding of the cultural, social, and other differences among the various groups involved.

Conclusion

At the moment there is no comprehensive and widely accepted approach to effects-based operations in the CF. However, there are some common points of agreement among various Canadian commentators. Most of those consulted in the EBO workshop process agree that, given the state of theory and practice related to EBO, it should be seen as a philosophy rather than a process. This philosophy, as it evolves, should—they believe—involve a top down, integrated (or whole-of-government) approach that could be used by a government to achieve a nation's strategic objectives. They also felt that the term "effects-based approach to operations" (EBAO) was preferable to EBO, as EBO has become associated with a technologically-based, largely air force way of conducting operations. A tentative definition, that effects-based operations are "co-ordinated sets of actions directed at shaping the behaviour of friends, neutrals, and foes in peace, crisis, and war," found widespread acceptance among those consulted. However, there was little consensus among them whether EBO, or even EBAO, had much utility in practice today, based on its current immature state of conceptual development.

Notes

1. J.F. Cottingham, "Effects-Based Operations: An Evolving Revolution," unpublished paper written as part of the MA in War Studies program, Royal Military College of Canada, July 2004.

2. Robert Vermaas, "Future Perfect: Effects Based Operations, Complexity and the Human Environment," DOR(Joint) Research Note RN 2004/01, Operational Research Division, Department of National Defence, January 2004.

3. Canada, Department of National Defence, *Purpose Defined: The Force Employment Concept for the Army - One Army One Team One Vision*, (np, 31 March 2004), 38-9.

Part VII - Annexes

Annex A
Effects-Based Operations: An Annotated Bibliography

J.R. McKay

Introduction

The origins of this annotated bibliography came from my preparations for the workshop in which I examined the available literature. It is far from exhaustive in that the volume of books, monographs, and articles on the topic of effects-based operations (EBO) increases with every month. As a concept, EBO represents a synthesis of a number of different ideas and is continually evolving. This presents a challenge for the authors of annotated bibliographies in that it can be difficult to find a satisfactory point of departure for the examination of the literature.

The sources used in this bibliography are exclusively from the English-speaking world. In the main, they come from American military journals, staff college papers, contracted works, and US Department of Defense publications. However, there are also contributions from the Canadian Forces and Canadian Department of National Defence, Great Britain, Australia, the Netherlands and Singapore.

There are a number of themes within the literature associated with EBO. These include its lineage, explanations of the concept, "Strategy-to-Task," Complex Adaptive Systems, "Control" Warfare, the Instruments of National Power,[1] Intelligence, Criticism plus a series of miscellaneous topics. This bibliography has been organized along thematic lines; within each theme, the works are presented chronologically. Some licence has been taken with the classification of the works as many overlap or bridge more than one theme.

Lineage

T.W. Beagle, *Effects-Based Targeting: Another Empty Promise?* (Maxwell AFB: Air University, 2000).

This paper was a School of Advanced Airpower Studies thesis by a serving US Air Force officer, produced in 2000, that sought to examine targeting processes in light of an effects-based methodology. It is intended to act as an academic submission. The author compared Operations POINT BLANK (strategic bombing of Germany), LINEBACKER II (1972 bombing campaign against North Vietnam), DESERT STORM (the 1991 restoration of Kuwait) and ALLIED FORCE (the 1999 campaign against Serbia) and drew some interesting conclusions. First, the author noted that the air campaigns were far more successful at the tactical level than the strategic or operational levels. Second, the author noted that the successful application of EBO was limited by planning and bomb damage

assessment. Finally, the author noted that psychological effects were the key to EBO, but the least understood. This early contribution is interesting in that it represents a sceptical point of view from within the ranks of the US Air Force.

Major K. Noedskov, "Systematizing Effect Based Air Operations," *Air & Space Power Journal – Chronicles Online Journal* (24 May 2000), pp. 1-11. Available at http://www.airpower.au.af.mil/airchronicles/cc/noedskov.html. Accessed 19 December 2006.

This article, originally written in 2000 by a Royal Danish Air Force student at the US Air Force Air War College, focusses on air operations and attempts to reconcile EBO applications in air warfare with the levels of war and associated missions and tasks. The author was careful to associate EBO with the strategic and operational levels. The article summarizes both NATO and US Air Force doctrine with regard to targeting and campaign design before addressing some of the literature related to systems analysis of the enemy. It is worth reading if one is unfamiliar with air warfare.

Phillip S. Meilinger, "The Origins of Effects-Based Operations," *JFQ: Joint Forces Quarterly*, 35 (Autumn 2004), 116-112.

The author, a renowned scholar of airpower, has produced a short yet informative article that reminds the reader, through a discussion of the theories of strategic bombing in vogue during the Second World War and the application thereof, that effects-based operations are not necessarily new. On the one hand, the US Army Air Corps' Air Corps Tactical School (ACTS) had trained a generation of American airmen to conceive of the enemy's economy as a vast system with a series of nodes that could be struck. On the other hand, critics of such approaches to strategic bombing referred to such nodes as "panacea targets." This article showed that John Warden's conception of the "enemy as a system" was a renaissance of earlier thinking than a new idea. It provides a succinct yet informative summary of the origins of EBO that reminds the readers that the concept is evolutionary as opposed to revolutionary.

Charles Tustin Kamps, "Effects Based Operations," Doctrine NOTAM, *Air & Space Power Journal*, 18, no. 2 (Summer 2004), 18.

Charles Tustin Kamps is a professor at the US Air Force's Air War College and a former officer in the US Army and US Navy. This article provides a brief summary of the evolution of effects-based operations and its long heritage in air power theory from Giulio Douhet to ACTS to Warden to Deptula. He notes that the major enabler of the effects-based operations concept has always been intelligence, but that its imperfect nature limited the effectiveness ofthe concept. This appears to be an implicit call for the US Air Force to increase the emphasis on intelligence issues and provides evidence of the existence of a debate internal to that service.

Major Z. Jobbagy, *Literature Survey on Effects-Based Operations*, (The Hague: TNO Physics and Electronics Laboratory, 2003).

As the title suggests, this is a literature survey on EBO. The author, a serving Dutch officer, has created a lengthy summary of EBO-related material, including European and some

obscure American sources, to fill the first of a number of requirements for a PhD on the topic. It is, however, not an annotated bibliography, as the author does not attempt to make any judgments on the quality of, or bias inherent in, the sources. It is worth reading as a primer, but it is three years old and the EBO concept continues to evolve. The author's conclusions still have some merit in that more research into the cognitive and psychological domains and a common lexicon are required for progress to be made in better understanding EBO.

EBO Explained

Major Thomas Tighe, Lieutenant-Colonel Raymond Hill and Lieutenant-Colonel Greg McIntyre, "A Decision for Strategic Effects: A Conceptual Approach to Effects-Based Targeting," *Air & Space Power Journal – Chronicles Online Journal* (11 Oct 2000), 1-21. Available at http://www.airpower.au.af.mil/airchronicles/cc/hill.html. Accessed 19 December 2006.

This paper, written by three US Air Force officers in 2000, applied John Boyd's Orient-Observe-Decide Act (OODA) Loop model to the analysis of an enemy with a view to identifying opportunities for strategic attack. The paper goes into vivid detail of the various conceptions of the OODA loop but concludes the best form of strategic attack is to defeat the enemy's decision process. The paper appears to be an academic submission of an Air War College paper as opposed to a conscious advocacy on the part of the authors. It shows the influence of Boyd's theories on EBO.

Maris "Buster" McCrabb, "Explaining 'Effects': A Theory for an Effects-Based Approach to Planning, Executing and Assessing Operations," Version 2.0, dated 7 August 2001, 3. Available at http://www.dtic.mil/jointvision/ideas_concepts/ebo.doc. Accessed 24 Jul 2007.

This paper, written by a former US Air Force officer turned academic, represents an attempt to address the issue of the EBO lexicon combined with an analysis of US Air Force and joint doctrine on EBO extant in 2001. The paper is intended to work towards the development of a more coherent theory of EBO to inform doctrinal work and research and development. The discussion of the lexicon is very useful as the author also takes the time to explain the weaknesses within the body of doctrine and alternatives to EBO. It must be read by anyone interested in the topic.

Colonel Edward Mann, Lieutenant-Colonel Gary Endersby and Tob Searle, "Dominant Effects: Effects-Based Joint Operations," *Aerospace Power Journal* 15, no. 3 (Fall 2001), 92-100 (online version). Available at: http://www.airpower.maxwell.af.mil/airchronicles/apj/apj01/fal01/vorfal01.html. Accessed 24 Jul 2007.

This article, written by a pair of former US Air Force officers and a research fellow at the Airpower Research Institute, provides an excellent lexicon of effects and their classification. The article is an excerpt of the results of a 1999 Title X Global Engagement War game run by Air University's College of Airpower Doctrine, Research and Education (CADRE). The authors describe the nature and type of effects, such as direct (first order physical, collateral,

psychological, and functional), and indirect (second or third order collateral, psychological, functional, cascading, cumulative, and systemic) effects (the physical, functional, systemic, and/or psychological outcomes or consequences that result from specific action). Their work sets the standard for identifying and dealing with effects-related language. It should serve as the basis for any doctrine work.

Major Reginald J. Williams and Rocky Kendall, *Operationalizing Effects-Based Operations: An EBO Methodology Based on Joint Doctrine* (Langley AFB: Air Combat Command, 2004).

This paper's origins are unknown, but it contains a short, yet good, summary of the lineage, nature and existing lexicon of EBO written by a US Air Force officer and a civilian employee at Air Combat Command Headquarters. It is intended to offer a methodology for EBO planning; however, this methodology is based on the contents of JP 3-30 *Joint Air Estimate Process*. The source makes the paper a rather US Air Force-oriented publication, and it should not come as a surprise that Deptula and other US Air Force sources have influenced it heavily.

Colonel J.F. Cottingham, "Effects-Based Operations: An Evolving Revolution," unpublished paper written as part of the MA in War Studies program, Royal Military College of Canada, July 2004, which is also a chapter in this volume.

Colonel Cottingham is the commanding officer of the Canadian Forces Aerospace Warfare Centre and his paper provides an excellent summary of the literature and lineage of the ideas surrounding EBO. The paper, like Meilinger's work, summarizes the US Air Force's development of a number of ideas that converged in the early 1990s to generate the concept of EBO. In addition, Cottingham's paper sought to explain the causes and nature of subsequent evolution, which the author explains with the concept of "spiral" development or the evolution of different versions of EBO. He argues that there have been two "spirals" or versions of EBO to date: the first was the development of the strategic military concepts that led to John Warden's and David Deptula's concepts, and the second, dealing primarily with the national instruments of power, was borne of coercion theories, the rise of complex adaptive systems, and the 1990s experience of dealing with complex emergencies through an interagency process. This paper, which appears in this volume, ought to be read by all military professionals and academics of military affairs.

J.P. Hunerwadel, "The Effects-Based Approach to Operations: Questions and Answers," *Air & Space Power Journal* 20, no. 1 (Spring 2006), 53-62.

The author, a former US Air Force officer who drafted the early US Air Force doctrine that introduced EBO, is recognized as an expert in the field. In this work, Hunerwadel appears to be writing to those unfamiliar with or hostile to the concept of EBO. He makes an effort to demonstrate that EBO is a synthesis of earlier concepts and that it seeks to bring the military instrument of power into the broader context of the American government's National Security Strategy. He argues that EBO ought to focus on the desired end-state and objectives, which he described as "Clausewitz 101." Hunerwadel's article represents an attempt to debate with the critics of EBO as opposed to merely replying to their criticisms.

Douglas E. Lee and Major Timothy Albrecht, "Transforming Battle Damage Assessment into Effects-Based Assessment," *Air & Space Power Journal* 2, no. 1 (Spring 2006), 51-2.

No information on the authors could be found other than they are US Air Force officers, but it is likely that they work in the realm of US Air Force doctrine. Their short article recommends a methodological change to the assessment phase of the targeting process to bring into compliance with the tenets and requirements of EBO. It is of greater interest to those who wish to examine how EBO ought to occur as opposed to those that wish to debate whether or not EBO ought to be adopted as a doctrinal principle.

Douglas E. Lee and Major Timothy Albrecht, "Strategy for Effects-Based Doctrine," *Air & Space Power Journal* 2, no. 2 (Summer 2006), 118-19.

This is another short article from Lee and Albrecht that offers a "way ahead" for dealing with the confusion generated by the lack of common joint lexicon for dealing with EBO. Its simplicity and argument make it a useful piece to read, even if it is very brief.

Strategy to Task

Dennis J. Gleeson, Colonel Gwen Linde, US Air Force, Commander Kathleen McGrath, US Navy, Adrienne J. Murphy, Williamson Murray, Tom O'Leary and Joel Resnick, *New Perspectives on Effects-Based Operations: Annotated Briefing*, (Alexandria, VA: Institute for Defense Analyses, 2001).

Staff at the Institute for Defense Analyses prepared this paper on behalf of US Joint Forces Command (JFCOM). It is the summary of a briefing and informs subsequent JFCOM work on the topic. Their intent was to brand EBO as a joint, as opposed to US Air Force, concept. The authors provide a summary of EBO, offering that the key to EBO was the adoption of "effects-based thinking," which combined the use of the military instrument of power in a larger context to serve strategic ends and the consideration of effects.[2] It is worth reading to look at the origins of the JFCOM EBO efforts.

Major William E. Young, *Discovering the Effects-End State Linkage: Using Soft Systems Methodology to Perform EBO Mission Analysis*, paper submitted to the 10th International Command and Control Research and Technology Symposium – the Future of C2.

Major Young was a US Air Force student at the US Air Force Air War College when this paper was produced. It was a submission to a symposium intended to suggest a methodology to inform the process of mission analysis in EBO. His key point, apart from the discussion of "soft systems methodology," was that there has not been a lot of research into how mission analysis deals with linking end states and effects. He criticizes the Political/Military/Economic/Social/Infrastructure/Informational (PMESII)[3] construct created by JFCOM as being somewhat reductionist in nature and which does not describe an adversary as a complex adaptive system adequately. The first half of the paper is worth reading for the discussion of the end states and effects at all levels of war, but the second would be of less interest to students of EBO.

Donald Lowe and Simon Ng, *Effects-Based Operations: Language, Meaning and the Effects-Based Approach* (Canberra, Australia: Defence Science and Technology Organization, 2004).

The authors are a pair of Australian defence scientists and their paper was a submission to the 2004 Command and Control Research and Technology Symposium. The paper was an attempt to provide a logical framework for EBO through a coherent lexicon, but due to the nature of the paper, it merely offers the first furtive steps to do so. While their arguments are coherent and clear, readers familiar with the subject may find their conclusions to be obvious.

Lieutenant-Colonel Joshua Ho, "The Dimensions of Effects-Based Operations," *Defence Studies* 5, no. 2 (Summer 2005), 169-87.

The author, a serving Singaporean Navy officer, worked on this topic while he was a senior fellow at the Institute of Defence and Strategic Studies at Nanyang Technical University, Singapore. His article was an exploration of the concept of EBO and an attempt to associate EBO with the levels of war. He started with the premise that EBO offered an alternative to the traditional strategies of annihilation or exhaustion by noting that destruction of the enemy is but a means to an end.[4] From there, he stated that EBO was a planning methodology at the tactical level, a means to leverage other instruments of power at the operational level and a framework for strategic resource allocation. This classification is thought provoking and makes this essay and its predecessor[5] very useful.

Steven D. Carey and Robyn S. Read, "Five Propositions Regarding Effects-Based Operations," *Air & Space Power Journal* 20, no. 1 (Spring 2006), 63-74.

The authors of this article, one a serving and the other a retired US Air Force Colonel, offer the idea that effects-based operations represents a mindset that links all activities to the overall goal. Their Proposition 1 was that all military operations should be effects-based, regardless of their place within the levels of war. Proposition 2 suggested that effects-based operations provides a comprehensive framework for coalition operations, and that EBO is a means for coalitions to fight easily and in more sophisticated ways than by using attrition or annihilation strategies. Others, however, had rejected this proposition.[6] Proposition 3 suggested that intelligence preparation is the critical foundation of effects-based planning. This means that military organizations must be capable of adaptation to match the environment and should look for second and third order effects in the context of their environment. Their fourth Proposition held that EBO should include specific mechanisms to identify, measure, and assess the consequences of each action taken. Their final proposition was that military forces should be specifically organized and trained to conduct EBO. Their work represents an attempt to develop an operational concept to inform future doctrine. This article has inspired some criticism as critics note that J.P. Hunerwadel (see above) had already covered much of the conceptual ground found in this article. Furthermore, some critics claim that their approach suffers from "ad hoc-cracy" and imprecise definitions. One critic recommended that the concept be permitted to evolve further before rejecting or codifying an immature concept, as was attempted in this article.[7] Hunerwadel's article should be read in conjunction with this essay.

"Commander's Handbook for an Effects Based Approach to Joint Operations," (Norfolk, VA: US Joint Force Command, 2006).

This is a "must read" book. It contains the most recent iteration of American joint doctrine on EBO. It represents an attempt to provide a common baseline for effects-based joint military operations within a whole-of-government approach, as opposed to the US Air Force version of EBO. It offers guidance on the role of effects within the planning and execution of joint military operations, and it states that the effects-based approach has a very limited application at the tactical level.

Complex Adaptive Systems

Colonel John A. Warden III, "The Enemy as a System," *Airpower Journal* 9, no. 1 (Spring 1995), 40-55.

John Warden is remembered most for his influence over the early version of the 1991 Gulf War air campaign and his 1988 work, *The Air Campaign*.[8] In this work, "The Enemy as a System," Warden encourages his readers to apply the deductive approach to warfare, where general rules are applied to arrive at specific conclusions. He follows this exhortation with the use of scientific analogies (e.g., the body or an atom), to describe an enemy. Warden owes a debt to Deptula in that he also uses terms like "control warfare" and "parallel attack" found in Deptula's work.[9] Warden's article merits reading as it provides a clear and parsimonious concept to deal with the analysis of an adversary.

Paul K. Davis, Effects-Based Operations: A Grand Challenge for the Analytical Community (Santa Monica, CA: RAND, 2001).

Paul K. Davis is a RAND researcher working on matters associated with operational research. In this publication, written before the proliferation of effects-based articles after the 2003 Iraq war, he provides a brief description of EBO and notes that the analytical community had to invest more effort in figuring out how to deal with it. This was a call to action to that community so that new concepts would not render it useless to practitioners. He notes that the "systems framework," by which he meant complex adaptive systems, makes it difficult for practitioners to avoid failures and/or unintended consequences. Despite its intended audience, the initial discussion of EBO is clear and free from jargon, which makes it an extremely lucid and coherent introduction to the concept.

William A. Owens, "The Once and Future Revolution in Military Affairs," *Joint Force Quarterly* 31 (Summer 2002), 55-61.

William Owens is a former US Navy Admiral who had worked on force modernization in the 1990s. This article is primarily about the revolution in military affairs, but it offers a succinct description of the concept of complex adaptive systems, noting that conflict is a dynamic process. Owens states that there was: "…a new conceptual framework that some called the *system of systems*. This concept depicts war as a deadly contest in which the side that best understands the battle space and can best transfer that knowledge among its own

elements to apply force faster, more precisely, and over greater distances wins. The key was seeing power in functional interactions and synergy." This article represents an evolution of Warden's idea of the enemy as a "system" and merits reading for this reason.

Major Leonard Rickerman, *Effects-Based Operations: A New Way of Thinking and Fighting*, (Fort Leavenworth, KS: US Army Command and General Staff College, 2002).

The author of this paper was a US Army student at the School of Advanced Military Studies and the intended audience of the paper was an internal one. In the paper, Major Rickerman examined EBO as the emerging joint warfare paradigm and sought to counter service-specific criticisms of the concept as he concluded it was the best tool at hand to organize for joint warfare. While an EBO enthusiast, he was careful to note that more work on the concept was required. This work does not significantly add to the body of literature.

Edward A. Smith, *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War*, (Washington, DC: Department of Defense, 2003).

The author was a retired US Navy Captain and the senior analyst for network-centric warfare (NCW) and EBO at Boeing Corporation. This weighty volume is intended to discuss EBO (defined as "co-ordinated sets of actions directed at shaping the behavior of friends, foes, and neutrals in peace, crisis, and war") and its application through NCW. The book is the third in the Department of Defense Information Age series and is written in the vein of the 1990s Revolution in Military Affairs literature. Despite the aforementioned broad definition, EBO was later described in this work as "operations in the cognitive domain" and the book is oriented towards the latter concept. Smith discusses complexity in detail and explores how to generate the desired effect from an action, determining what other effects actions will have and how to attribute causality to an action. He provides a conceptual link between complexity theory and the lexicon surrounding effects. The book did not get good reviews and its length (600+ pages) may deter some from reading it.[10] However, these factors should not detract from its contribution to the body of literature, and it is worth the effort to read it.

Robert Vermaas, "Future Perfect: Effects Based Operations, Complexity and the Human Environment," Directorate of Operational Research (Joint) Research Note 2004/01 (Ottawa, ON: National Defence, 2004); and Robert Grossman-Vermaas, "Discourse of Action: Command, Control, Conflict and the Effects Based Approach" (Ottawa: Department of National Defence, 2004).

Robert Grossman-Vermaas is a defence scientist with the Department of National Defence. This first title was a monograph and was the first in a series on the EBO concept. It is intended to inform readers of the potential benefits of the concept, such as the leveraging of all of the instruments of national power, a greater economy of effort and a means to influence allies, adversaries or neutrals. He notes that the inclusion of complex adaptive systems concepts will have the greatest impact on command and control issues, and, as a result, Canada ought to pursue a means of operational net assessment, the American term for interagency information fusion.

The second work builds upon the contents of the first, and it expanded the discussion of effects-based planning with regard to command and control. This work was one of the few sources to deal with the issue of coalitions and information sharing. Both of these works are worth reading as a primer for issues pertaining to complex adaptive systems and for the broad perspective taken to EBO.

Edward A. Smith, *Complexity, Networking and Effects-Based Operations: Approaching the "how to" of EBO* (Arlington, VA: Boeing Company, 2005).

Edward Smith, at the time of publication, was the Executive Strategist, Effects-Based Operations for Boeing Corporation. This paper is aimed at addressing a perceived gap in terms of cognitive and psychological effects within complex adaptive systems. However, being somewhat short, it does not do so specifically, but offers a logical framework to deal with the issue. This framework, based on living systems theory, provides the context for understanding the concept of complex adaptive systems as open entities and is worth the effort to read it on that subject alone.

Edward A. Smith, *Complexity, Networking, & Effects-Based Approaches to Operations*, (Washington, DC: Department of Defense, 2006).

This book expands upon the aforementioned paper. In this book, the author recommends the application of EBO as the best means of dealing with the complexity of the contemporary operating environment. His 2003 definition of EBO in his *Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War* (see above), remains intact in this book, but there is a new take on the issue. Instead of being about operating in the cognitive domain, EBO is now portrayed as an approach to warfare that puts the "human-in-the-loop" as opposed to being focussed on technology. The argument presented in the aforementioned paper has been expanded upon to discuss living systems theory in greater detail as it relates to complexity. However, the book comes across as a repackaging of his 2003 work to fit the counter-insurgency mould.

Major Robert Umstead and Lieutenant-Colonel David Denhard, "Viewing the Center of Gravity through the Prism of Effects-Based Operations," *Military Review* 86, no. 5 (September-October 2006), 90-5.

Two US Air Force officers wrote this work and it is intended to show that EBO is not incompatible with existing practices such as "Center of Gravity analysis." They, with a short yet succinct discussion of systems analysis, suggest that the concept of a "Center of Gravity" can be meshed with systems analysis. This article provides a good primer for systems analysis as described by USJFCOM. The similarity of this essay to published doctrine is noticeable; however, the editor of *Military Review* describes this similarity as coincidental.

Control Warfare

Major Jason Barlow, "Strategic Paralysis: An Air Power Strategy for the Present," *Airpower Journal* 7, no. 4 (Winter 1993), 4-15.

This article was written by a serving US Air Force Officer in the wake of the 1991 Gulf War. The article advocates the adoption of a new strategy described as "strategic paralysis," which, at the time, represented a service-specific vision of victory through the massive application of conventional air power. This theory, inspired partially by John Warden's *Air Campaign* and the 1991 Gulf War, held that air power could be employed to obtain a quick and relatively inexpensive victory. The lynchpin of this strategy was to identify and target those sources of the national instruments of power, which the author labelled as National Elements of Value (NEV). Without the NEVs, an adversary would be literally unable to act effectively. This article is worth reading as it pre-dates Deptula's works and offers a different means of describing what has become known as "control warfare."

David A. Deptula, "Parallel Warfare: What Is It? Where Did It Come From? Why Is It Important?" in William Head and Earl H. Tilford, Jr., eds., *The Eagle in the Desert: Looking Back on US Involvement in the Persian Gulf War* (Westport: Praeger, 1996), 127-56.

This was the first of several versions of an article on the topic of "parallel warfare" by an Air Force officer who had served as one of the main planners of the 1991 Gulf War air campaign.[11] His intended audience was the US Air Force community as well as the American joint community. He argued that the 1991 Gulf War air campaign was "parallel" as opposed to "serial." Both terms were taken from electrical circuit designs where the term "parallel" represents simultaneous and "serial" represents sequential. He noted that this was not a new idea, but that technological advances (e.g., precision guided munitions and stealth technology) allowed for it to be applied effectively. Deptula also redefined the concept of mass in this article.[12] And he argued that existing targeting processes support strategies of annihilation or attrition and therefore a strategy of "control" (a means to make enemy command and control ineffective) was being ignored. This was an argument based on the principle of economy of force. Later versions of Deptula's work modified some of the concepts presented in this paper to include leveraging all of the instruments of national power. This work ought to be read by all interested in EBO as it is one of the seminal works on the topic.

Gary L. Crowder, "Effects-Based Operations: The Impact of Precision Strike Weapons on Air Warfare Doctrines," *Military Technology* 27, no. 6 (June 2003), 16-25.

The author of this article was the Chief, Strategy, Concepts and Doctrine of US Air Force Air Combat Command. The article itself is a distillation of a briefing delivered in March 2003. Although written before the start of Operation IRAQI FREEDOM, the article discusses the concept, first raised by David Deptula in this context, of "parallel war." This form of warfare, the author argues, can be used to achieve cumulative or cascading effects to achieve control over the enemy. Crowder discussed the concept in light of the potential for a greater economy of force offered by the combination of stealth technology and precision guided munitions. He also suggested that EBO was a means to reduce possibility of collateral damage.

Colonel Merrick E. Krause, "Integrated Coercive Strategies and the Role of the Air Component," *JFQ: Joint Force Quarterly*, Issue 41 (Summer 2006), pp. 68-75.

The author of this article, a US Air Force officer was the editor of Joint Force Quarterly. He, like Deptula, argued that EBO represented a new type of war based on a strategy of "control" as opposed to annihilation or exhaustion. Krause, however, based his argument on the concept of coercion (the use of threats and/or discrete uses of force to alter an adversary's decision calculus). In this context coercion is intended to cause adversaries to feel a sense of fear and/or loss, thus making them more willing to comply with the coercer's demands.[13] This introduction of coercion theory represents a further step in the logic of the economy of force.

Harlan Ullman, "Slogan or Strategy? Shock and Awe Reassessed," *National Interest*, Issue 84 (Summer 2006), 43-9.

Harlan Ullman is a Washington Times columnist and senior member of the Centre for Strategic and International Studies. He was also one of the major contributors to a National Defense University-sponsored paper that later became well known due to the widespread use by the media of the paper's title: "Shock and Awe." The original paper was written to provide an alternative concept for mission packaging in order to defeat an adversary quickly and easily. The authors of the paper concluded that in many cases, the best means was to defeat the adversary before having to engage in decisive battle.[14] This concept, like some found in Deptula's writings, provides an alternative to strategies of annihilation or exhaustion. In this 2006 article, Ullman was attempting to set the record straight on the concept of Shock and Awe after the media's use of it to describe the opening of 2003 Gulf War. The concluding paragraph of the article provides a rebuke to the Bush Administration and argues that the proper use of Shock and Awe would have forced them to think through the second- or third-order effects of the invasion, and therefore, make plans to address them. Ullman's article represents an attempt to disassociate his concept from the failure of US strategy to deal with the post-invasion insurgency.

Instruments of National Power

Major H.A. Foster, *Organizing for Effect: Assessing the Institutional Machinery Needed to Effectively Conduct Effects-Based Operations* (Quantico, VA: Marine Corps University, 2002).

This academic paper, written by a US Air Force student at the US Marine Corps Command and Staff College, is an analysis of EBO in light of the requirement to leverage the instruments of national power. Using "control warfare" as a point of departure, the author argued that knowledge of all aspects of the enemy was necessary and obtainable if and only if all instruments of national power shared information with one and other. The author argued that the American intelligence community needed to reform the interagency process with regard to security issues and better prepare the armed services for operating in a DIME context. Intelligence personnel would benefit from reading this paper.

Major David W. Pendall, "Effects-Based Operations and the Exercise of National Power," *Military Review* 84, no. 1 (January/February 2004), 20-31.

Major Pendall, at the time of the article's publication, was a US Army strategic planner with the National Security Agency. This article was aimed at the critics of EBO; it sought to convey the message that EBO was the best means to leverage all aspects of military power. However, the article read like a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis briefing and this approach and its tone was unhelpful. It did not, despite the article's title, address the instruments of national power in any meaningful way.

Major Robert B. Herndon, Chief Warrant Officer 3 John A. Robinson, Colonel James L. Creighton, Lieutenant-Colonel Raphael Torres and Major Louis J. Bello, "Effects-Based Operations in Afghanistan," *Field Artillery Journal* 9, no. 1 (January-February 2004), 26-30.

This article was a brief discussion by officers of the US Army of the application of EBO concepts by Combined Joint Task Force 180 in Afghanistan. The commander of the 10th Mountain Division's Artillery Brigade and members of the Divisional Artillery staff wrote the article to demonstrate the utility of an effects-based approach to the broader US Army artillery community. In short, they argued that the fire support community ought to expand beyond the realm of kinetic weapons such as artillery and air assets and learn to synchronize non-kinetic military assets and perhaps even non-military assets. The article reinforces David Lazarus' point about counter-terror campaigns.

Joint Doctrine & Concepts Centre, *The UK Military Effects-Based Approach*, Joint Doctrine Note 1/05, (Shrivenham, UK: Ministry of Defence, 2005).

This is an official British military document that codifies thoughts on the effects-based approach concept and provides a guide for further doctrine development. It is based on the British Government's "Comprehensive Approach" where all elements of government are used to deal with complex emergencies. The effects-based approach is seen as a means to make the military arm more effective within the comprehensive approach. The document also provides an excellent definition of what constitutes an effect from a planning perspective (e.g., who is to be affected, the desired change of state, when the effect is to occur, and the requirement for effects to be both measurable and realistic).

Joint Doctrine & Concepts Centre, *The Comprehensive Approach*, Joint Doctrine Note 4/05, (Shrivenham, UK: Ministry of Defence, 2005).

This is another official British military document. It provides an explanation of the British government's comprehensive approach and situates the British military instrument of power within a broader framework. It is worth reading for the British perspective on whole-of-government approaches to complex emergencies. This approach explicitly states that the Ministry of Defence will often support other ministries as opposed to leading all efforts. For example, in Operation FRESCO, the Home Office led the efforts that saw British Army units serve as community fire brigades.

David B. Lazarus, "Effects Based Operations and Counter-Terrorism," *Air and Space Power Journal* 19, no. 3 (Fall 2005), 22-8.

David Lazarus was the Australian National University intern at the Australian Army's Land Warfare Studies Centre at the time of publication. In this article, he sought to compare EBO with the demands of the global war on terrorism (GWOT). In so doing, he argued that an effects-based method of targeting provides the "enabling foundation" for EBO, but effects-based planning exists primarily at operational level. More importantly, he concluded that the GWOT cannot be won purely by military or kinetic means, and as a result, a coherent application of all instruments of national power is required. The article provides worthwhile reading for an example of how EBO ought to be applied in a counter-terror campaign.

Intelligence

Price T. Bingham, "Seeking Synergy: Effects Based Joint Operations," *Joint Force Quarterly* 30 (Spring 2002), 52-60.

This article advocates that the US military adopt the joint application of EBO. This term represents the synchronized use of air and land assets to force a dilemma on the enemy; for example, the enemy could stay and be subjected to air and land attack or it could move and be subjected to an even more damaging air attack. The author is a former US Air Force officer who has written a number of other articles about targeting.[15] However, the author should not be considered as a typical US Air Force advocate of all things airpower as he notes that the adoption of the concept would lead to an increase in command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) assets while the requirement for manned aircraft would decrease.[16]

Major-General James M. Dubik, "Effects Based Decisions and Actions," *Military Review* 83, no. 1 (January / February 2003), 33-6.

At the time the article was published, Major-General Dubik, US Army, was the J9 of US Joint Forces Command. This article appears to be aimed at sceptics of EBO within the ranks of the US Army. The author advocated the adoption of EBO at the tactical level, noting that it focusses on products as opposed to processes, as well as noting the crucial role of intelligence gathering. He also drew explicit links between commander's intent, the definition of information requirements, and cross-Battle Operating Systems information gathering. He argues that an effects-based approach allows for greater integration of the operations and intelligence functions and activities than the existing paradigm. The article would be of interest to those interested in a land-centric application of EBO.

Colonel Stephen P. Perkins and Lieutenant-Colonel John D. Jackson, "Effects-Based Operations and Its Enabling Capabilities in Expeditionary Warfare," *Military Intelligence Professional Bulletin* 30, no. 3 (July-September 2004), 11-19.

The authors were both US Army intelligence officers stationed at US Joint Forces Command in Norfolk, VA when the article was written. Their work was an attempt to describe the emerging concept of EBO and its potential benefits to their colleagues in the military intelligence community. Not surprisingly, they noted that intelligence support is crucial to

EBO at all levels and that success is dependent on the accurate identification of centres of gravity as well as the assessment of enemy systems. They also argued that EBO allows the government to leverage all of the DIME tools to change the Political, Military, Economic, Social, Infrastructure, and Information (PMESII) situations in the battle space to achieve goals. Lastly, they note that EBO ought to connect strategies and tasks in a synchronized and coherent manner that causes the changes desired in the enemy's behaviour. It is a good primer for EBO advocates.

Other Concepts

Williamson Murray, ed., *Transformation Concepts for National Security in the 21st Century* (Carlisle Barracks, PA: Strategic Studies Institute, 2002).

This book, edited by the noted historian Williamson Murray, is a series of articles written by students at the US Army War College's Advanced Strategic Art Program. The intent of the volume was to explore some of the ramifications of concepts like EBO for the US Army's transformation program and to raise the questions surrounding those concepts. Three of the papers within the volume merit discussion. Lieutenant-Colonel Brett Williams, US Air Force, wrote a paper titled "Effects-Based Operations: Theory, Application and the Role of Airpower" in which he sought to counter the criticisms of EBO. Williams, like many US Air Force officers, argued that an effects-based approach naturally led to an economy of force. He then noted that the JFCOM concept of rapid decisive operations (RDO) and Deptula's "control warfare" were rather specific and fundamentally tactical in nature, and he therefore concluded that EBO was best applied at the strategic and operational levels. Lieutenant-Colonel Allan Batschelet's "Effects-Based Operations: A New Operational Model?" provides an excellent summary of the lineage of EBO, such as Deptula's concept of control warfare and the Institute of Defense Analyses' paper linking strategies and tasks. More importantly, Batschelet, a serving US Army officer, notes that the theories had some common foundations in terms of the importance of knowledge, the view of the enemy as a complex adaptive system and the concept of commander's intent. Finally, Colonel Gary Cheek, US Army, sought to examine the ramifications of EBO for ground forces. He sought to address the concerns within the Army that EBO was a means to support a reallocation of resources in favour of the Air Force and the emergence of the "Strategy-to-Task" view of EBO.[17] In his paper, "Effects-Based Operations: The End of Dominant Maneuver?" he noted that the lack of a common lexicon was unhelpful and, despite the enthusiast's claims, there would always be a role for ground forces in future conflict. The authors, with their strategic perspective, provided three papers worth reading.

Air Vice Marshal Iain McNicoll, "Effects-Based Air Operations: Air Command and Control and the Nature of the Emerging Battlespace," *Journal of the Royal United Services Institute*148, no. 3 (June 2003), 38-44.

This article is a reprint of a presentation made by the author to a RUSI sponsored conference on the future of air power by a senior Royal Air Force officer. The author, at the time of publication, was the Director General Joint Doctrine and Concepts, which is the British military organization that has published the recent joint doctrine notes on EBO (see above).

The article contains two fundamental messages set in a basic yet clear manner. First, it reflects the emerging British paradigm of command and control, and second, that recent conflicts (i.e., Operations GRANBY [DESERT STORM] and Operation TELIC as [IRAQI FREEDOM]) have been fought using EBO. The combination of the forum, author, and introductory tone of the article suggests that the presentation and subsequent article may have been a "trial balloon" for the concept. Unfortunately, the article does not contain any record of the audience's reaction.

Guy Duczynski, *Effects-Based Operations: A Guide for Practitioners* (Perth, Australia: Edith Cowan University, 2004).

Guy Duczynski is a former Australian Army member turned academic. His paper, produced for the 2004 Command and Control Research and Technology Symposium, is an attempt to translate the theories of EBO into a usable practical application. While a laudable goal, the solution offered in the paper requires at least a familiarity with game theory and specific decision-making theories. This limits its value for most readers, with the exception of operational researchers.

Air Chief Marshal Brian Burridge, "Technical Development and Effects-Based Operations," *Journal of the Royal United Services Institute* 149, no. 5 (October 2004), 26-30.

This article was the transcription of the RUSI 2004 Trenchard Memorial Lecture given by a senior Royal Air Force officer. This series of annual lectures, given by senior airmen, is focussed on "pertinent issues of the day relating to air power." In this case, the author was the Air Officer Commanding-in-Chief Strike Command. His lecture (and associated article) focussed on the opportunities created by a network-enabled capability (NEC) and how this relates to specific programs for the RAF Strike Command. The article does not specifically address EBO, but argues that NEC will lead to greater situational awareness, therefore reducing the risk to aircrews, an integration of the application of land and air forces to a common goal, and the ability of air forces to seize opportunities unavailable to ground forces. While an interesting read, it does not bring to light anything significant regarding EBO.

Alexandre Sergio Da Rocha, "Effects-Based Operations: A Military Application of Pragmatical Analysis," *Air & Space Power Journal* 19, no. 3 (Fall 2005), 29-38.

The author was employed at the Brazilian National War College in the late 1980s and early 1990s, and during that time developed a method called "pragmatical analysis." This analysis owes its roots to the philosophical movement of pragmatism, which holds that outcomes of actions are the source of their meaning and that objectivity is merely a social construct. Pragmatical analysis seeks to examine consistency in actions over time to discern the actor's purpose and offers a means of classification of such actions. It is a worthwhile read as it pertains to EBO, but discusses it in an abstract and philosophical manner.

Major Jack Sine, "Defining the 'Precision Weapon' in Effects-Based Terms," *Air & Space Power Journal* 20, no. 1 (Spring 2006), 81-8.

The author, a member of the American Air Staff Weapons Requirements section, produced an interesting article that advocates an effects-based approach to weapons development and procurement. His argument owes a debt to the change in targeting philosophy for the 1991 Gulf War air campaign where key nodes were attacked as opposed to entire target sets. Sine notes that precision is currently measured in circular error probable (CEP) relative to the aim point. He suggested that precision ought to be measured in quantifiable first order effects, without second or third order effects, because: "Weapons employment produces first-order effects and relies on a system of cause and effect for second- and third-order effects. Target development includes responsibility to ensuring second- and third-order effects by determining enemy-system characteristics and targeting appropriate points within the system to achieve desired effects." This approach seeks to reconcile CEP with targeting processes, and it is an excellent example of how difficult it is to move from a quantitative to a qualitative measure.

Critics

Lieutenant-Colonel Antulio J. Echevarria II, "Rapid Decisive Operations: US Operational Assumptions Regarding Future Warfare," *Defence Studies* 2, no. 1 (Spring 2002), 127-38.

At the time, the author was a US Army officer who was the Director of National Security Affairs at the US Army War College. This article, published in a British journal, was a public critique of the US Joint Force Command's 2001 operational concept based around the concept of rapid decisive operations. This article could be taken as a public criticism of US DoD transformation. While no mention is made of the 1996 paper written by Ullman and Wade on RDO, Echevarria notes that an operational concept ought to inform doctrine and research and development efforts, but in the case of RDO, the concept is too ambitious and may lead to interoperability issues with major allies. He also argued that the inclusion of "systems" thinking (e.g., complex adaptive systems) is flawed in that the language describing such systems implies that they are reactive, waiting for the US to stimulate them into action. Furthermore, warfare is fundamentally an open (as opposed to a closed) system, which renders systems analysis unhelpful. The article is worth reading as it provides a snapshot into the evolution of EBO-like concepts five year ago.

Timothy R. Reese, "Precision Firepower: Smart Bombs, Dumb Strategy," *Military Review* 83, no. 4 (July/August 2003), 46-53.

The author of the article, a serving US Army lieutenant-colonel, criticizes the enthusiastic advocacy in some circles of precision guided munitions (PGMs). He notes that the precision firepower advocates suggest the widespread use of PGMs to make war more efficient and compress the levels of war. He argues that, while precision firepower is a decisive shaper of the battlefield, it is not a singular war-winner. He accuses advocates of PGMs of "sloppy" strategic thinking, because, for them, military strategy becomes a mere exercise in targeting and destruction focussing on infrastructure as opposed to forces.

Brigadier Justin Kelly and Lieutenant-Colonel David Kilcullen, "Chaos versus Predictability: A Critique of Effects-Based Operations," *Australian Army Journal* 2, no. 1 (Winter 2004), 87-98.

The authors are serving Australian Army officers with academic backgrounds based on education and employment. Their argument is that EBO may not be suitable to a land environment due to the political process and its relationship with strategy. The political process within any western democracy is based on compromises, they argue, and this makes it difficult if not impossible to obtain clear direction from government on what effects are to be achieved. This article addresses the co-ordination problem inherent in the whole-of-government-type approaches very well and clearly.

Lieutenant-Colonel Jim Storr, "A Critique of Effects-Based Thinking," *Journal of the Royal United Services Institute*150, no. 6 (December 2005), 32-5.

Lieutenant-Colonel Storr, then a British Army officer serving with US European Command in Germany, wrote this article that examined effects-based thinking in a critical light. His audience is primarily British, although the *RUSI Journal* has a wide international audience, and he appears to be offering a public caution to the British armed forces to consider whether or not the concept has utility before adopting it. Storr notes that effects-based thinking is founded on the logic of stealth bombers and precision guided munitions reducing the requirement for mass, the adoption of mission command, and the process of tracking activity as opposed to effect. He did not see anything new in the literature and wondered if EBO was really an issue of semantics. Although the article was rather short, his point about semantics should not be overlooked and EBO advocates would do well to address his observations.

Milan N. Vego, "Effects-Based Operations: A Critique," JFQ: Joint Force Quarterly 41 (Spring 2006), 51-7.

Milan N. Vego is a Professor of Operations in the Joint Military Operations department of the US Naval War College. His article is a well-considered critique of the arguments provided by EBO advocates and enthusiasts, and his article is aimed at providing an alternative to their view of the concept. Vego states that EBO descended from network-centric warfare (NCW), and both were flawed concepts, as they took a mathematical approach to war where war is considered as a science only, as opposed to an art and a science. Furthermore, he argued that, despite claims to the contrary, EBO is antithetical to operational art.[18] His final point is that the American military establishment does not need to adopt EBO because the existing military planning processes are suitable. All interested in the topic must read this article as it provides a clear and lucid series of arguments that merit consideration against the adoption of the concept.

Conclusion

The sources in this bibliography show that EBO is a synthesis of a number of ideas and that the nature of EBO continues to evolve over time. While debates over its utility and applicability to all levels of war continue, there is a general consensus on the utility in the EBO approach of leveraging all instruments of national power and the importance of intelligence to EBO. On the other hand the immaturity EBO as a concept means that there is still much work to be done before it can be used without causing confusion among academics and military professionals.

Notes

1. This term covers the various terms in use associated with the coordinated application of all of the Diplomatic, Informational, Military and Economic (DIME) instruments of national powers. It includes the Canadian Defence-Diplomacy-Development (3-D) or whole-of-government approach and the British "Comprehensive Approach."

2. For the origins of this concept, see Leslie Lewis and C. Robert Roll, *Strategy-to-Tasks: A Methodology for Resource Allocation and Management,* P-7839, (Santa Monica, CA: RAND, 1993).

3. For a discussion of PMESII, see Joint Warfighting Center, US Joint Forces Command, Joint Doctrine Series: Pamphlet 7, "Operational Implications of Effects-Based Operations," dated 17 November 2004.

4. The terms "strategy of annihilation" (*Niederwerfungsstrategie*) and "strategy of exhaustion" (*Ermattungsstrategie*) originated with the German military historian Hans Delbrück. See Gordon A. Craig, "Hans Delbrück: The Military Historian," in Peter Paret, ed., *Makers of Modern Strategy: from Machiavelli to the Nuclear Age* (Princeton: Princeton University Press, 1986), 341-44.

5. See Lieutenant-Colonel Joshua Ho, Singapore Navy, "The Dimensions of Effects-Based Operations: The View from Singapore," *Australian Army Journal* 2, no. 1 (Winter 2004), 99-106.

6. For example, see Benjamin Lambeth, Letter on "Five Propositions Regarding Effects-Based Operations,"*Air & Space Power Journal* 20, no. 2 (Summer 2006), 5-6.

7. J. P. Hunerwadel, "Overpromising and Underestimating: A Response to "Five Propositions Regarding Effects-Based Operations," *Air & Space Power Journal* 20, no.1, (Spring 2006), 75-80.

8. See John Warden, *The Air Campaign: Planning for Combat* (Washington, DC: National Defense University, 1988).

9. See the entries on David Deptula's articles.

10. See Roger W. Barnett, "Effects Based Operations: Applying Network Centric Warfare in Peace, Crisis, and War, Book Review," *Naval War College Review* 57, no. 2 (Spring 2004), 180-1.

11. Subsequent versions include David A. Deptula, *Effects-Based Operations: Change in the Nature of Warfare* (Arlington, VA: Aerospace Education Foundation, 2001). Available at http://www.aef.org/pub/psbook.pdf . Accessed 27 Jul 2007; and David Deptula, "Foreword: Effects Based Operations," *Air & Space Power Journal* 20, no. 1 (Spring 2006), 4-5.

12. See Buster S. Glosson, "Impact of Precision Weapons on Air Combat Operations,"*Airpower Journal* 7, no. 2 (Summer 1993), 4-11; and Lieutenant-Colonel Edward Mann, "One Target, One Bomb: Is The Principle of Mass Dead?" *Airpower Journal* 7, no. 1 (Spring 1993), 35-43.

13. Major works in the coercion literature include Lawrence Freedman, ed., *Strategic Coercion: Concepts and Cases* (Oxford: Oxford University Press, 1998); Robert Pape, *Bombing to Win: Air Power and*

Coercion in War (Ithaca: Cornell University Press, 1996); and Thomas Schelling, *Arms and Influence* (London: Yale University Press, 1966).

14. See Harlan Ullman and James Wade, *Shock and Awe: Achieving Rapid Dominance* (Washington, DC: National Defense University, 1996).

15. For example, see Price T. Bingham, "Air Power Targeting Theory: A Key Element in Transformation," *Military Review* 82, no. 3 (May/June 2002), 34-9; and Price T. Bingham, "Ground Radar Surveillance and Targeting," *Joint Force Quarterly* 35 (Autumn 2004), 88-94.

16. This argument is similar to the one made in another of his articles: Price T. Bingham, "Transforming Warfare with Effects-Based Joint Operations," *Aerospace Power Journal* 15, no. 1 (Spring 2001), 58-66.

17. This expression was attributed to the Gleeson, et al., *New Perspectives on Effects-Based Operations: Annotated Briefing* 2001 IDA paper (see above).

18. This had led others to react to this argument. For example, see James B. Ellsworth, Letter to the Editor, *Joint Force Quarterly* 42 (Fall 2006), 6.

Annex B
Application of Combat Power (Draft)[1]
Section 1
Introduction

1. Combat power is applied as part of a campaign plan in order to reach a desired end-state. In planning the campaign, the application of combat power must be considered with the aim of reaching enduring objectives and end-states that address the root causes of a conflict. Whilst the application of violence against an adversary will always be the purview of the military and other security forces, it must be done in combination with a range of activities and other agencies to reach those enduring outcomes.

2. Combat power is applied in a harmonised and complementary manner across all levels of command in order to achieve operational objectives and in turn strategic end-states. It is applied through a comprehensive approach that sees the engagement of a wide variety of targets and systems that influence the environment and are key to achieving the overall end-state and lasting solutions. Planning focusses on identifying and articulating desired effects that will lead to the required objectives and end-states. Activities are then directed, through plans, to create those desired effects. Activities that lead to enduring end-states are created by a wide range of agencies, in addition to military forces, and together they address a wide range of systems and entities that affect the environment and the conclusion of the campaign.

3. This effects based planning is applied through a manoeuvrist approach. This includes physical activities that create obvious effects on a target's capability and thus affects the target's behaviour. It also includes activities that seek to influence a target to affect understanding, perception, will and ultimately behaviour. Often these will seek to influence target audiences other than an adversary to support operations, objectives and end-states. Thus, this manoeuvrist approach is applied on both the physical and cognitive planes. This focus on effects and their realisation through a manoeuvrist approach are guided by the principle of mission command.

4. This chapter will explain in detail the substance of each of these concepts and how, when applied in unison, they apply combat power in a holistic, comprehensive and complementary fashion that leads to enduring end-states.

5. In order to understand the concepts discussed herein, it is necessary to discipline the use of the term "effects". Effects are defined as: *changes as a result or consequence of actions, circumstances or other causes.* An effect is the consequence of one or more activities that contribute to one or more objectives. Effects are the physical, functional or psychological outcome, result, or consequence that results from military or non-military activities at the tactical, operational and strategic levels. They occur on the physical and cognitive planes.

Whilst understanding this, it must be remembered that an effect may be caused by inaction as well[2]. At the tactical level, those activities normally constitute tactical level operations and are assigned in mission statements and tasks. In simplest terms, **an effect is a result, be it physical or cognitive, of an activity or a series of activities**.

Section 2
Activities And Effects On The Physical And Cognitive Planes

General

6. The object of conflict is the imposition of one's will on an opponent. The organised application of violence by physical force is one means to that end and may be seen as a traditional application of power. However, other activities may be undertaken that target and affect an opponent's or other's will to fight or to support a particular activity. These may include, for example, psychological operations in the form of flyers aimed at convincing enemy conscripts to dessert or a target population not to support an insurgent element. Thus, there are both physical and influence activities that may be undertaken in the prosecution of conflict. Seen from this perspective, activities and their effects exist on two planes, the physical and the cognitive, and activities fall into two categories, physical effects activities and influence activities.

The Physical Plane

7. The physical plane *comprises* the physical objects, actions and effects in the operational area. It includes military forces, the electromagnetic spectrum, civilian populations, armed factions, logistical resources and infrastructure as well as the geography, oceanography, and meteorology.

8. On the physical plane conflict is often a clash between armed combatants. Activities on the physical plane and their direct effects[3] are tangible and measurable. The physical plane and related activities have the following attributes:

a. each party in a conflict expends quantities of munitions and other combat supplies, and each is supported by the industrial and economic power of their respective sides; and

b. activities and effects on the physical plane can generally be easily observed, understood, estimated and measured with a degree of certainty. Of primary concern are the material support requirements for manoeuvre and firepower. It is on this plane that the *science* of conflict predominates, including those activities directly subject to the laws of physics, chemistry and like discipline.

The Cognitive Plane

9. The **cognitive plane** *constitutes* the motivation, conviction and commitment of individuals and groups to pursue their objective. It may be referred to as the **moral** plane[4]. It represents the ***will*** that enables them to overcome fear and adversity as well as the cohesion that holds them together. It includes cognitive aspects such as belief in a cause, indoctrination and judgement as well as emotive responses such as patriotism, ethnicity, religious zeal and *esprit de corps*.

10. On the moral/cognitive plane, conflict is a struggle between opposing wills or a struggle for moral and intellectual support from a target audience. The term *moral* used here is not restricted to ethics but pertains to those forces of psychological rather than physical nature, including the mental aspects of conflict. These are difficult to grasp and impossible to quantify. They are manifest in such intangibles as the national resolve of adversaries, their military plans and tactics, the quality of leadership and the determination of the individual combatants to achieve victory. It also includes to the manner in which forces and their commanders perceive and understand an environment and situation. Activities on the cognitive plane and their resulting effects will seek to undermine an threat's will, influence his perception of a situation and/or influence the will of a populace or other target audience. The cognitive plane and related activities have the following attributes:

a. activities and effects on the cognitive plane should follow a targeting process identical to that of used for activities on the physical plane. This targeting should be done simultaneously with targeting for activities on the physical plane to ensure activities and effects are comprehensive and complementary;

b. activities on the cognitive plane are more difficult and require the greater investment in combat development and training, however they are more flexible. On this plane the quality of military leadership, the morale of the fighting troops, their cohesion and sense of purpose are of primary importance. Here the *art* of conflict is dominant;

c. activities and their effects on the cognitive plane may have subsequent effects on the physical plane. For example, leaflets convincing threat conscripts to dessert will lesson the strength of threat forces.

11. Although much has been written regarding elements on an "informational plane", this level of existence has yet to be truly identified and defined as being distinct from either the physical or cognitive planes. Information that exists on information systems, on computer systems or even in the form of electrons belong to the physical plane, for they can be blocked, destroyed or otherwise physically altered. Information that resides in an individual's mind or in the collective opinion of a group of people, and thus affects their perceptions, will and behaviour, exist on the cognitive plane. They too can be altered, but through non-lethal activities that seek to influence.

Physical Effects Activities

12. Physical effects activities are those tangible undertakings that consume resources and produce immediate effects through motion and force. They may be lethal or non-lethal and applied to create first order effects on the physical plane, and second order effects on the cognitive plane.[5]

13. Physical effects activities will focus on the physical destruction, attrition, disruption or denial of those things essential to adversaries through the application of lethal and non-lethal fires and manoeuvre throughout the depth of the joint operations area. They include all physical activities such as electronic warfare (EW). Physical activities affect capability in order to affect an adversary's behaviour.[6] The goal is to contribute to the defeat of opposing forces and to undermine their will and cohesion, by denying them the physical means or opportunities they require to carry out their intentions and achieve their objective.

14. Physical effects activities may have second order effects on the cognitive plane, that is, on the perceptions, will and ultimately on the behaviour of a target. For example, defeat of a portion of the enemy's force from an unexpected direction or timing will undermine his confidence and morale.

Influence Activities

15. Influence activities non-lethal activities that target and affect the perceptions and will of a target and thus the behaviour of the target. They may be **physical** or **cognitive** activities:

a. **Physical (influence) activities** are non-lethal and create cognitive effects as a first order and are demonstrative in nature. They include such undertakings as a feint to deceive enemy commanders or the demonstration of capabilities (eg, crowd control or firepower) to persuade individuals or groups to act in a certain manner. They will include physical demonstrations of commitment and credibility as reflected in the CIMIC supported reconstruction of infrastructure and social development, which in turn engender support from political/social leaders and local populations.

b. **Cognitive (influence) activities** are those intellectual, perception related activities undertaken to shape perceptions, understanding, will and ultimately behaviour, by using or affecting information. They seek to influence target audiences and are exemplified by such activities as broadcast of radio announcement to a local populace advertising the benefits of the ongoing operation or the issue of flyers to enemy conscripts encouraging them to surrender. Cognitive activities include activities such as public affairs, psychological operations, the profile and

posture of troops interacting with a local populace[7], and civil-military cooperation (CIMIC), as realised through support to infrastructure and social development activities. It will include such disparate activities as the issue of flyers to persuade enemy conscripts to flee, and the development of public infrastructure to engender support from a populace

16. These activities focus on promoting perceptions and attitudes, influencing will and affecting behaviour of governments, organizations, groups and individuals, including those that are opponents, friends and neutral, to support the achievement of the objective and ultimately the end-state.

17. The activities convey selected information as well as physical evidence and indications to target groups and individuals with the aim of influencing their emotions, attitudes, motives, perceptions, reasoning and ultimately their behaviour. Although influence activities are conducted on the cognitive plane only, they may have secondary results on the physical plane. For example, flyers that convince enemy conscripts to flee will have the first order cognitive effect of causing them to flee and the second order effect on the physical plane of reducing the enemy commander's combat power. It will thus likely have a third order effect on the cognitive plane of undermining the commander's confidence.

18. The need to influence a target audience may be key to the long-term success of a mission. Commanders at the lowest levels must be made to understand the importance of such influence activities and the effects, positive and negative, that may be gained from them. The conduct of individual soldiers will influence the perceptions and support of local populations and one incident of poor conduct can rapidly undermine, in an exponential manner, many positive influences.

19. Influence activities have been, in the recent past, classified as part of Information Operations. However, Information Operations are being redefined to apply solely to these influence activities. (See Section 4.)

Effects Through Physical Effects Activities

20. Physical activities will create first order effects on the physical plane and often second order effects on the cognitive plane.

21. Physical activities that lead to the destruction of the threat's capacity to fight will be but one of a number of ways to defeat him. Selective physical destruction can be aimed at isolating components of the force or breaking the threat physically into smaller groups. Destruction may be pursued to undermine an adversary's ability to conduct operations, but is often most effective when it is used to damage the adversary's morale, and increase his feelings of fear, desperation and hopelessness. That is, physical activities are most effective in creating second order effects on the cognitive plane. Thus, physical activities affect an adversary's behaviour by attacking capability as a first order, and by affecting perception and will, and ultimately behaviour as a second order.[8]

22. Physical destruction may not in itself lead to success. The destruction, for example, of a large number of insurgents will not solve the underlying causes of an insurgency and may create new recruits to the movement. This would be a physical activity that leads to an undesired second order effect on the cognitive plane. Additionally, targeting the adversary could cause unnecessary collateral damage that in turn undermines the support of a neutral populace and the legitimacy of a campaign and creates new opposition. Success criteria that rely on destruction must take into account the risk to public and political support that protracted and inconclusive battles and engagements entail. Physical destruction of the adversary, by itself, is not therefore a wholly reliable means of achieving lasting success even if it is aimed at the secondary effects against will and behaviour on the cognitive plane.

Effects Through Influence Activities

23. Since defeating an adversary by physical activity and its related effects, be they on the physical or cognitive planes, alone has limitations and rarely leads to a campaign end-state, land operations doctrine also encompasses activities that seek to create a direct, first order effect of influencing target audiences. Thus, influence activities create first order effects on the cognitive plane and possibly second order effects on the physical plane.

24. These target audiences are wide in scope. They may be elements of the adversary, such as weak willed conscripts that can be encouraged to flee the battlefield. They may include individual power holders, religious leaders and segments of a populace in order to influence perceptions and gain support for the campaign and its objectives. They may also include allies and friendly troops in order to counter adversary propaganda and biased media coverage.[9] In short, these target audiences will include adversary, friendly and neutral individuals and groups.

25. The key to employing influence activities is to decide the effect that is to be created. Activities can then be assigned to create those desired effects or to avoid undesired effects. A wide range of activities will be used to influence a target. They include: deception; psychological operations; CIMIC activities; selected posture and profile of troops; and public affairs to name the most pervasive means. Examples are given as follows:

a. A feint by forces will affect the enemy commander's perception, influence him to incorrectly identify the main effort and move his forces away from the true intended area of attack, thus affecting his behaviour;

b. A firepower demonstration during a peace support campaign may convince a belligerent commander not to manoeuvre his forces.

c. Psychological operations may be used in the form of a public radio station to bring accurate news to a local populace and to encourage their support for a counter-insurgency campaign;

d. CIMIC activities may assist in civil reconstruction in order to engender moral support from a government and its populace and to enhance the perception of the campaign by an local populace.

e. Public affairs messages may be issued in order to counter enemy propaganda and ensure local and international support for the campaign and its operations.

26. Influence activities may be conducted to create their own effects or they may be conducted to support physical activities. For example, prior to a deliberate attack on an enemy position, PsyOps flyers may be dropped informing enemy soldiers of the means to surrender and giving a promise of fair treatment.

27. Influence activities are a key part of the concept of full-spectrum operations.

28. In order to understand what activities are required to create influences and thus the desired cognitive effects and behaviour, a commander must understand the target audience and the cultural and environmental influences that affect the target's cognitive reasoning. Unintended effects may occur and do enormous damage to the campaign. For example, the firepower demonstration conduct to convince a belligerent commander not to manoeuvre his forces may only serve to embarrassment him in front of his supports and thus cause him to actually manoeuvre his forces. Likewise, activities taken to instil fear or dissuasion in a target audience, for example, may only create hatred instead.[10]

The Interaction And Balance Of Activities On The Two Planes

29. Each episode in a conflict is a unique product of the dynamic interaction of a multitude of moral and physical forces. Whereas the physical activities and effects on the physical plane may be quantified with some measure of effectiveness, influence activities and effects on the cognitive plane are difficult to qualify and measure. Notwithstanding the difficulty in assessing effects on the cognitive plane, it is ultimately these effects that will achieve the lasting objectives and end-state of a campaign. An adversary force with a strong will and moral fibre may continue to fight even asymmetrically once its material forces have been depleted; but, they will not continue to fight effectively once their morale and will have been destroyed.

30. To attack the threat's will to resist, an understanding of the nature of human will is necessary. When an individual faces combat, the primary responses are to fight, flee, or surrender. In most cases, an attack on the adversary's will to fight should be accompanied by measures that encourage the threat to surrender or flee.

31. This can be accomplished not only through fear generated by violent physical actions such as massive firepower but also by surprising him with unexpected threats. It can also be supported by offering fair treatment for prisoners and wounded, showing respect for the law of armed conflict, offering honourable surrender terms or pursuing other methods that legitimize and encourage his surrender. If desirable, flight can be encouraged by offering

an open avenue of escape, such as when dispersing a riot. These can be seen to be activities that create effects on the cognitive plane.

32. An individual's will to resist is built on internal influences, those of the group, and those of the leader. Internal influences include personal motivation and emotions, such as hatred or revenge, that motivate the individual to continue fighting even if alone. Often more dominant are the influences of the small group. Battlefield studies, notably the work of S.L.A. Marshall, have shown that the primary reason men fight is the feeling of group loyalty or the fear of letting down other members of the group. The individual, and in fact the group, are also affected by the influence of leaders who can provide motivation and compulsion to fight and legitimize the efforts of individuals.

33. It is difficult to alter strongly held personal beliefs, and closely-knit small groups are difficult to break up. Therefore, efforts aimed at attacking the threat's will to fight should focus on two areas. The first is to attack the leaders' will to fight and the second is to disrupt the bonds between larger groups, and shattering the links between leaders and followers. In other words the preferred method of attacking the will to fight is to render the threat incapable of resisting by shattering the physical and moral cohesion of his force.

34. Even when an adversary force is defeated in a physical sense, lasting peace will not result unless there is a moral will to support it and the means for sustaining it. Thus much effort, from the military and from other agencies, will be expended seeking those lasting effects. Firstly, there will be a great deal of influence activity to engender support for the campaign and its objectives. Secondly, there will be much activity, by the military but ideally by other agencies, to build institutions and capabilities amongst the indigenous society to secure a lasting stability and peace.

35. This comprehensive construct can be summarised as follows:

a. Physical activities will help defeat an enemy through destruction of his capability on the physical plane. This will alter his behaviour. On the cognitive plane, well planned physical activities that destroy capability will, as a second order effect, alter perceptions and will of an enemy and thus affect his behaviour.

b. Influence activities, be they physical or cognitive, will have a first order effect on the cognitive plane that will influence perceptions, affect will and thus behaviour of a target audience that will include individuals and groups, be they friendly, adversarial or neutral. When aimed at leaders and local populaces, they generally seek to engender support for a campaign and its long-term objectives.

c. Many of the influence activities will be undertaken by agencies other than the military, but ideally in close cooperation with the military. These will seek to create the institutions and capabilities for long-term stability and peace.

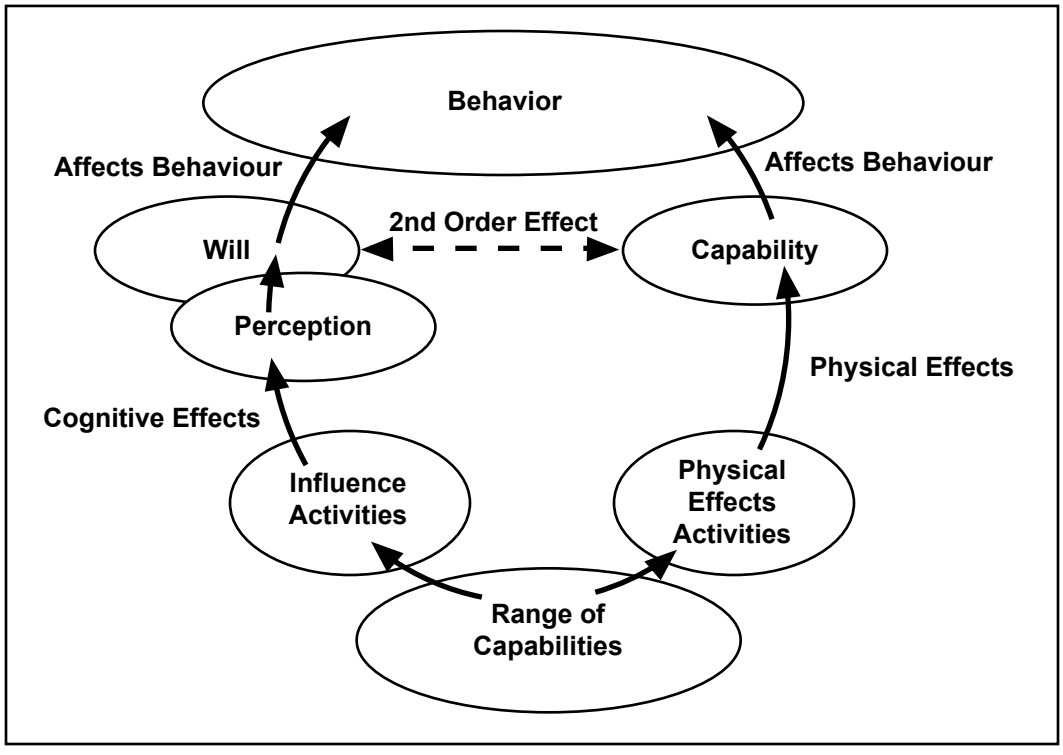


Figure 5-1. Interaction of Physical-Effects Activities and Influence Activities

36. Therefore, conflict remains ultimately an activity of human creativity and intuition powered by the strength of human will. It requires intuition to grasp the essence of unique situations, creativity to devise innovative solutions and the strength of purpose to act. Conflict is above all a moral undertaking. As a result, *moral/cognitive forces exert a more significant influence on the nature and outcome of conflict than do physical***.** This point is fundamental to understanding Canadian Land Force doctrine.

37. In considering these activities together, a taxonomy can be summarised. This is not new terminology, but simply a better method of articulating all the activities and operations that military forces have undertaken to create desired, lasting effects.

Physical Plane	Cognitive Plane
Lethal and Non-lethal Activities	Non-Lethal Activities
Physical Activities	Influence Activities: Physical & Cognitive
Physical Effects – First order	Cognitive Effects – First Order

Figure 5-2. Taxonomy for Activities on the Physical and Cognitive Planes

38. This concept is not new. Competent military commanders have always understood the need to balance their activities to create desired effects on the physical and cognitive planes and history is full of examples of such campaigns. The commander will decide upon the balance between his capabilities and activities based on the campaign theme and its guiding principles. For example, whilst a major combat campaign against a conventional adversary will require mainly physical activities supported by some influence activities such as deception and PsyOps, a COIN campaign may require only enough physical activity to neutralise the insurgents whilst the military and other agencies work to gain the confidence and support of the local populace through influence activities, such as infrastructure and economic development.

39. The figure below illustrates the conduct of activities on the physical and cognitive planes.

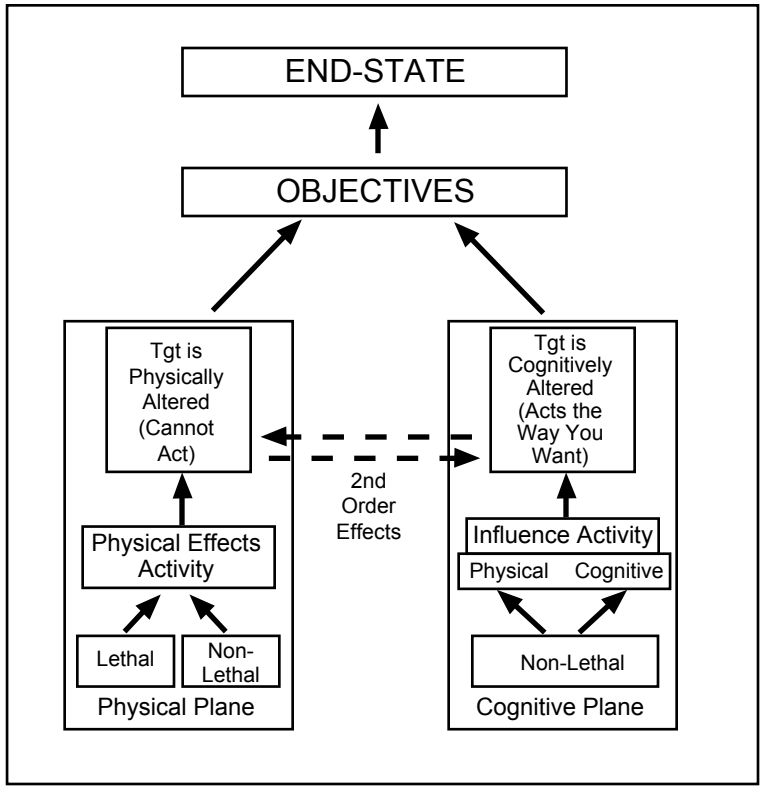


Figure 5-3. Activities and Effects on the Physical and Cognitive Planes

Defining Success Through The Application Of Combat Power

40. In order to reach the desired end-state and thus successful conclusion of a campaign, a number of agencies will be involved in addition to the military. This will ensure that all the elements of a situation that led to military intervention are addressed in order to establish a lasting stability and peace.

41. The primary role of the military will to be to employ its monopoly on force and to counter threats of violence and military power posed by an adversary. The object of the use of force or threat of force is to impose the force's will upon specific targets. In many campaigns military capabilities will be employed to neutralise an enemy threat in order to allow other agencies to undertake their activities in a secure environment that will address long term solutions to the situation. In addition to this, military capabilities, in conjunction with those of other agencies and elements, will be used to create effects and support objectives, in relation to a local populace and supported government. For example, military forces may be used to build infrastructure or to support other agencies in such efforts. These will be done to create a better, more stable environment and to engender support and stability from a populace and local authority; that is, they will create effects on the cognitive plane. Thus the campaign will employ a comprehensive approach that deals with an enemy or potential adversary and supports a government or population segment using a combination of physical and influence activities to create lasting effects on the physical and cognitive planes.

42. Success is measured against predetermined criteria that support the decided end-state. The end-state is the result that must be achieved at the end of a campaign to conclude the conflict on favourable terms. The end-state will likely have political, diplomatic, economic and psychological, as well as military aspects, and hence will require the multi-agency, comprehensive approach.

43. Victory in a campaign, in military terms, may not see the outright surrender of an opposing force. Rather than a pure military victory, the end-state may often be defined in terms such as reconciliation, acceptance of the status quo, or agreement to a peace plan. In many campaigns such as counter-insurgency, there may be no outright victory, but only a concession by the insurgents to pursue peaceful means to reach their political goals or the development of an indigenous capacity (physically and intellectually) to deal decisively with the insurgency on their own. Success, in short, will occur through activities on both the physical and cognitive planes.

Maintaining Cohesion And Attacking The Threat's Cohesion

44. Cohesion is unity and it is derived from all three components of combat power: the physical; the conceptual; and the moral. It is the quality that binds together constituent parts of a military organisation and brings a measure of quality to its combat power. With a cohesive force, a commander can maintain unity of effort in imposing his will on the adversary or other target audiences. *Cohesion comprises the general identification with a common aim or purpose (conceptual component), the means to concentrate force in a coordinated and timely manner (physical component) and the maintenance of high morale (moral component).*

45. Cohesion reflects the unity of effort in the force. It includes the influence of a commander's intent focussed at a common objective, the motivation and *esprit de corps* of the force and also the physical components necessary to integrate and apply combat power. Cohesion therefore has both moral and physical components.

46. The adversary's cohesion can be attacked by making his overall aim, or the missions of his component parts, increasingly inappropriate or irrelevant, by forcing him to dissipate his forces in both time and space and by targeting the moral and material pillars of his morale. The adversary's cohesion may also be attacked on the purely on the cognitive plane but undermining his moral justification and his legitimacy in this own eyes and in the eyes of potential supporters.

47. Cohesion is an intangible but potent force. A breakdown in cohesion will lead to isolation, fear, confusion, and loss of the will to fight. The threat will be unable to apply his full combat power and his component parts can be defeated in detail. Ideally, the result is an adversary made up of a collection of individuals and small groups lacking motivation, direction and purpose. This loose collection can be more easily defeated because the ability to fight effectively as a force has been eliminated, that is, they have been affected on the physical and cognitive planes.

48. Breaking the threat's cohesion, however, may only be a temporary or transitory effect, and the threat could regroup and recover if pressure is not maintained. Where physical and moral cohesion is shattered and resistance continues, such as by fanatical individuals or groups, physical destruction may be the only alternative. This however should be seen as a last resort.

49. In summary combat power must be created and applied through activities, with a view to shattering the threat's moral and physical cohesion, while bolstering that of the allies and neutral elements. In order to accomplish this activities must be undertaken on both the physical and moral/cognitive planes in a complementary and synchronised fashion.

Section 3
A Comprehensive Approach And Focus On Effects

> There are only two forces in the world, the sword and the mind. In the end the sword is always beaten by the mind.
>
> Napoleon

General

50. Rarely will a campaign meet with success through military action only. Campaigns occur in complex situations that involve local populations, urban areas, complicated social and political structures and extensive, inter-related problems that led to the need for military intervention. Long term success and stability will only occur with the support of the majority of an indigenous population. Thus, in order to address all facets of a complex environment,

most military campaigns must involve the employment of other government agencies, such as those with expertise in social and political development and economic development. Only such an approach will create the conditions for a sustainable stability.

A Comprehensive Approach

51. The Land Force follows an effects-based approach to the conduct of campaigns and operations, in order to deal with the conditions in the modern battlespace and to reach successful, lasting conclusions to those campaigns. The successful, lasting, conclusion to a campaign will likely require more than just a military solution. The causes of the situation that required the military intervention in the first place will likely include a wide range, from the economic, to the political, to the social, and thus require the application of other agencies and elements of power in order to address all of these interconnected systems.

52. To that end, the military must work in harmony with the diplomatic, economic and various other instruments of power so that all elements of an environment are addressed in the most appropriate and effective fashion, in order to reach those lasting end states. This approach recognises that a lasting end-state requires effects and objectives on both the physical and cognitive planes and therefore requires the resources and work of more than simply the military. This approach to a campaign may be termed a **comprehensive approach** and begins at the strategic level of planning.

53. This comprehensive approach may be defined as: *commonly understood principles and collaborative processes that enhance the likelihood of favourable and enduring outcomes within a particular environment.* A comprehensive approach seeks to incorporate all the elements of power working to reach the strategic end-state and harmonise them, their capabilities and activities in order to address the elements and complexities present in an environment.

54. It does not mean to imply that a military authority is overall in charge of a campaign but only seeks to ensure that military activities, effects and objectives lead to the strategic end-state and are complementary to those of the lead agency and of other elements of power. This approach brings together not only other government agencies, but also other organisations, be they international or indigenous.

55. Whilst the military will focus on security and defeating, or at least neutralising, an adversary, other elements of power will address those elements and systems of the environment that ensure lasting security for a populace – the political, social and economic elements. Although this is done to meet the long-term objectives of a campaign, it is also undertaken to ensure support from local populations and leaders who are key to long-term success and stability.

56. During the early stages of a campaign the security situation may only allow for the military to undertake all aspects of the campaign. Hence the military may undertake the initial reconstruction and economic and political development and reform of security services. Once the security situation improves, other agencies should be able to assume the

lead in these non-martial responsibilities. Eventually, the campaign may reach such a state that the military's role will be reduced to an minimum and indigenous forces will be able to handle any residual threat to security.

57. The campaign design may involve a formal unified structure with a lead agency and commander, and all agencies, be they military or civil, working within a single chain of command. Such constructs are ideal and work to ensure excellent harmony and cooperation between agencies. Such situations will be rare however.[11] Usually, informal arrangements will have to be designed in order to ensure that all agencies work in a complementary manner in the attainment of agreed objectives and end-states. Often there will be a major onus on the military commander to ensure that genuine, cooperative and collaborative working environments are developed between the military and other agencies, be they national, international, local or unaligned NGOs. Participants must work proactively by sharing understanding of situations and conducting planning and activities on the basis of agreed favourable outcomes in the short, medium and long term. Hence, the comprehensive approach will rely as much on personal relationships as on formal arrangements. Processes and structures may need to be adapted to reflect specific circumstances and situations. For example, a military headquarters may have to accommodate the interface with non-military organisations and take the lead in coordinating objectives and efforts. The comprehensive approach must also consider actors and agencies beyond the government, such as non-government organisations (NGOs), international organisations (IOs), local agencies and leaders and others, all of which conduct activity and pursuer objectives that have a bearing on the successful conclusion of the campaign.

58. Although the comprehensive approach begins at the strategic level, it should be viewed and implemented pervasively throughout all levels of command. Hence, it will be envisioned, designed and ideally empowered at the strategic level in order create strategic end-states, but implemented and practised at both the operational and tactical level. At the operational level, commanders will endeavour to ensure a holistic and complementary integration of military and non-military agencies in order to address all systems and elements within the environment, thus creating physical and cognitive effects that support operational objectives. This comprehensive approach should be replicated as appropriate at the tactical level where unit and even sub-unit commanders will work with other agencies to create effects that support enduring objectives.

59. Through this comprehensive approach, the influence activities that create enduring effects on the cognitive plane will be created by both the military and other agencies. This comprehensive approach uses all instruments of power to address all the systems that influence an environment and the need for the intervention and campaign. Activities within an environment must be considered against more than simply an adversary. All systems - political, military, economic, social, infrastructure and informational - within the environment must be identified and considered in terms of their power structures, inter-relationships and influences on the desired objectives and end-states. Activities planned and taken by all agencies including the military must be considered in terms of their effects on each of these systems in relation to the desired outcomes. **Only in this comprehensive**

manner – using multiple agencies in addition to the military to address all the systems and elements in an environment – will long term solutions to campaigns be reached.

60. The comprehensive approach consists of three elements:

a. **Unifying Theme.** In striving towards a strategic end-state, the lead agency should issue a unifying theme that is focussed on long-term outcomes and end states. For the military, this should be pervasive throughout the campaign design. It should be developed in the commander's visualization of the campaign and articulated in his intent.

b. **Collaborative Working.** An effort is made to harmonise the activities, effects and objectives of all the elements of power in the JIMP[12] framework so that all efforts are complementary and integrated towards common objectives and end-states. This may occur under formal arrangements or informal arrangements.

c. **Comprehensive Response.** The activities and effects of all the elements of the JIMP framework are to be applied to all the relevant elements, systems and entities that are at work in the environment, be they political, social, military, economic, etc, in a holistic approach to the situation.[13] Furthermore, there occurs continuous assessment as to how campaign activities will affect each of these systems and entities and how they will in turn affect one another.

61. Within the campaign environment different groups will co-exist either peacefully or in competition with each other based on religious, ethnic, political, ideological or clan/tribal lines. Human perceptions of issues of economy and security will affect the behaviour and thinking of the population. Cultural factors are dynamic and present both obstacles and opportunities. Knowing the groups, what relationships exist between them, how they relate to the infrastructure and how each group will respond to an activity is critical to success.

62. In general, four fundamentals should be considered in applying a comprehensive approach:

a. **A Proactive Approach.** Ad-hoc relationships formed at short notice in response to a developing crisis prove problematic and although at times unavoidable, do not produce the best results in the shortest order and prove difficult in overcoming prejudices and previously held misconceptions. Rather, a comprehensive approach should be supported by standing agreements and strong personal and institutional relationships and early, shared analysis of an environment and battlespace.

b. **Shared Understanding.** A shared understanding of the strengths, limitations, aims and cultures of each element within the comprehensive approach to a campaign will allow a harmonised and complementary application of capabilities. Secondly, a share understanding of the operating environment and the threats to

lasting stability security will again help ensure a harmonised and complementary approach to the campaign across the various elements of power.

c. **Outcome or End-State Based Thinking.** The unifying theme should serve to focus the elements within the comprehensive approach and ensure that activities conducted by all elements within the comprehensive approach are based on, and judged on, the achievement of progress towards the agreed objectives and end-state. Each undertaking by an element of power should be considered against how it might further progress towards the end-state.

d. **Collaborative Working.** The comprehensive approach demands that military and non-military institutions – be they national or indigenous – work together with trust, transparency and personal investment in order to be successful. This must be fostered at all levels. Whilst some elements and their leaders, particularly those not familiar with the military, will not be comfortable with a collaborative or highly cooperative relationship, effort must be made to insure, at the very least, a coordinated and de-conflicted coexistence is established vice a mutually exclusive relationship. In such circumstances, the onus may fall upon the military commander to foster and engender, through dynamic, engaging and generous personality, an atmosphere of cooperation.

63. It should be noted that the levels of authority, experience, technical ability and understanding of the personnel within these, largely civilian, organisations might not always correspond to that of the land force. This will inevitably introduce frictions, and uncertainties, which may exacerbate personality and institutional difficulties. Nor will a formal command relationship likely exist between military and non-military agencies. The commander has a key role to play in harmonizing these relationships. When collaboration is achieved, significant advantages will include to:

a. more accurate, shared situational awareness;

b. easier identification of, and agreement about, outcomes;

c. earlier identification of emerging opportunities as an operation progresses;

d. improved capacity for mitigating undesirable consequences; and

e. more efficient use of resources.

Understanding Effects

64. **General.** To succeed in this environment commanders must recognize that the activities they undertake will create effects that cannot be viewed in isolation. Applying physical force requires an increasingly precise ability to find, fix and strike targets, while at the same time avoiding unintended consequences that may be counter-productive, such as collateral damages. Many campaigns require military commanders to consider activities in

relation to more than simply an enemy force. Success in a complex environment requires that they understand the creation of effects and the range of elements and systems within the environment that affect the successful conclusion of a campaign.

65. **End-States and Objectives.** At all levels, activities create effects that in turn support desired objectives and thus end-states:

a. **Strategic End-state.** The desired situation derived from Policy direction. It is realised by the achievement of strategic objectives. A strategic end-state will be multi-faceted and a military objective and end-state will only be a part of it.

b. **Strategic Objective.** A constituent of the desired strategic end-state realised through the aggregation of agreed circumstances and conditions, specific to a particular element of power involved in meeting the strategic end-state. Once all objectives are realised, the strategic end-state will have been achieved.

c. **Military Operational End-state.** The desired and enduring military situation derived from strategic direction, brought about by the campaign, taking into account the end-state and objectives of the other instruments of power. It may be reached before the strategic end-state is reached. Upon achieving it, the military involvement in a campaign may cease or be reduced substantially.

d. **Operational Objective.** A constituent of the desired operational end-state realised through the aggregation of one or a number of inter-related effects.

e. **Tactical End-State.** The tactical situation once a tactical mission has been completed. It is described in the concept of operations paragraph of an tactical order for a specific mission.

f. **Tactical Objective.** A constituent part of the tactical end-state and the immediate aim of a tactical mission as described by the mission statement. They result from the achievement of a tactical effect or group of effects resulting from tactical activities (see below).

66. **Effects.** Effects are defined as: *changes as a result or consequence of actions, circumstances or other causes.* An effect may be a physical or cognitive result of an activity or series of activities, that may be military or non-military. Effects can be categorized as follows:

a. **Direct Effects**. Direct effects are the consequence of activities (weapons employment results, populace informed through leaflets, etc.), unaltered by intervening events or mechanisms. They are usually immediate and easily recognisable. Direct effects occur within the same system or group targeted.

b. **Indirect Effects** are the consequences of an activity that occur as a result of the application of a direct effect that is removed in time or purpose from the initial point of application and target. They occur in a target that was not the

object of the activity. For example, if a successful attack on a village occupied by insurgents convinces insurgents in another village to withdrawal, the latter is an indirect effect. Indirect effects may be difficult to recognize, due to subtle changes in behaviour that may hide their extent or their unanticipated nature.

c. **Intended and Unintended Effects**. Intended effects are those that are planned in relation to the activities conducted and support the desired objective. They may be direct or indirect. Unintended effects are those that were not foreseen and/or desired by the related activities. They may be direct or indirect and will likely undermine the attainment of the desired objective.

d. **Second, third and subsequent order effects**. These are the intended effects that relate to consequences of a direct effect. As an example, dropping leaflets has the direct effect of causing enemy soldiers to desert. The intended second order effect is that their unit's combat power is reduced or becomes ineffective and a third order effect that the commander's loose confidence and morale. Note that these subsequent effects cross between the cognitive and physical planes.

67. **Actions.** Actions are assigned by the joint/operational level of command to the component level command in order to create the desired operational level effects. They are issued as missions and are conducted through a series of planned activities.

68. **Activities.** Once an action/mission is assigned to a component, it issues activities. Activities are tactical level undertakings, that is, missions, assigned to formations and units and are realised through tactical tasks and effects. In line with the Continuum of Operations construct, activities are classified as offensive, defensive, stability and enabling. The construct of a mission statement clearly articulates the tactical level effects that are required by an activity. [14]

69. **Unpredictability of Effects.** Note that effects are at times caused by circumstances that are beyond the foresight or control of a military commander and result from the unpredictable dynamics of systems within the environment. Thus, in such situations, an effects-based approach demands that a commander simply work through the situation and mitigate the undesired effects that could not be foreseen or avoided.

Effects Taxonomy And Planning An Effects Based Approach

70. An effects-based approach to operations may be defined as: *The way of thinking combined with specific processes that enable the realisation of strategic objectives through the integration and effectiveness of the military contribution within a comprehensive approach. It plans activities to create desired effects in support of objectives, and complements military activities with those of other elements of power, in consideration of the complexities of the given environment.* It is a process that focusses on outcomes, objectives and end-states, and the effects, created through activities, need to realise them. It is a philosophy supported by methodology.

71. In order to properly apply effects there is a requirement for an analytical approach using the coordinated application of the full range of military and non-military capabilities, to undertake activities and create effects. These effects are assessed and adjusted against pre-determined measures of effectiveness (MoE), which ask the question, "*Are we doing the right things to create the desired effects*". The effects in turn lead to objectives, achieving the desired end-state. Adjusting the effects and the activities used to create those effects, based on the assessment feedback, is vital to the implementation of this approach.

72. In planning operations and articulating outcomes, commanders must clearly understand and express: the end-state; the conditions needed to achieve it, that is, their objective(s); the effect(s) required to achieve the objective(s); and those activities required to create the effect(s). (See figure below). Thus, in execution, activities are conducted to create desired effects that realise objectives, which in turn, support desired end-states.

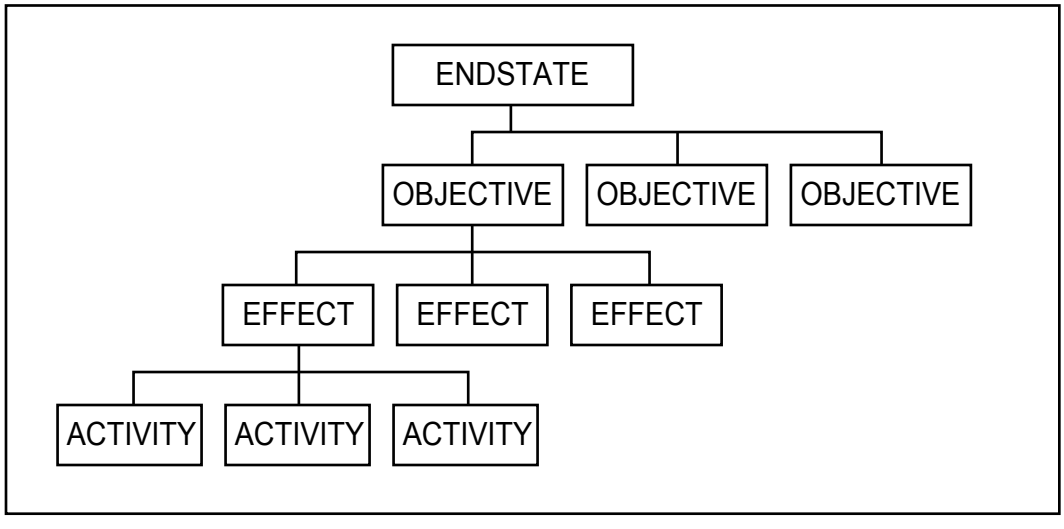


Figure 5-4. The Effects Based Approach

73. Although the construct of activities creating effects leading to objectives is applicable at all levels of command, the link between its application at operational and tactical levels is through allocated missions. At the joint and operational level, the following taxonomy will be applied:

a. operational objectives that support the end-state will be identified;

b. effects will be articulated in order to support these objectives;

c. these effects will be allocated to the component commands (eg, to the land component of the joint force) as actions to be undertaken. These will be issued as missions;

d. the missions will be executed through a series of activities assigned to subordinate elements of the component command.

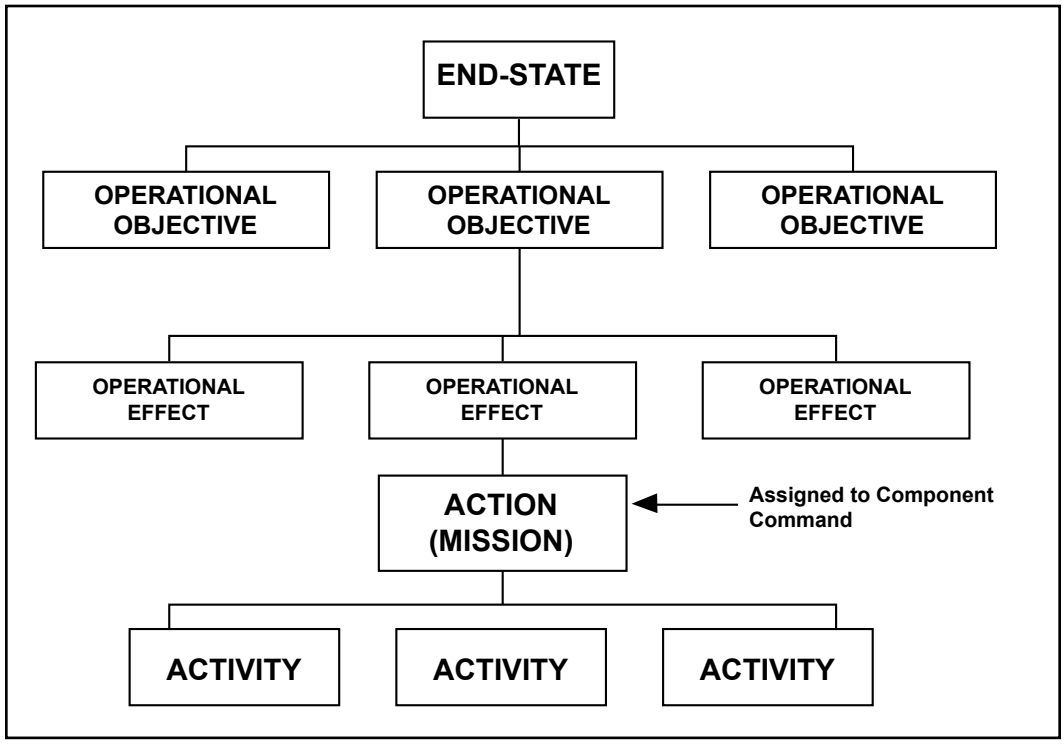


Figure 5-5. The Effects Based Approach Applied Between Operational and Tactical Levels

74. At the tactical level, an effects-based approach is practised through the manoeuvrist approach (see below), applied on both the physical and moral/cognitive planes, so that a combination of complementary physical-effects activities and influence activities are used to achieve desired objectives. Furthermore, the standard orders process and the principle of Mission Command remain relevant and the expression of effects is already a constituent part of a well-constructed mission statement. Indeed, an effects approach helps to more clearly define the commander's intent and to focus the force on achieving it.

Key Elements Of An Effects-based Approach

75. An effects-based approach to operations acknowledges that conflicts and campaigns in the contemporary operating environment involve a wide variety of sources and issues, and require a wide range of capabilities and activities in order to influence and affect their causes and actors, including the indigenous population. In order to consider and incorporate all elements and entities that influence the operational situation, the following are key elements for an effects-based approach:

a. **Knowledge Base.** An effects-based approach to operations is predicated on a sound understanding of the battlespace and the actors, factors and influences within it. Information and intelligence collection must be expanded in order to incorporate and assess the various elements and entities that inter-relate within

an environment – the political, military, economic, social (including cultural and religious factors), infrastructure and informational entities[15].

b. **Comprehensive Approach.** A comprehensive approach seeks to incorporate all the elements of power working to reach the strategic end-state and harmonise them, their capabilities and their activities. It seeks to address all the systems and influences within an environment that may have in impact upon long term stability. It comprises of: a unifying theme; collaborative working; and, comprehensive response.

c. **Measures of Effectiveness[16].** A measure of effectiveness is defined as: *a criterion used to evaluate how a task has affected selected system behaviour or capabilities over time*. Measures of effectiveness indicate if the right things are being done in order to create the desired effects. They are generally subjective and depend upon the situation and campaign. They are used to confirm that the correct activities are being undertaken and to adjust activities as necessary to achieve desired objectives.

76. Application of an effects-based approach to operations simply expands the current operational planning process and campaign prosecution in order to incorporate a broader scope of information, elements of power, capabilities, application and assessment in order to reach operational and strategic end-states in complex environments.

Applying An Effects Based Approach

77. The *methodology* for an effects based approach to planning, execution and assessment continues to develop. However, the *philosophy* is widely understood and the concept is not a new one. Good commanders have intuitively understood and applied a wide range of effects against all the elements in an environment that impact the overall objective. The Land Force effects-based approach is exercised through a number of means:

a. the adoption of campaign themes as articulated in the Continuum of Operations, that acts to focus operations on long term outcomes and end states. The campaign theme, along with the guiding principles for that particular type of campaign, inform the commander as to the balance required between physical-effects activities and influence activities, that is, between effects on the physical plane and effects on the cognitive plane;

b. the Joint, Inter-agency, Multi-national, Public (JIMP) framework, that harnesses the efforts and capabilities of other players within the operating environment in order to reach common end-states;

c. consideration of all the systems or entities that exist in a complex environment that impact upon the overall situation and successful conclusion to the campaign. These systems and entities, or at their general classifications, will help identify lines of operation for the campaign (eg, economic development);

d. a comprehensive targeting the considers the whole range of targets and target audiences within an environment together and plans their engagement using the full range of lethal and non-lethal capabilities to create complementary effects on the physical and cognitive planes; and

e. the adoption of measures of effectiveness, that allow continuous assessment of progress across a wider range of campaign lines of operation.

With these tools the commander conducts his operations in a more comprehensive manner using the full resources available across the full breath of lines of operation.

78. This concept of *comprehensiveness* in all aspects of the plan and its enables commanders to more effectively address all aspects and influences of their battlespace and environment by incorporating in a synchronised and complementary fashion operations on both the cognitive and physical planes.

Effects Based Approach As Part Of Campaign Planning

79. In incorporating an effects-based approach to the extent that operational outcomes can be translated into coherent tactical activity, existing tactical procedures, terminology and practice can be seen as complementary to effects-based practice at all levels of command. The significance of the Commander's unifying theme continues and it is this theme that provides the focus for the campaign plan, which in turn enables operational design. Operational art, intuition and command will still have a major part to play, especially in uncertain conditions and in those situations where there is a compelling need to act. In all circumstances, it is anticipated that operational freedom of action will be preserved and this is necessary for there will always be gaps in knowledge and a commander's intuition will still be required. Indeed, regardless of the lengths to which commanders and staff may go to anticipate all the actions and reactions of the systems in an environment, there remain too many variables, not the least of which are individual personalities and motives, to allow an accurate prediction of all cause-and-effect relationships. Thus, commander's intuition and responsiveness to the unforeseen will remain key to successful operations.

80. The application of an effects-based approach is pervasive at all levels throughout the planning and execution of operations, from the campaign plan downwards. Whilst the strategic direction gives the long-term perspective, the campaign plan will provide the medium-term framework, focussing on an operational end-state, constituent operational objectives and required effects. The near term to medium term gap is covered through operation plans that issue the activities that create the desired effects.

81. An effects-based approach to campaigns and operations will not alter the process of campaign design and planning but only provide it with better focus and measurable progress. Terminology for campaign design will remain extant, but the application of it, on both the physical and cognitive planes, will have to be conceptually expanded. The steps involved in an effects-based approach are the same as those in campaign planning and the operational

planning process, however the scope of these planning processes will need to broadened, in order to fully encompass all the disparate, yet inter-connected components pertinent to the situation. In other words, they will have to be comprehensive and plan for both physical and cognitive effects, in a simultaneous and complementary fashion, as required by the campaign and its environment.

82. Once the commander has conducted his visualization of the operation and developed a unifying theme in his intent, and confirmed his end-state, he can identify the objectives to achieve the operational end-state and then decide required effects that must be applied to realise those objectives. The identification of the objectives will then determine the lines of operation required that will lead to each of the objectives. Effects will then be decided along each line of operation, possibly described as decisive points[17]. These may be issued to staff or subordinates as either planning guidance or in orders.

83. A campaign design will include a number of lines of operation that lead from the current state of affairs and disposition – physically and conceptually – to the operational end states. The lines of operation will link assign activities that create the desired effects, that lead to objectives that together constitute the end-state. Effects along these lines of operation may be described as **decisive points** that must be reached en route to their respective objectives. Since they support an objective, they may also be termed, ***supporting effects***. A centre of gravity analysis remains important in campaign planning, but it must be assessed with a greater understanding of the nature of the complexities of the environment. In assessing a centre of gravity at each level of command, it must be remembered that they may be physical or moral centres of gravity, and they are based on people, be they groups or individuals.[18] While centres of gravity may be identified and targeted in due course, lines of operation should focus on achieving the desired end-state through the attainment of key objectives.

84. In the early stages of a campaign, the military may assume a role in each or at least most, lines of operation. As a security situation improves, the responsibilities for non-security related lines of operation should be passed to those other agencies best suited to conduct them. For example, initial reconstruction of infrastructure may fall to the military. However, as the security situation improves and other government agencies and NGOs arrive in theatre, such responsibilities should be assumed by them.

85. Lines of operation in many campaigns in a complex operating environment will incorporate a large array of objectives, effects and activities. They will include diverse, but inter-related aspects such as security, governance and development. Some will be prosecuted by a single element of power whilst others, such as governance, will be shared by several agencies, none of which may be military.

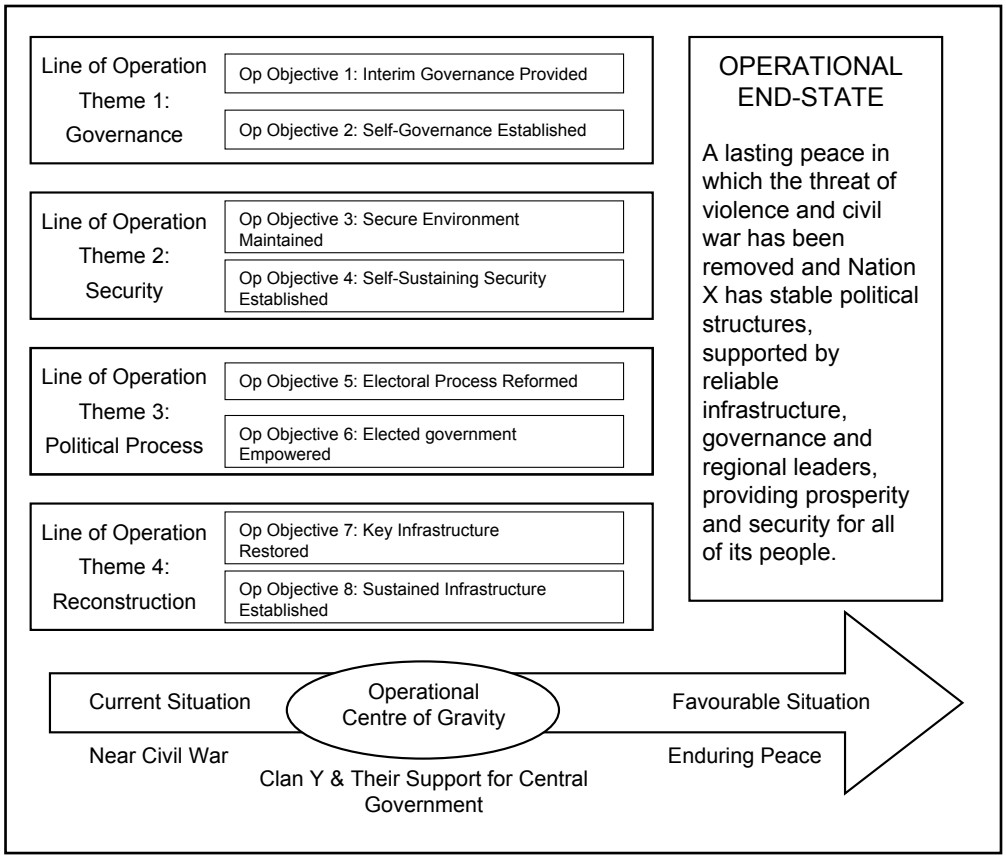


Figure 5-6. An Example of Lines of Operation as Part of a Campaign Plan.

Governance		**Security**		**Political Process**		**Reconstruction**	
Interim Governance Provided	Self-Governance Established	Secure Environment Maintained	Self-Sustaining Security	Electoral Process Reformed	Elected Government Empowered	Key Restoration	Sustained Infrastructure Established
Transitional government is established	Military control reformed	Provincial capitals secured	Militia B repatriated	Electoral process designed	Government structures reformed	Essential services re-established in all areas	Equitable control achieved
Provincial governments re-established	Police control reformed	Border crossings secured	Military trg re-established	Ethnic leaders engaged	Political oversight of security institutions	Resource infra-structure secured	Accountability procedures in place
	Economic reforms for distribution	Militia B deterred	Police trg re-established			Interim control of resources achieved	Enduring infrastructure re-built
		Militia B defeated					Sustained growth

Figure 5.7. Sample Supporting Effects for Operational Objectives and Lines of Operations

86. Commanders may not necessarily have all the integral resources required to generate the effects they envision. By leveraging and synchronizing the resources and capabilities across the JIMP framework, they can produce the right combination of effects on the right lines of operation to lead to the desired end state. This places particular emphasis on the collaboration required at all levels with JIMP participants. Some lines of operation may be conducted by only the military, others will be the sole responsibility of other agencies, and others may be shared between the military and others. In either case, a campaign seeking to establish enduring solutions for conflicts in complex environments must accept a long-term view and the requirement for a range of instruments of power to be employed.

Effects-based Approach At The Tactical Level: The Manoeuvrist Approach

87. In practical terms, activities are conducted to generate effects aimed at achieving objectives. These activities, assigned as tasks, may be physical or influencing in nature to produce effects on the physical or cognitive planes. While the term objective has commonly been used to refer to a physical object against which action is taken, in an effects-based approach an objective may be something far more abstract, particularly if the it is on the cognitive plane.

88. At the tactical level, the standard orders process and the principle of m*ission command* will remain relevant. The desired "effect" of a mission statement is issued in the tactical task (often as a first order effect, eg seize) and in the purpose of the tactical task (in order to….), which may be a second order effect.[19] Mission command allows a subordinate commander to assume tasks in support of achieving the desired effects.

89. The principles underlying the manoeuvrist approach remain appropriate at all levels and dovetail neatly within an effects-based approach. **The effects based approach is applied at the tactical level through the manoeuvrist approach**. The manoeuvrist approach traditionally incorporates three core activities and effects: attacking will; shattering cohesion; and shaping understanding. In applying the manoeuvrist approach to both the physical and cognitive plane, a wider conceptualisation must occur. In understanding this application, it must be remembered that when applied to certain target audiences, such as a friendly or neutral audience, activities may be undertaken to shape understanding, but in an effort to strengthen will and enhance cohesion. It sees idea of manoeuvre applied on both the physical and moral/cognitive planes. Thus, for example, a COIN campaign plan may envision attacking key insurgent strongholds in order to undermine his will and cohesion (manoeuvrist approach on the physical plane) while providing better economic and social development for the local populace, and advertising these activities quickly in the local media (manoeuvre on the cognitive plane to shape understanding and engender support from the populace).

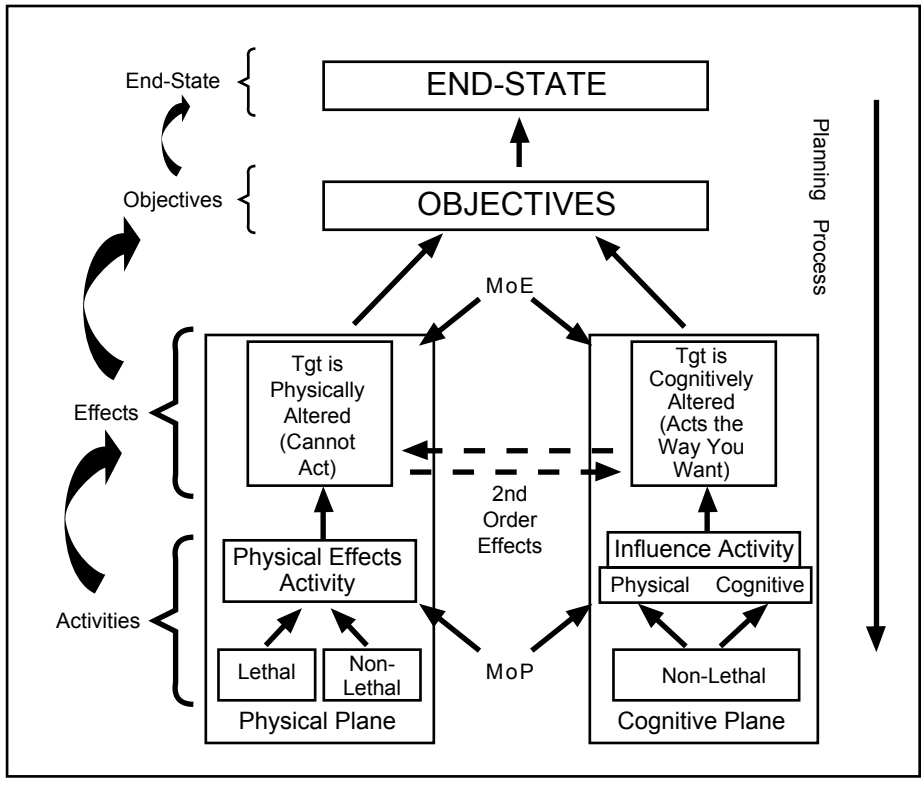


Figure 5-8. Activities and Effects on the Physical and Cognitive Planes Leading to Objectives

90. It is important to note that activities on the physical plane may have an impact on the cognitive plane and *vice versa*. This emphasises the need to understand both the first and subsequent orders of effects and to be aware of the possibility of undesired effects and the need to work to avoid them. For example, while an assault on an insurgent element in village X has a first order effect on the physical plane of the destruction of that force, the second order effect, on the cognitive plane, is the increase in security of the local populace and the increase in their confidence and sense of legitimacy of the campaign. If however, the attack resulted in civilian deaths and significant destruction, then the undesired effect, on the cognitive plane, will be the loss of support for the campaign amongst the local populace and a loss of legitimacy for the campaign.

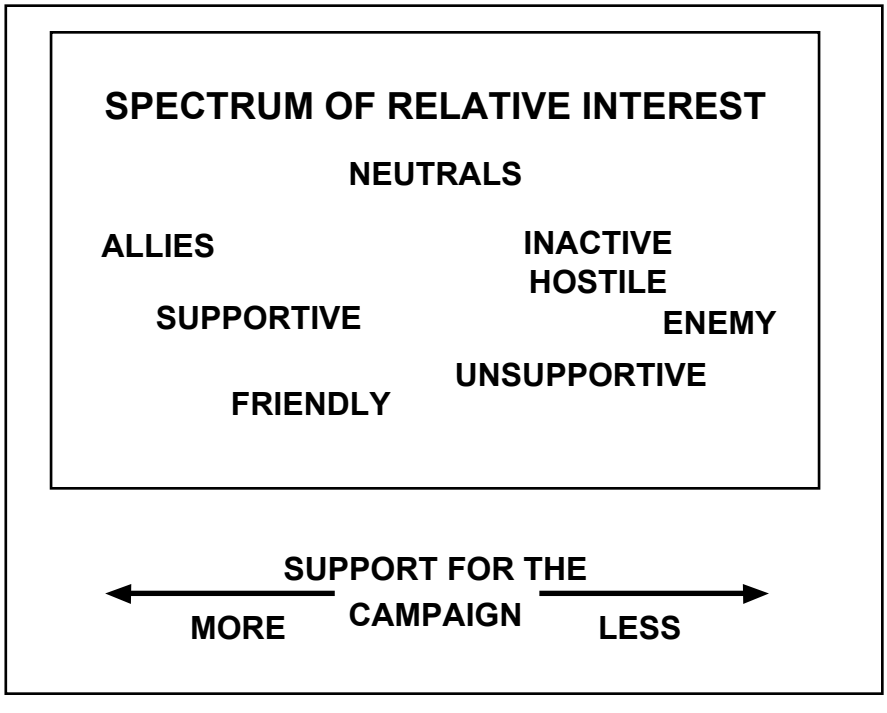
91. The degree of risk acceptance imposed upon the commander or that which he considers acceptable, will in some cases determine the types of activities the commander will apply to achieve his desired end state. For example the best means to defeat an opposing actor in area X may be to improve the economic conditions of the local population. However, the risk to agencies that can best affect this may currently be too high. Therefore, physical-effects activities aimed at the opposing force may have to precede actions by other agencies. In making this decision, the commander must weigh the potential adverse effect of any collateral damage in conducting lethal, physical-effects activity against the risk of casualties among the other agencies should they be employed first. Sequencing and synchronization of activities and effects will be critical to the overall establishment of the

desired end state.

The Knowledge Base And The Spectrum Of Relative Interest

92. As discussed above, a broad knowledge base that defines and assesses all the elements, actors and systems within an environment that may influence the outcomes, is a key aspect of an effects-based approach to operations.

93. An effects-based approach is predicated on a sound understanding of the battlespace and the actors and influences within it. It must be guided by an IPB process designed for the complexity of the operating environment and includes modifying the way a campaign planner and tactical commanders look at the adversary and all other factors, systems and entities that affect the environment and a successful conclusion to the campaign. Hence, it requires a broader classification of all the actors, that ranges from the adversary, through hostile and neutral to friendly and allies, within the battlespace as they relate to the interests and objectives of the friendly force. This has been labelled the **spectrum of relative interest** and where these actors fit on it in relation to the desired end-state will weigh heavily on the commander's consideration of what effects he will apply to modify their position on the continuum to align them with our interests. Some of these effects will be physical, but many others, specifically those seeking to engender support from the target, will be cognitive



effects. They are all targets or target audiences for engagement, either on the physical plane, the cognitive plane or both.[20]

Figure 5-9. The Spectrum of Relative Interest

94. The increasing emphasis within the Land Force on cultural understanding, stemming from the need to engender support from local populations and to engage other elements of an environment, is a recognition that there is a requirement to gain insight into the cognitive plane, and the intent, motivations and relationships of actors and groups in the battlespace, in order to out manoeuvre them or to move them, through an effect of influence, to a position of acceptance, cooperation and even support. The assessment that leads to this categorisation supports the targeting process, for each of the audiences on the spectrum of relative interest is assessed with respect to how they may be influenced and moved to a position of support or acceptance.

95. Each of the groups within an environment may be plotted along the spectrum of relative interest, and an assessment may be made as to what activities are required to either maintain their support or to move them to a position of support, that is, to produce cognitive effects in support of the end-states of the campaign.

96. This approach must also recognize the paradigm shift in information acquisition. While in major combat operations a significant part of the information required to establish understanding by the commander may flow from national or higher echelon sources, in peace support and counter-insurgency operations, this shifts toward a model that is more bottom up, with soldiers in direct contact as the key source of information. In many such circumstances, actionable intelligence regarding adversary targets and the motivations for their support will come from contact with the local populace. Furthermore, such contact will provide useful input for measures of effectiveness, particularly in terms of gauging the reaction of the local populace to the campaign's activities and conduct. Thus, an understanding and application of an effects-based approach down to the lower tactical level is critical to its overall success.

Fundamentals For An Effects Based Approach

97. The fundaments that guide an effects-based approach to campaigns and operations are:

a. **Long-term View.** Commanders and planners must take a long-term view of the campaign and the situation, to deal with the symptoms, and more importantly, the underlying causes of the conflict and crisis. The solution to the base causes will usually take a long time to create and secure. It is important that political leaders understand this requirement as well.

b. **Whole Environment.** It must be realised that the environment in which a situation and conflict occur is complex, adaptive and often unpredictable. The environment must be viewed holistically and the influence of all systems and actors with respect to resolving the conflict must be assessed and considered in planning. The inter-related nature of the environment in which the adversary, neutral and friendly elements interact must be considered. Commanders must comprehend the relationships between activities and effects particularly in relation to the elements and systems of the environment.

c. **Focus on End-state.** Planning must focus on strategic end-state and objectives, and operational objectives and the conditions needed to realise them.

d. **Collaboration.** All levels of command must work to create complementary effects that work towards operational objectives.

e. **Complementary Application of the Instruments of Power.** The military activities must be harmonised with the contributions of different instruments of power (JIMP) and agencies within the battlespace and environment in order to reach agreed objectives and end-states. Planning and execution must be done within the context of the comprehensive approach.

f. **Continuous Analysis and Assessment.** Continuous analysis and assessment must be done in a holistic, interative fashion to deepen understanding of the environment and to modify the plan and execution as necessary to reach the operational objectives. Staff and commanders must continually assess the effectiveness of activities in creating the desired effects, and adapt accordingly.

Assessment

98. The assessment element is a key component in an effects-based approach and in the achievement of enduring end-states. Assessment remains the responsibility of intelligence staffs, however resources and time must be dedicated to assessing the effect of operations on all systems and entities within an environment. Assessment of effects on the cognitive plane take time to measure and changes may be incremental.

99. Assessment assists the commander during execution in determining measures of performance (MoP - are things being done right), and measures of effectiveness (MoE - are the right things being done to achieve desired effects)[21]. Even if activities are done correctly and measures of performance indicate successful completion of those activities, it will be for nought in terms of achieving objectives if those activities are not creating the desired effects necessary to realise objectives. The requirement of both types of assessment leads to the requirement to establish a deliberate process, designed to assess progress in:

a. achieving end-state conditions;

b. accomplishment of operational objectives; and

c. accomplishment of activities.

100. Assessment is described in detail in Chapter 7, under targeting.

Section 4
Information Operations

Introduction

101. Information operations are defined as: *Co-ordinated actions to create desired effects on the will, understanding and capability of adversaries, potential adversaries and other approved parties in support of overall objectives by affecting their information, information-based processes and systems while exploiting and protecting one's own*[22].

102. Information operations (Info Ops) are not an operation unto itself. Rather, the doctrinal construct is a collection of capabilities related to information. It includes a wide range of activities, both physical and cognitive. Both seek to affect the understanding, capabilities and ultimately, the attitude and will of a target audience. Thus information operations includes a wide range of activities spanning, for example, from physical attacks against enemy command posts, to building schools, to issuing media statements to running a public radio station, all in order to affect information, capability, perceptions, will and eventually behaviour.

103. Info Ops doctrine developed in the latter part of the 20th century to include a wide and disparate collection of capabilities, loosely linked by a concept of information control. It was motivated by rapid technological advances in information processes but lacked a fathering and guiding holistic philosophy and set of principles. Reconsideration of the doctrine has allowed it to be refined and disciplined, with the focus on those activities that influence perceptions and affect motivations and behaviours. This section outlines the broad Info Ops doctrine accepted across the NATO Alliance, but then refines it to focus on activities that create effects on the cognitive plane.[23]

Core Activity Areas

104. Info Ops are conducted in three core activity areas: Influence Activity, which is the primary means of influencing will; Counter command activity (CCA), which counters information and command related capability; and information protection activity (IPA), which safeguards friendly information, thereby affecting an adversary's understanding. There is no clear delineation between the three elements and each will impact on the others and therefore must not be considered exclusive.

a. **Influence Activity.** Influence activity comprises any activity for which the primary purpose is to influence the perception and will of the target audience, be it friendly or hostile. It may include the use of physical means such as demonstrative fires to indicate intent and cognitive means, such as psychological operations (PsyOps). In either case, their effects are cognitive. Influence activities may be stand-alone activities seeking a particular effect or they may be support-

ing other activities. In short, these activities affect the information and perception of adversaries and others, and thus affect their will and behaviour.

b. **Counter-Command Activity.** Counter-Command Activity (CCA) seeks to physically alter an adversary's C2 capability. It affects the flow of information to and from a decision-maker, thereby affecting understanding or influencing will. CCA seeks, within ROE, to disrupt, degrade, usurp, deny, deceive or destroy an adversary's information, command, propaganda and associated systems, processes and networks. In targeting such systems, commanders must assess the secondary and long-term effects[24]. In short, these activities affect the adversary's information capabilities and thus his understanding. In targeting such systems commanders must assess the secondary and long-term effects. It may be better to simply exploit information gained from a C4 system rather than destroy it. Secondly, the impact of destruction of C4 systems must be considered in relation to the long-term, adverse effects on civilian systems being used by the adversary.

c. **Information Protection Activity**. Information Protection Activity (IPA) comprises any activity that prevents an adversary from gaining information relating to friendly operations. IPA includes Operations Security (OPSEC), counter-intelligence, information security (INFOSEC) and counter- intelligence, surveillance, targeting, acquisition and reconnaissance (ISTAR). The counter-ISTAR function includes the technical and non-technical elements of an adversary's information gathering capability and may include preventing a third party from receiving or relaying essential elements of friendly information (EEFI). In short, these activities deny the adversary information and thus affect his understanding and capabilities. They thus may affect will as a second order effect.

Key Activities Within Information Operations

105. Info Ops coordinates activity and is not a capability in its own right. The three core Info Ops activity areas can make use of all or any capability or activity that can exert influence, affect understanding or have a counter-command effect. However, there are several capabilities, tools and techniques that form the basis of most Info Ops activity. They include Psychological Operations (PsyOps), presence posture and profile (PPP), OPSEC, Information Security (INFOSEC), deception, Electronic Warfare (EW), physical destruction and Computer Network Operations (CNO). Clearly, many of these tools and techniques, such as physical destruction, have a much wider application than Info Ops (and when not used to support Info Ops the potential unintended effects of such activity must be considered), but can be drawn upon by Info Ops. It is important to note that only when tools and techniques are used directly to influence will, affect understanding or affect a decision-maker's C4ISR capability, they can be deemed part of Info Ops activity. Furthermore, the activities are conducted based on the desired effect. Not every campaign will utilise all the tools available.

a. **Psychological Operations**. The primary purpose of PsyOps is to influence the perceptions, attitudes and behaviour of selected individuals or groups in accordance with Info Ops objectives. Unlike Public Affairs (PA), PsyOps retains direct control over contents, dissemination and focusses on a specific audience(s). Effective PsyOps requires timely provision of resources, analysis and planning. PsyOps products will utilise a wide variety of means including print, radio, television, loudspeakers, face-to-face contact, the Internet, faxes, pagers and mobile telephones.

b. **Presence, Posture and Profile**. The appearance, presence and attitude of a force may have significant impact on perceptions and attitudes, particularly on neutral or potentially adversarial audiences. This concept is applicable at all command levels and all elements of the force contribute to it. It seeks to send or support a message and thus create a perception that supports that overall objective. For example, the decision to wear berets instead of combat helmets and body armour can make a considerable difference to the perceptions of both the adversary and local people. The public profile of commanders at all levels will impact on perceptions and therefore the public role of the commander must be carefully analysed and opportunities used to transmit key messages. Commanders must understand and assess the attendant risk that accompanies any decision regarding posture and profile against the need to send a particular message.

c. **Operations Security.** OPSEC is used to identify and protect information that is critical to the success of the campaign and is described as essential elements of friendly information. (EEFI). It aims to deny the identified EEFI to the adversary decision-maker, thereby affecting understanding. EEFI will need to be protected throughout its lifecycle and throughout the range of military activities. Adversarial understanding and capability are targeted to maintain the security of EEFI, using a combination of passive and active techniques.

d. **Information Security**. The goal of INFOSEC is to protect the confidentiality, integrity and availability of information through a variety of procedural, technical and administrative controls. INFOSEC includes a range of measures that are applied on a routine basis under the auspices of security policy to protect information. INFOSEC encompasses elements of physical security, such as personnel and document security, and Information Assurance (IA) measures. INFOSEC includes elements of physical security, such as personnel and document security, and Information Assurance (IA). IA includes a range of electronic techniques, such as Computer Network Defence (CND) and Communications Security (COMSEC) incorporating Emission Control (EMCON), defensive monitoring and technical inspection techniques, counter-eavesdropping, limited electronic sweeps and vulnerability analysis.

e. **Deception**. Deception involves measures designed to mislead adversaries by manipulation, distortion or falsification. Deception is a complex art, which

demands considerable effort, a high level of security and coordination, and a sound understanding of an adversary's way of thinking. It is normally used to dislocate the attention and combat power of an adversary but may be used as part of information protection, that is, to conceal friendly force intentions and capabilities. Deception will likely use a combination of physical means (such as a feint or demonstration) supported by other information cues.

f. **Physical Destruction**. There are two main aspects to the use of physical attack for IO purposes. First, attacks on command and control systems will affect the capability of an adversary and thus his ability to apply will. Secondly, the use of force in certain situations sends a strong cognitive message and consequently will have significant psychological impact. Carefully applied force can play a major role in coercion and deterrence and in reducing an adversary's ability to exercise command. However, undue collateral damage and unnecessary casualties will have an adverse effect on public support. This must particularly be considered if the enemy is using civilian infrastructure to support his C2 requirements. If physical destruction is required to achieve the desired effect the Commander must consider and balance the potential negative impact that it may cause with the expected benefits.

g. **Electronic Warfare.** Electronic Warfare (EW) has wide application in military operations. The effect of EW activity can be temporary or permanent and it has the potential to minimise the use of force, hence avoiding unnecessary casualties and collateral damage. EW will be used to affect critical information or the systems by which it is transmitted. Electronic attack enables CCA and attacks on Information Technology (IT). It also supports influence activity by enabling deception and PsyOps, including broadcasts to target audiences. Conversely, EW can be used to defend systems and information. Electronic defence, in conjunction with spectrum management, contributes by helping to counter an adversary's CCA and protecting friendly use of the electromagnetic spectrum.

h. **Computer Network Operations**. The opportunity for, and effectiveness of, CNO is proportional to the adversary's dependence on Information Technology (IT). CNO comprise attack, exploitation and defence:

1) **Computer Network Attack**. Computer Network Attack (CNA) includes means to attack computer systems. Software and hardware vulnerabilities allow computers, storage devices and networking equipments to be attacked through insertion of malicious codes, such as viruses, or through more subtle manipulation of data, all in order to affect the understanding and ultimately the actions of the adversary.

2) **Computer Network Exploitation**. Computer Network Exploitation (CNE) supports Info Ops by the ability to get information about computers and computer networks, by gaining access to information hosted on

those and the ability to make use of the information and the computers/ computer network itself.

3) **Computer Network Defence**. The purpose of Computer Network Defence (CND) is to protect against adversary CNA and CNE. CND is action taken to protect against disruption, denial, theft, degradation or destruction of information resident in computers and computer networks, or of the computers and networks themselves. CND is essential to maintain decision-making capability and confidence.

i. **Civil-Military Cooperation (CIMIC).** CIMIC[25] is a coordination and liaison function that facilitates operations in relation to civil authorities and non-military organisations and leads to activities that support local authorities. Because of their ability to inform, demonstrate, influence and compel, CIMIC related activities are a key aspect to the Info Ops plan. It provides information in the form of physical evidence of cognitive issues such as commitment and situational improvement and thus engenders support from target audiences. CIMIC related activities therefore need to be coordinated within the overall Info Ops plan, in terms of impacts upon civil audiences, their leaders and their information systems in order to ensure that activities work to support overall objectives.

j. **Public Information.** The aim of public affairs (PA) or media operations is to protect the credibility and legitimacy of operations and promote widespread understanding, thereby gaining support for military operations while not compromising EEFI. It communicates information to audiences, through the medium of local, national and international media and other communication means. Although PA is primarily focussed on informing and educating audiences, its impact is much wider. It is therefore essential that PA staff and those of other IO capabilities work closely together to ensure that a coordinated message is delivered to the intended audiences. To avoid giving the false impression that the media are being manipulated in any way, a distinction must be maintained between PsyOps and PA[26].

Targets For Information Operations

106. Based on the above, the activities listed under Info Ops may be classified as either: influence activities; counter-command activities; or, as information protection activities. In order words, they are activities that create effects on the cognitive plane or the physical plane. Influence activities use either physical means and/or cognitive means to create effects amongst target audiences on the cognitive plane in order to influence perception, attitudes, will and behaviour. Activities classified as either counter-command activities or information protection activities are physical-effects activities that create effects on the physical plane[27].

107. Targets for Info Ops may thus be grouped in accordance with the following table:

Influence Activities: **Targets on the Cognitive Plane**	**Counter-Command Activities and Information Protection Activities:** **Targets on the Physical Plane**
Human: • Political Leaders • Religious and Social Leaders • Groups of a population, such as tribes, clans • Adversary Leaders/Commanders • Adversary troops and sub-groups such as conscripts	Links: • Couriers and Dispatch Riders • Land Line • Radio and Other Informational Links Nodes: • C2 Centres and Command Posts • Physical Plant • Satellites

Figure 5-10. Targets for Information Operations

Revised Doctrine For Information Operations

108. An analysis of Info Ops doctrine, its justification and its origins, conducted from a historical perspective, indicates significant problems with the construct, its logic and its application. Firstly, within the Info Ops construct as it developed, nothing, other than the technological support of information processes and the types of nodes and links composing command and control (C2) systems, was actually new. The idea of attacking and defending C2 systems or the idea of influencing individuals or groups in order to alter perceptions, will and behaviour, are not new concepts that developed only through information technology. Many of the best examples of "information operations" occurred before the doctrine developed or were conducted by militaries and adversary groups that lacked any such doctrine[28].

109. Secondly, those physical activities that are classified as counter-command and information protection are, at their very essence, nothing more than offensive and defensive activities, that is, attack and defence. Whether information if being denied to the enemy through counter-reconnaissance activities, defence and security platoons deployed around an HQ, or through computer firewalls and anti-virus software, it can all be classified as defensive activities. Likewise, an attack against a courier, that is, a link in a C2 system, an

fighting patrol against a command post, that is, a node, an EW attack or a computer virus launched to neutralise enemy C2 systems, may all be classified as, planned as, and conducted as, offensive operations. Their subsequent classification as information operations was unnecessary.

110. Finally, those capabilities and activities meant to influence cannot be considered separately from other operations, for they themselves are operations, that is, they are tactical activities undertaken to create desired effects. The deception of an enemy commander, the use of flyers to convince conscripts to flee, the building of civilian infrastructure to counter an insurgency and win the support of a populace, and other such activities seeking cognitive effects are tactical activities that must be conceived, planned and targeted as part of an overall plan, simultaneous with and complementary to, physical activities. Like physical activities, they may be classified in the operational framework and described by their effects of shaping, decisive or sustaining[29]. In other words, they will be conducting manoeuvre on the cognitive plane.

111. In light of this re-assessment of Info Ops doctrine, the following outline construct shall be considered Info Ops for Cdn Land Forces[30]:

a. Info Ops activities be considered only those that fall into the category of influence activities: PsyOps; presence, profile and posture; deception; CIMIC; and public affairs. That is, Info Ops are physical and cognitive activities that create first order effects on the cognitive plane.

b. Those activities previously considered counter-command and information protection activities are to be considered simply as elements of offensive and defensive operations and planned and conducted as required.

c. Info Ops, that is, activities that influence, are to be part of a G3 staff branch for conduct and part of G5 staff branch for planning. Each staff branch may contain specialist advisors, in such areas as CIMIC, PsyOPs and PA, for operations and planning, but no staff branch should be specifically designated as an Info Ops staff. All staff functions other than G3/G5 support and enable operations, but do not conduct them. Thus, no specific staff branch other than G3/G5 have Info Ops responsibilities. The G9 CIMIC staff branch may be deleted unless used for purely liaison and information support functions. Specialist advice to the commander will either be through the G3/G5 functions or come from the commanders of those units and detachments conducting the operations, for example, from a PsyOps detachment commander.

d. Influence activities are to be conceived, planned and conducted in unison with physical-effects activities. In some ways they will be shaping, such as the issue of PsyOps flyers to enemy forces, just prior to an assault, encouraging them to surrender or the conduct of a feint to deceive the enemy. In other aspects, they may be decisive, such as the re-establishment of key infrastructure to secure the support of a populace.

e. Just as combat arms units manoeuvre on the physical plane, influence activities will be considered part of the manoeuvrist approach on the cognitive plane. Although all units will play a role in creating influences (eg, the posture of troops conducting framework patrolling or the use of EW to create deception), the manoeuvre units for specific influence effects may be considered PsyOps, CIMIC resources and PA. **Manoeuvre on both planes must be considered together in the creation of complementary effects and achievement of tactical and operational objectives.**

Information Operations (Influence Activity) Philosophy[31]

112. Land forces conduct activities to create effects in order to achieve military objectives assigned. Info Ops incorporate influence activities that focus on achieving a cognitive effect on key local decision-makers and groups by affecting their perception, will, decision-making processes and behaviour. Although they create effects on the cognitive plane, they are considered operations, in the same context as activities that create effects on the physical plane. They may be classified using the same taxonomy: offensive; defensive; stability; and enabling. They are conceived, planned and conducted simultaneously with activities that create physical effects. Together they may be considered comprehensive operations that consider the whole environment. As operations, they come under the direct responsibility of the commander. This is fundamental to an effects-based approach to operations and a comprehensive approach to operations.

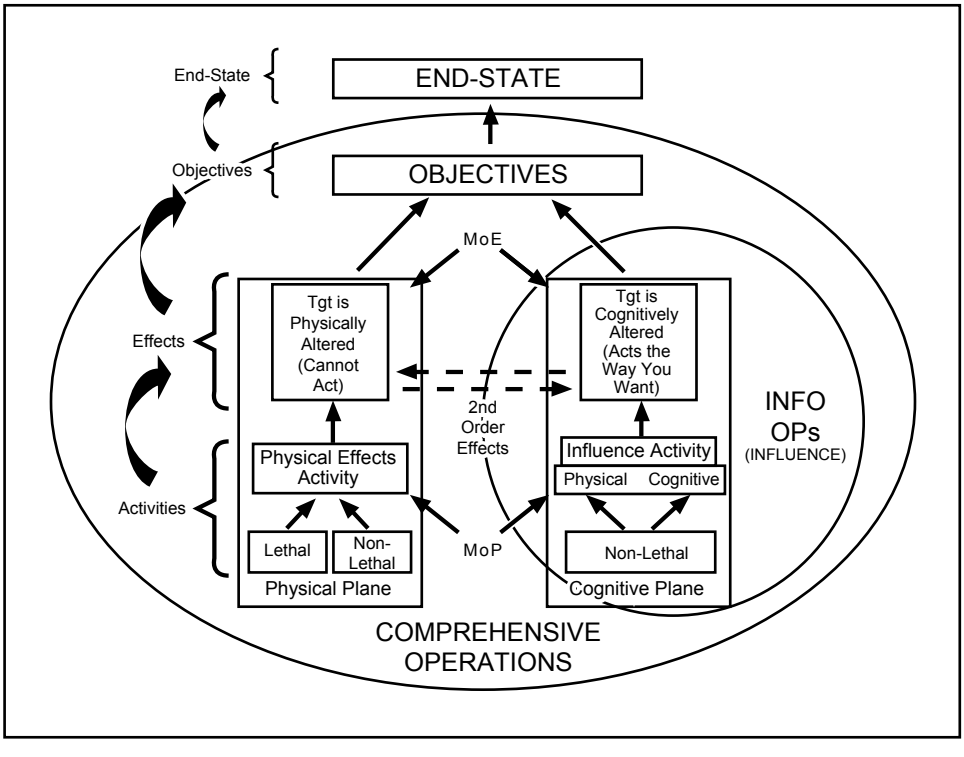


Figure 5-11. Operations that Consider the Whole Environment

113. Failure to incorporate physical-effects activities and influence activities together, that is, effects on both the physical and cognitive planes, will preclude the conduct of full-spectrum operations.

114. Many of the influence effects sought by influence activities will be beyond the capability and capacity of military forces, at least for an extended period. Thus, the military will seek to conduct influence activities within the JIMP framework so that activities such as reconstruction and economic development and the long-term solutions to a conflict may be fully realised.

Principles In The Application Of Information Operations (Influence Activities)

115. As with all types of military activities, information operations should be planned and conducted based on certain key principles:

a. **Commander's Direction and Personal Involvement**. The commander's personal involvement drives Info Ops and exercises control over all Info Ops activity, within a framework of timely decision-making and consultation up and down the chain of command. Without the clear guidance of the commander's unifying theme and intent, the Info Ops effort will lack focus and will not achieve the desired effects in harmony with other activities.

b. **Close Co-ordination and Sequencing**. The very nature of Info Ops and the large, diverse target set means that there needs to be very close integration, vertically and horizontally, within a command in terms of creating complementary effects in support of common objectives. The issue of contradictory messages or inaccurate information will undermine credibility and legitimacy. All Info Ops plans and activities must be closely coordinated throughout the echelons and ideally across multiple agencies. This is the responsibility of the commander, assisted by targeting staff, advisors and subordinate commanders.

c. **Accurate Intelligence and Information**. Successful Info Ops must be founded on good intelligence support and the development of a deep and broad knowledge base in which all elements, systems and entities within an environment may be assessed. This intelligence must include timely, accurate, and relevant information about potential adversaries, the other approved parties, and the operating environment. The Info Ops staff should work closely with the intelligence staff to define requirements necessary to plan, execute, and assess the effectiveness of Info Ops. Intelligence preparation of the battlespace (IPB) should include analysis of human factors (including culture, religion, languages, etc.), decision-making infrastructure and power structures.

d. **Centralised Planning and Decentralised Execution**. Due to the requirement for close coordination of Info Ops activity, the principle of centralised planning

and decentralised execution applies to Info Ops at all command levels. However, centralised execution may be required for certain types of targeted information activities, when all involved force elements are required to adhere rigidly to a plan, or when strategic assets are used. The approval level and process for PsyOps messages must be as low and streamlined as possible in order to ensure messages are timely and relevant to the environment at hand.

e. **Comprehensive and Integrated Targeting**. At the operational level, targeting starts with a detailed understanding of the operational environment, its constituent systems and entities, and the commander's objectives. Commanders and targeting staff identify Info Ops effects required to achieve the desired objectives and a range of activities that, when integrated into the overall operation plan, will achieve those effects. It is important to realise that any element of targeting activity may influence a range of target audiences and create unintended effects. The targeting staff therefore has to analyse the impact of such activity and propose appropriate measures to avoid or mitigate unintended effects. Info Ops targeting must not be planned separately from the targeting of physical effects[32], but in conjunction with it so that effects are complementary.

f. **Early Involvement and Timely Preparation**. Info Ops planning must start early, because both planning and execution take time and results can be slow to emerge. Hence, a Commander's intent and direction must be viewed right from the start in relation to Info Ops capabilities and maintained throughout the planning process. Planning and targeting staff and advisors need to be fully involved in the planning process to integrate Info Ops within the overall plan.

g. **Monitoring and Effects Assessment**. The successful prosecution of Info Ops relies on continuous monitoring and assessment of the short and long-term effects of inter-related activities. This is achieved by the collection of all-source intelligence and other feedback on the Info Ops activities. Measures of Effectiveness (MoE) must be included in the Info Ops plan and are integrated in the intelligence collection activities.

h. **Establishing and Maintaining Credibility**. In order for Info Ops to be successful in creating influences on the cognitive plane, the source of the Info Ops must have significant credibility in the eyes of the target audience. The credibility of a force may have to be established in a planned, incremental fashion. If lacking credibility, a force will require the engagement of indigenous proxies such as social or religious leaders who have established credibility with target audiences, in order to broadcast the desired messages.

i. **Timely Counter-Information Operations.** Even the most effective Info Ops plans will be frustrated in execution if deliberate actions are not taken to counter the Info Ops actions of the adversary and neutral parties. This includes the passive and active measures used to protect friendly information and

information systems. With respect to influence activities, the advent of real-time communications technologies forces the commander to constantly observe and counter the enemy's attempts to influence target audiences, locally and internationally. There are numerous examples, from Kosovo to Lebanon to Afghanistan, of a militarily weaker opponent effectively conducting an Info Ops campaign that has influenced foreign and indigenous populations. Failure to adequately counter the contrived story in a timely and credible fashion can undermine not only a public's morale, but it can also bolster an adversary's popularity, and rally public opinion against the mission. Info Ops planning must dedicate resources to monitoring adversary Info Ops and remain flexible enough to counter erroneous information. Timeliness is paramount and in terms of PA, the first side to get their story out into the public domain often holds the public high ground.

Influence Activities And Their Targets – The Causal Relationship Of Filters And Perceptions

External Influences and Internal Perceptions

116. To create effects on target audiences in terms of understanding, will and behaviour, there is a need to understand the target audiences on the cognitive plane[33]. This includes their personal perceptions, their filters and how to affect them. This is referred to as the *causal relationship*- or cause and effect - which is understanding how to contribute to an effect(s), and is far more difficult on the cognitive plane than on the physical plane.

117. It is important to appreciate that targets on the cognitive plane will act according to their own interests, shaped by perspectives and values, which may be significantly different from one's own. As well, every activity on the cognitive plane will have a different response time and a different set of information filters that can (potentially) alter the interpretation of the message (see table below). These filters will differ with each situation and target and will be a result of the target's external influences and internalised traits and perceptions.

118. External filter variables include culture, society, family, media, government institutions, and decision-making processes.[34] External filters, therefore, include variables that limit behaviour to what is socially, culturally, and legally acceptable, informed by information sources such as media, government, group, and informal communications networks. Internal filter variables include personal values, beliefs, hopes, fears, and experiences. Without an understanding of these filters and their effects, messages or activities may provoke unintended actions.

Information Filters	

External Influences:
• Cultural Bias & Values
• Social Pressures
• Family
• Religious Institution & Constructs
• Media
• Group Dynamics
• Government Institutions
• Political Influences
• Decision-Making Processes
  • Individual
  • Group
	Internal Perceptions:
	• Values
	• Beliefs
	• Experiences
	• Hopes
	• Emotions

Figure 5-12. Information Filters for a Target: Individual and Collective

119. Additionally, a decision–making process may be unique to an individual or group. What appears to be a rational process to one person may seem irrational to another. The rationale may have a cultural or religious basis or it may be unique to that one particular personality trait, whether it is individual or shared.

120. All the filters modify information input to the target audience. Targeting must be sophisticated enough to understand and manipulate, or at least work through, these variables to achieve the desired effect on the intended target. They are a key consideration for Red Teaming[35] during the planning and war gaming process. Activities seeking to influence must specifically focus on *what and how the target perceives something within the environment* and be adjusted to suit it and achieve the desired effect. For example, a message delivered or action taken by a military leader in a society distrustful of those in uniform may not be effective. However, the same message, delivered by a religious leader or a civilian of similar cultural background may gain the desired effect. Therefore, a significant effort should focus on altering that environment or influencing perception through means specifically tailored to the environment. **The impact of influence activities is their effect on decision-making processes.**[36]

121. Care must be taken in deciding the activities to be undertaken to create desired effects. Measures taken to intimidate, for example, may simply result in animosity and hatred by leaders or local populations. Such reactions will be difficult to gauge, but a study of both external and internal filters may help predict and mitigate such reactions.

122. In order to commanders and staff to plan activities to create the desired effects, it is important that they make use of cultural advisors and experts. Just as commanders have employed in the past political advisors (POLADs), they must consider the employment of experts in social, cultural and economic fields as well.

Spectrum of Relative Interest

123. As discussed in an earlier section target types on the cognitive plane can be defined along a *spectrum of relative interest* as it relates to achieving the end-state. This spectrum can be broadly broken down into any number of groups that may be generally described along the following lines: the adversaries; the inactive hostile; the unsupportive; the neutral; the friendly but uncommitted; the supportive; and allies. The boundaries between these groups may be blurred. Each group may be influenced in different ways using different activities. The amount of effort and type of activity needed to influence them will depend upon the situation, the relative size of the target audience, the disposition of the audience on the spectrum (supportive to hostile), and the importance of ensuring popular support for the success of the campaign.

124. In addition to the normal targeting process there is a requirement for additional information when determining a target on the cognitive plane. These have been derived from the CARVER targeting matrix[37] as follows:

a. **Criticality** – criticality or target value, is the primary consideration. It refers to how much its execution will alter the target attitudes, beliefs and behaviour.

b. **Accessibility** – how accessible is the target? Does the target require a direct or indirect attack? If indirect, through what or who must the target be accessed? What method, medium and delivery means will be more effective?

c. **"Recuperabilty"** - If changed, how long can the attitude, belief, or behaviour be expected to remain consistent without reinforcement? What reinforcement will be required?

d. **Vulnerability** - What is the degree of vulnerability? Will the objective be achieved?

e. **Effect** – the target should only be attacked if the desired cognitive effect will be achieved. The likely unintended consequences must be calculated and weighed against the benefits. Will the attack be awful under current ROE?

f. **Recognisable**– Can the target be easily accessed and not confused with other targets or neutral elements? Will the desired effect of the attack be readily apparent? Will the targeting efforts be transparent or easily recognized by the target or other audiences? Will this recognition affect the credibility and legitimacy of the mission?

Offensive Information Operations: Op Archer, Afghanistan, 2006

A crucial component of COIN efforts in Afghanistan is persuading local populations that the authority of the Central government is legitimate and that the role of coalition forces is one of security, not occupation. Islam plays a pivotal role in Afghan culture and society. Furthermore, tribal and village elders occupy a central cultural and religious leadership position in Afghan society and power structures. Thus, offensive information operations in Afghanistan must target tribal and village elders while being mindful of the role of Islam in the day-to-day lives of the local populace.

In the spring of 2006 the CF incorporated a Muslim imam who is also a member of the CF in select meetings with village and tribal leaders. Through recitation of Koranic verse and Islamic prayers, the military imam used religious language to persuade Afghans that the Taliban do not hold the moral high ground, that the Islamic government in Kabul is worthy of support, and that the Western forces in their midst are not occupiers, but operate with the goal of establishing security and peace within the parameters of an Islamic society.

The unique use of an imam to influence societal and religious leaders in Afghanistan by the CF is a superb example of an offensive information operation conducted on the cognitive plane. Undermining Taliban claims of moral superiority based on religious piety was assessed by many as a critical step in defeating the insurgency, particularly in the Taliban's former strongholds in Southern Afghanistan.

Source: Graeme Smith, The Globe and Mail, p.A13, 12 June 2006.

The Messages And Messengers

125. The following points should be considered with regard to the way information operations are conducted[38]:

a. influencing a target audience requires "delivering the goods" not simply sending the message. Thus, if a promise is made it must be kept. If a message is sent, it must be fulfilled.

b. cultural awareness is vital, and the threat often has more cultural credibility. Ideally, key individuals or groups within a target audience receive the message,

accept it, and then deliver it or spread it through the larger audience. This will add credibility to the message.

c. maintain message discipline and do not be thrown off by erratic media reports. In short, the message has to be sustained to be believed and must be consistent over time and across different levels of command.

d. central strategic theme is essential, however, subordinate themes and messages (and deeds that reflect the message content) must be categorized, assigned, and tracked against different target audiences. In the ubiquitous media environment at least two cultures must be addressed: that of the threat/indigenous population, and that of committed friendly forces.

e. mounting casualties put additional stress on troops and may lead to information operation mistakes. They must be anticipated and proactively handled. Risks may have to be taken in order to support messages and to keep them constant.

f. whichever news story breaks first will be pre-eminent, at least initially; therefore publicize anything that lends credence to our operations.

Assessment – Measures Of Performance And Effectiveness

126. As with any military activity, the results of Info Ops are assessed using measures of performance (MoP) (are things done right?) and measures of effectiveness (MoE) (are the right things being done, to create the desired effects?).

127. MoP for Info Ops refer to the mechanisms of planning and implementation. They can be viewed in the same manner as the delivery of indirect fire: reaction times; quality of product; correct identification and assessment of target; and suitability of engagement means, to name a few.

128. MoE refer to the desired effects and whether or not the activities conducted have created those effects. All three types of Info Ops activity areas contribute to the achievement of effects. Some of the activities of CCA and IPA are objective and measurable. Others, particularly for influence activities, are more subjective and difficult to evaluate.

129. In influence activities, MoE are applied to activities and changes on the cognitive plane. Given all of the individual and environmental variables in the human decision-making process, developing MoE for Info Ops on the cognitive plane may be one of the most daunting intellectual tasks facing a commander. Influence activities seek to work through external and internal filters in order to either persuade or dissuade and thus affect behaviour and action. Hence, the planning and conduct of these activities is an *art* requiring the commander's subjective feel for their affect. The results of these influence activities require as defined a set of indicators as possible, in order to detect changes in perceptions, attitudes and behaviours. These indicators need to account for the effect of the information filters.

130. MoE will vary significantly between missions and even within missions. Commanders must clearly state the end-state and ideally any milestones on the path to that end-state. MoE, using whatever means are most appropriate, measure and indicate progress in the target audience towards that end-state. MoEs must be tailored to the specifics of not only the overall change desired, but to the environment, that is, the commander's AOO. Because of the intangible factors involved and the subjective nature of influencing, the MoE will almost certainly be subjective, and because behaviour influence is the aim, they require a significant amount of time to determine effectiveness. Therefore, they must be assessed as a set routine to attempt to recognise changes, trends and slight yet significant indicators. The commander exercises judgement as to when an adjustment or change to an activity against a target must be made in reaction to the measured effectiveness.

131. In order to overcome the difficulties in selecting and applying MoE for Info Ops, some basic **fundamentals** exist that can aid in the development of useful MoEs:

a. **Causality**.[39] A definitive cause and effect relationship must be established between the activity and the effect attempting to be measured. Given the cultural and other variables/filters present, there has to be a reasonable likelihood that the planned activity will create the desired effect. Secondly, commanders and Info Ops staff must be able to assess any other extant factors that may be causing the effect other than their own activities. Likewise, they must ascertain if the measured effect is merely coincidental.

b. **Quantifiable**.[40] A MoE that can be counted helps to remove some of the subjectivity that plagues MoEs on the cognitive plane. Quantification allows accurate trend measurement.[41]

c. **Observable and Attributable**. When drafting MoEs, consideration should be given to the possibility that all of the variables influencing an activity and change in behaviour cannot be observed. The MoE must be able to recognise a trend or change and confirm the connection or attribution to the activity. For example, if the presence or absence of negative graffiti is being used as an informal indicator of support for a campaign and military force in an urban area, observers will ideally be able to ascertain: its timing, that is, when it was done; its attribution to a particular group (political, criminal, military) and their motive, and whether it represents a minority or majority viewpoint; its attribution in terms of cause, particularly if it appears as a reaction to a specific event or action; and, its location in relation to the cultural make-up of the local environment.

d. **Correlated to Effects, Objectives and End-States**. Just as activities are planned to support effects and objectives along a line of operation, MoEs should be selected to correlate to the achievement of each effect and should be reflective of the level of employment. Strategic Info Ops require measures that occur throughout the length of a campaign and many MoEs at the operational and

tactical level will measure the incremental progress through effects and objectives.

e. **Flexibility**. Although MoEs should be drafted at the planning stage they should remain under regular review and commanders must be prepared to adjust them as required. They must evolve as a mission progresses, particularly as the consequence of their activities leads to the attainment of operational effects. Similarly, MoEs are likely not transferable from mission to mission. Even if a mission takes place in the same AOO the passage of time will force reconsideration of MoEs previously employed.

f. **Collection**. The commander must possess the capabilities to collect the intelligence necessary to employ an MoE and provide the direction and guidance to do so. Plans must be made to collect and assess MoEs through all units in the AOO. Collection may be assisted by other agencies, however, without a formal command relationship, this may have to be done informally. Notwithstanding this, other, non-military agencies may prove to be an effective gauge of progress through Info Ops.

g. **Relativity**. Improvements sought in a given environment must be relative to the specific environment and to what is considered normal for that particular environment and culture. Expectations for situational improvement must be reasonable given the starting state and the normal state of that particular environment. Improvements to a situation that will make it relatively normal for that environment may come quickly; however, systemic improvements in absolute terms may require cultural changes over a very long period of time. Expectations for change and the related MoE should be set as incremental milestones so that improvement can be measured and demonstrated as tangible progress over time.

132. Developing appropriate MoE to assess Info Ops on the cognitive plane is a very difficult task. Willpower, perceptions, and beliefs are all less-than-completely-tangible variables that defy simple measurement. Observing and measuring trends is one of the surest ways of gauging a target's attitude. Trends, however, require a definable baseline and this may be impossible to identify.

Information Operations: Op Archer, Afghanistan, 2006

The absence of domestic or international support for a mission can undermine both the legitimacy of a mission as well as the morale of CF personnel. Therefore, one of the tasks in-theatre commanders may be called upon to undertake is the education of the domestic and international publics, most likely through the media. It may become necessary to clarify policy or inform the public about a mission or a specific component of that mission in order to explain its reasoning and to bolster support for the desired end-state.

One of the dilemmas that confronted the Canadian government and military from the outset of operations in Afghanistan was the disposition and disposal of enemy personnel captured during combat. The typical foe encountered by the CF in Afghanistan does not meet the definition of "members of armed forces" as established by the 1949 Geneva Conventions, in that most do not carry arms openly, do not abide international laws and customs of war, and are not readily identifiable by the wearing of a uniform or distinctive insignia.

On 18 December 2005 the Government of Canada signed an agreement with the Government of Afghanistan concerning the transfer of enemy captured in Afghanistan by the CF. Five months later, Ottawa declared that captured al-Qaeda and Taliban fighters would not be afforded formal PW status as defined by the 1949 conventions.

This policy, combined with concerns that detainees transferred to Afghan custody would not always be treated in accordance with international human rights standards, caused the Canadian media, some experts, and members of the general public to express concern that Canada's policies abrogated international law.

Despite declarations in parliament and in the media by the Prime Minister and Minister of Defence, Brigadier-General David Fraser, Commander Multi-National Brigade for Regional Command South in Afghanistan, felt compelled to clarify government policy by granting an interview to a member of the Canadian media only days after the detainee policy was announced. Brigadier Fraser covered all aspects of the Canadian detainee policy to include: the role of the Afghan government; the fact that the spirit of the 1949 Conventions was to be followed in dealing with detainees; and, the role of respected international organisations such as the ICRC to oversee the handling. All this reinforced that Canadian policy conformed to international law.

The actions of General Fraser involved a complex legal, policy, and moral issue, targeted both the undecided and friendly components of the influence spectrum, and simultaneously emphasised the sovereignty of the nascent democratic government of Afghanistan.

Sources:

Paul Koring, "Troops told Geneva rules don't apply," The Globe and Mail, 31 May 2006
Graeme Smith, "General defends detainee policy," The Globe and Mail, 3 June 2006.

Information Operations: Operation Iraqi Freedom, Baghdad, Iraq 2003-2004

To be effective, offensive Info Ops must target an appropriate audience, be focussed on a limited number of themes, and be timely. Technology allows almost immediate diffusion of information and minutes can make a difference in countering or pre-empting enemy Info Ops.

Colonel Ralph Baker, USA, commanded the 2nd Brigade Combat Team of the 1st Armored Division in 2003-2004. 2 BCT's AO encompassed the Karkh and Karada districts of Baghdad. The operational environment in this AO was extremely complex, given that the resident population is an amalgam of Shiite, Sunni, Christian, secular business and academic elites, and the diplomatic district of the Iraqi capital. Moreover, the AO encompassed Saddam Hussein's hometown of Kaddamiya, where a sizable pro-Baathist element continued to lurk. A final complicating variable was the rumour-centric nature of Iraqi society.

Once it became apparent that US forces were facing a full-blown insurgency, Col. Baker quickly realized that "IO (sic) is critical to successfully combating an insurgency. It fights with words, symbols, and ideas, and it operates under the same dynamics as all combat operations." The greatest problem facing 2 BCT with regards to Info Ops was that the insurgents consistently dominated activities on the cognitive plane, successfully shaping the environment before US elements could respond. Without fail, the various insurgent groups were able to engage the most important mediums (television & internet) through the most important media outlets in a rapid and effective manner, often before US or coalition Info Ops teams could even begin to respond.

The Info Ops staff of 2 BCT took a number of steps to rectify the Info Ops deficiency in the AO. In the first place, three broad categories of Iraqi citizens were identified to lend greater focus to targeting. The groups were: those who would never accept the coalition's presence; those who accepted the coalition's presence; and, "the vast majority of Iraqi's who were undecided." It was this last group that was the specific target of the majority of 2 BCT Info Ops, firstly because those in this group were generally more susceptible to influence, and secondly, because a successful insurgency only requires the acquiescence of a population, not outright support. A final group that was targeted was 2 BCT's own personnel, who were at times demoralized by "inaccurate [and] slanted news" from US media outlets.

Once targets were identified and prioritised, two broad themes were adopted to focus the information and messages that were critical to a successful mission outcome: discredit insurgents and terrorists, and highlight the economic, political,

social, and security efforts of the coalition forces. Next, synchronization of all available brigade Info Ops assets was pursued to end counter-productive and often conflicting messages (Info Ops fratricide).

Specific groups of targets within the "undecided" catagory of Iraqis were identified so that they would in turn spread the message. These groups were the local and international media, local imams and religious leaders, tribal and clan leaders, governmental officials, and university and lower-level school leadership. This last point is particularly important, for it is far more effective that someone from the target audience spread the desired message because it is much more likely to be accepted and trusted.

Finally, 2 BCT identified a number of measures of effectiveness (MoE) by which the progress of brigade Info Ops could be evaluated. The MoEs are necessarily subjective and lack rigorous quantification. Given that Info Ops on the cognitive plane seek to influence people's attitudes, this should not be surprising. Nevertheless, some MoE is required. For 2 BCT, these included the number of accurate/positive stories published or aired by all media sources, the number of negative press, the number of tips provided by the local populace, the "wave" factor (who and how many local residents waved to coalition troops during patrols), observance of the tone of graffiti in the AO, the tenor of sermons at local mosques, and the willingness of the local populace to openly work with coalition forces.

Although lacking an effective Info Ops doctrine, Col. Baker and his brigade Info Ops team quickly developed an effective plan to counter and pre-empt enemy Info Ops. Understanding that an effective Info Ops plan was critical to a successful COIN operation, Baker and 2 BCT rapidly implemented Info Ops doctrine that enabled the tactical leader, by providing a clear commander's intent and end-state goals. From their experiences, Col. Baker drew a number of essential observations relevant to all Info Ops:

- Info Ops must tailor themes and messages to a specific target
- The press must be engaged; you have no influence if you do not talk to them
- Credibility and the ability to improve the quality of life of the local residents is directly related
- Developing trust and confidence between your forces and local residents should be a primary Info Ops goal. Hence, messages must be based on the truth.
- Commander's vision and intent must be clear and concise.
- Messages must be few, simple, and repetitive

Source: Colonel Ralph Baker, "The Decisive Weapon: A Brigade Commander's Perspective on Information Operations," Military Review, May-June 2006, pp.13-32.

Section 5
Manoeuvre Warfare

Manoeuvre Doctrine And Its Application

Definition

133. The concept of *manoeuvre warfare* is defined as:

A war fighting philosophy and approach to operations that seeks to defeat the enemy by shattering his moral and physical cohesion – his ability to fight as an effective, coordinated whole – rather than by destroying him physically through incremental attrition. (AAP 39).

134. The manoeuvrist approach is realised through the following activities and effects:

a. Attacking will;

b. Shattering cohesion; and

c. Shaping understanding.

135. Cohesion is seen as the glue that solidifies individual and group will under the command of leaders. Cohesion allows military forces to endure hardship and retain the physical and moral strength to continue fighting to accomplish their mission.

136. This manoeuvrist approach[42] to operations seeks to attack the adversary's will to fight, and thus undermine and even shatter his cohesion, usually, but not necessarily, by avoiding trials of strength, and targeting weakness. An adversary's will and thus cohesion may also be affected by the shaping of his understanding. If the adversary's C2 ability is neutralised, he will fail to understand his environment or misunderstand his environment and thus lose his will and cohesion. Likewise, if conscripts are convinced to surrender or flee, the will and cohesion of the entire adversary force are affected.

137. As a result, the focus is to defeat the threat by shattering his moral and physical cohesion, his ability to fight as an effective coordinated whole, rather than by destroying him physically through incremental attrition. *It is equally applicable to all types of campaigns from peace support through major combat.*

138. In short, the manoeuvrist approach is applied across the physical and moral/ cognitive planes with effects occurring on both planes.

139. Attacking the adversary's cohesion, on both the physical and moral/cognitive planes, is the key to manoeuvre warfare. It is done using both physical-effects and influence activities. There are three approaches to attacking will and cohesion. These are, in order of preference: *pre-emption, dislocation and disruption*.

Pre-emption

140. To pre-empt the threat is to seize an opportunity, often fleeting, before he does, to deny him an advantageous course of action. Pre-emption relies on surprise above all and requires good intelligence and an ability to understand and anticipate the opponent's actions. Its success lies in the speed with which the situation can subsequently be exploited. Pre-emption is used to produce a sufficient and suitably located threat that: causes confusion and doubt; destroys confidence by foiling the threat's plans; and makes his intended course of action irrelevant. Pre-emption denies initiative to the threat.

141. Whether offensive or defensive, pre-emption demands a keen awareness of time and a willingness to take calculated risks that offer a high payoff. These risks may be reduced with the benefit of intelligence derived from real time sensors that provide a more accurate assessment of the threat's true situation. Pre-emption can also be achieved by allowing subordinates at all levels the initiative, consistent with the commander's intent, to seize opportunities as they arise.

142. Establishing air superiority or establishing control of the electromagnetic spectrum at the start of operations can achieve pre-emption. On the cognitive plane, the threat can be pre-empted by use of a proactive public affairs programme. This may also include actions to secure the support or neutrality of third parties before the opposition can do so.

Dislocation

143. To dislocate the threat is to deny him the ability to bring his strength to bear. Its purpose is much wider than disruption and goes beyond the frustration of the threat's plans. To dislocate is to render the strength of elements of the force irrelevant. It seeks to avoid fighting the threat on his terms. This is done by avoiding his strengths and neutralizing them so they cannot be used effectively. A dislocating move is usually preceded by actions to distract the threat and fix his attention.

> "It is through 'distraction' of the commander's mind that the distraction of his forces follows. The loss of freedom of action is the sequel to the loss of his freedom of conception."
>
> Captain Liddell-Hart

144. Envelopments or deep penetrations into the operational depth of a threat, even by small military forces, may cause dislocation of elements of the force by attacking reserves, lines of communications and command and control networks. Deception can also be used to lure the threat into making incorrect deployments, inappropriate use of reserves, and inadequate preparations for operations.

Disruption

145. To disrupt is to attack the threat selectively in order to break apart and throw into confusion the assets that are critical to the employment and coherence of his fighting power. It is a deliberate act that requires sound intelligence. *Its purpose is to rupture the integrity of the threat's combat power and to reduce it to less than the total of its constituent parts.* Identifying and locating the most critical assets may not be easy. Key strategic and military targets might include command centres, high-value base facilities, air defence systems, weapons of mass destruction, choke points and critical logistics and industrial facilities. This can be done by getting into his rear areas (normally considered secure), seizing or neutralizing what is important to him, surprising and deceiving him, presenting him with unexpected situations, using psychological operations, and attacking his plans and preparations.

146. To attack moral cohesion, components of the threat force should be isolated from their command and control. Opposing commanders should be cut off from their sources of information. The lack of information will force bad decisions and cause loss of credibility, motivation, and the will to fight for a "losing" commander. This creates a lack of faith in threat leaders, so that their effectiveness and competence, as well as the legitimacy of their cause will come into question. This takes away the threat's sense of purpose and induces fear. The ultimate goal is to produce panic and paralysis by presenting the opponent with sudden unexpected and dangerous change or a series of such changes to which he cannot adjust.

147. Physical cohesion can be attacked by separating commanders from their subordinates by severing, disrupting or jamming communications, attacking lines of communications, destroying elements of the force and interfering with control measures.

Historical Perspective

Operation Overlord, 6 June 1944

During the initial stages of the landings in Normandy, the Allies' main fear was a rapid and concentrated German counter-attack before the beachhead was secured. Actions were taken to break the cohesion of the German response by pre-emption, disruption and dislocation.

Pre-emption

Allied troops were parachuted into German rear areas and on the flanks of the landings to seize bridges and other points vital to both sides. This denied mobility to the German troops moving to repel the invaders. At the same time, Ranger and Commando units were employed to seize key emplacements that dominated the landings.

Dislocation

Part of Operation Overlord was the construction of the First United States Army Group (FUSAG) under Gen George S. Patton. This army, an elaborate fake, helped deceive the Germans into believing that the Normandy landings were a feint. The plan used a minimal number of Allied troops to hold German reserves in the Pas de Calais region. This dislocated the main component of the axis reserves so that their full strength was not brought to bear against the Allied invasion.

Disruption

French resistance forces, carefully coordinated with Operation Overlord, destroyed key portions of the railway net in France. At the same time, Allied air forces bombed other targets on the lines of communications. This disrupted the German transport system, and damaged the ability of the Axis commanders to redeploy their forces to meet the Allied invasion, and to supply their forces in the field.

Application of Manoeuvre Doctrine

148. Manoeuvre warfare plays as much upon the adversary's will to fight and his ability to react to a changing situation, as upon his material ability to do so. It is an indirect approach that emphasises a targeting of the adversary's moral component of his combat power rather than the physical component.

149. It requires a flexible and positive attitude of mind by commanders who must seek opportunities to exploit threat vulnerabilities while maximizing their own strengths. The

focus is the threat's Centre(s) of Gravity, *the source of his freedom of action, physical strength or will to fight*, and how best to attack, neutralize or destroy it. It focusses on objectives and end-states rather than actions and their immediate physical results.

150. The physical application of violence is still critical, but is conducted selectively. Rather than conducting an operation as a toe-to-toe slugging match between two boxers, it should be fought like a bullfight where a stronger opponent can be worn down, confused, and disoriented by the picadors and the elusive and flexible cape of the matador until the latter delivers the final blow with a thrust to the heart:

a. Operations should be dynamic and multidimensional. It requires a balance between mass, time and space. By speed of action we attempt to pre-empt threat plans, dislocate threat forces, disrupt his movement and his means of command and control. Our combat forces are pitted against the threat's strength only if this is required to hold and neutralize the opponent's forces, or to set up the conditions for decisive action against a critical vulnerability. Normally our combat power is directed against threat weakness, particularly against his cohesion;

b. Where possible, existing weak points are exploited. Failing that, they must be created. Weak points may be physical, for example, an undefended boundary. They may also be less tangible, such as vulnerability in passage of information. They are often produced when a threat is over-extended or suffering the effects of a high tempo of operations. Exploiting weak points requires agility, flexibility and anticipation, and low level freedom of action;

c. Threat strength is avoided and combat power targeted through his weakness to strike at his critical assets (lines of communications, headquarters, rear areas, reserve forces etc.) directly. The image of water flowing over surfaces and gaps is useful to understand the notion. Water runs off surfaces - threat strengths - and pours through gaps - threat weaknesses to follow the path of least resistance. This relates to the concept of gathering intelligence and searching and probing with reconnaissance elements to find gaps to "pull" combat power towards weakness rather than "pushing" based exclusively on centralised direction from the commander;

d. Tactical battles are not an end in themselves, but only a building block within the framework of a larger campaign that uses surprise, deception, manoeuvre and firepower to break the threat's will to fight, primarily through attacking moral and physical cohesion.

151. The concepts of manoeuvre warfare apply equally to activities, effects and objectives on the cognitive plane. The effects should shape an adversary's understanding, undermine his will and shatter his cohesion. Manoeuvre through information operations, for example, may undermine the support an insurgent or belligerent military commander receives from the local populace or media. This will in turn affect the adversary's will and cohesion.

Manoeuvre On The Cognitive Plane: Affects On The Will, Cohesion And Understanding Of Other Targets

152. In a conventional sense, the manoeuvrist approach sees the attacking of will and cohesion of an enemy force. In many campaigns, there will be other audiences whose understanding, will and cohesion will be vital for long term success of the campaign. These will include local leaders, influential members of a society and the populace as a whole, or key segments of it.

153. The will, cohesion and understanding of these groups and individuals must be "targeted" as well in order to create desired effects. This may seek to undermine the will of leaders opposing the campaign, or they may seek to enhance the understanding and will and cohesion of neutral audiences or those supporting a campaign. Certainly during counter-insurgency, a key aim will be to enhance the understanding of the local and international audiences in order to reinforce their will to support the campaign and to counter the propaganda of the insurgents.

154. Therefore, while commanders are adopting a manoeuvrist approach to attack the will and cohesion of an adversary, they must understand that efforts must be made to shape the perceptions, understanding and will of other audiences or targets. In other words, they will manoeuvre on the cognitive plane. This must be done in a complementary fashion to all other activities and the operations planned and targeted together in a harmonised, simultaneous fashion.

155. As mentioned in previous sections, commanders therefore manoeuvre simultaneously against a wide range of targets on both the physical and cognitive planes. Much of the manoeuvre on the cognitive plane will be conducted through information operations that seek to influence target audiences and create desired cognitive effects. This cognitive manoeuvre will be used to pre-empt, dislocate and disrupt the Info Ops and cognitive manoeuvre of the adversary.

156. All forms of manoeuvre, physical and cognitive, are considered operations and are therefore the direct responsibility of the commander and his G3 staff branch. The commander will strike the correct balance between physical-effects activities and influence activities, that is, between manoeuvre on the two planes, based on the campaign theme, its guiding principles and the need to create effects that will realise enduring objectives and end-states.

157. Thus this concept of a comprehensive approach to operations becomes pervasive. It begins at the strategic level with the JIMP framework being enabled, moves to campaign planning using all instruments of power and focussing on enduring outcomes throughout the whole environment and moves throughout all levels of command to manoeuvre at the tactical level, creating physical and cognitive effects in support of the operational objectives.

Enablers For The Manoeuvrist Approach

158. The manoeuvrist approach to operations is enabled through:

a. a comprehensive effects based approach to operations that provides a unifying theme and purpose (expressed in the commander's intent) to all the elements in a JIMP framework in order to address all the threats and consider all influences faced in the operating environment (such as political, military, economic, social to name a few), a clear articulation of the end-state and the objectives required to realise that end-state;

b. identification of the weaknesses and vulnerabilities of the threat;

c. identification of the adversary's centre(s) of gravity and its/their relative importance to reaching the desired end-state;

d. the commander's ability to conceptualise and direct the harmonisation of the operational functions to create combat power on both the moral and physical planes in a mutually complementary and supporting manner; that is, the actions on the cognitive plane seek the same objective as actions on the physical plane;

e. in support of the above, harmonised targeting the considers the complementary and synchronised application of physical-effects and influence activities

f. mission command; and

g. a unity of effort across all forces created through the shared understanding of superior commanders' intent, two levels higher.

Fundamentals Of Manoeuvre Warfare

159. Manoeuvre warfare is a mindset for applying combat power and resources to defeat threats and address sources of conflict. There is no prescribed formula, however certain fundamentals can provide guidance:

a. **Concentrate on the Adversary's Vulnerabilities.** With the objective being to attack the threat's will to fight and cohesion, activities and their effects should be planned along these lines. Plans should focus on exploiting the threat's vulnerabilities and not on seizing and holding the ground. The purist application of manoeuvre warfare is to disarm or neutralize an threat before the fight;

b. **Mission Type Orders.** This involves de-centralising decision-making and letting decisions be taken at the lowest possible level. It is essential that commanders know and fully understand their commanders' intent two levels up. Subordinates must understand what is on their commander's mind, his vision of the battlefield and what end state is desired. Mission orders allow commanders, at all levels, to react to situations and to capitalize as they arise. The commander directs and controls his operation through clear intent and tasks rather than detailed supervision and control measures or restriction;

c. **Agility.** enables us to seize the initiative and dictate the course of operations that is *acting quicker than the threat can react*. Eventually, the threat is overcome by events and his cohesion and ability to influence the situation are destroyed. Agility is the liability of the commander to change faster than the threat can anticipate. Quickness and intellectual acuity are the keys to effective agility. Commanders must be quick to make good decisions and to exploit developments on both the physical and cognitive planes. Commanders and units must be able to respond quickly to physical developments, and to cognitive developments. Just as a unit will move to exploit a sudden gap on the battlefield before the threat can re-position to close it, a commander must be quick to exploit through information operations a public relations error by an insurgent force. Getting inside the threat's decision cycle is the essence of tempo. Well rehearsed battle drills, standard operating procedure enhance the agility of a formation;

d. **Focus on Main Effort**. Main Effort focusses combat power and resources on the vital element of the plan and allows subordinates to make decisions that will support the commander's intent without constantly seeking advice. This way, the commander is successful in achieving his goal and each subordinate ensures his actions support the main effort. It is the focus of all, generally expressed in terms of a particular friendly unit. While each unit is granted the freedom to operate independently, everyone serves the ultimate goal, which unifies their efforts. In certain campaigns, the main effort may be focussed on influence activities in the cognitive plane while activities on the physical plane are supporting and may seek only to maintain a secure environment for other elements and forces;

e. **Exploit Tactical Opportunities.** Commanders continually assess the situation (mission analysis) and then have the necessary freedom of action to be able to react to changes more quickly than the threat. Rigid control measures that are interchangeable and unlikely to survive first contact are avoided. Reserves are created, correctly positioned and grouped to exploit situations that have been created by shaping the battle to conform to friendly concepts of operations;

f. **Act Boldly and Decisively**. Commanders at all levels are able to deal with uncertainty and act with audacity, initiative and inventiveness in order to seize fleeting opportunities within their higher commanders' intent. They not only accept confusion and disorder, they generate it for the threat. Failure to make a decision surrenders the initiative to the threat. Risk is calculated, understood and accepted. In doing so, commanders must keep in the foremost of their minds, the overall objective. Notwithstanding this need, at times, tactical success may have to be sacrificed in order to meet the overarching operational objective; and

g. **Command from the front**. Commanders place themselves where they can influence the main effort and ensure that the desired effects are created to realise the desired objectives.

Section 6
Mission Command[43]

Definition And Tenets

160. Mission command is defined as:

> *The philosophy of command that promotes unity of effort, the duty and authority to act, and initiative to subordinate commanders.*

161. It focusses on decentralised command and is intended for situations that are complex, dynamic and adversarial. It allows for and accepts that the successful application of surprise, shock and high operational tempo against an threat is best executed through rapid and timely decision-making at all levels of command in response to the unexpected or fortuitous occurrence of both threats and opportunities. In practical terms, activities are conducted to generate effects aimed at achieving objectives. These activities, assigned as tasks, may be physical or cognitive in nature to produce effects on the physical or cognitive planes. While the term objective has commonly been used to refer to a physical object against which action is taken, in an effects based approach an objective may be something far more abstract, particularly if the it is on the cognitive plane.

162. It underpins manoeuvre warfare and the effects based approach with four tenets:

a. timely decision making;

b. the importance of understanding a superior commander's intention;

c. a clear responsibility on the part of subordinates to fulfil that intent; and

d. determination on the part of the commander to see a plan through to a successful conclusion.

Creating A Mission Command Atmosphere

163. Under the Mission Command philosophy, commanders must:

a. give orders in a manner that ensures that subordinates understand intent, their own tasks and the context of those tasks;

b. provide those orders and tasks within the context of a unity of effort that is shared horizontally and vertically within the formation;

c. tell subordinates **what effect(s)** they are to achieve and **the reason why** or purpose, which may be a second order effect or objective. (Examples include, "seize in order to ….", or, "conduct security patrols in order to…..);

d. allocate appropriate resources to carry out missions and tasks;

e. use a minimum of control measures so as not to limit unnecessarily the freedom of action of subordinates; and

f. allow subordinates to decide within their delegated freedom of action how best to achieve their missions and tasks.

164. Mission command applies to activities on both the physical and cognitive planes. At its essence is freedom of action, trust and confidence. When all else goes awry and subordinates cannot obtain new direction for the changing situation, they can always use the commander's clearly stated intent, with the desired end-state, to guide their decisions and actions.

Unity Of Effort And Common Intent

165. Balanced against the tenets of freedom of action and decentralised decision-making, is the requirement to harmonise all activities and effects within a unity of effort. Unity of effort is vital for a force as it brings harmonises the actions of the constituent elements of forces, at times both military and non-military.

166. Unity of effort stems from a number of inter-related means: the commander's ability to articulate a clear intent and mission statements; the use of common doctrine, tactics, techniques and procedures; a common language of command; a high standard of collective training and teamwork; and the designation of main effort[44]. In short, they together generate a common understanding across a force and harmonise and coordinate their actions, particularly at times of confusion and disorientation.

167. Within an operation, unity of effort is enhanced by subordinates understanding the intentions both of their immediate superiors and of those two levels up. This vertical integration allows subordinates to nest their own plans and activities within those of their superiors. The unity of effort shared amongst subordinates gives horizontal integration and allows subordinates to understand how their missions interact with those of others. A well-established unity of effort also supports the manoeuvrist approach to operations.

168. Unity of effort is largely based on a commander's explicit (stated) intent. It is understood in the context of a common doctrine, language and training. However, a complete unity of effort and mission command implementation must be based on the establishment and maintenance of *common intent*: the sum of shared explicit intent as expressed in a commander's verbal or written statement, plus operationally relevant shared *implicit intent*.

169. Implicit intent is understood through a web of shared connotations, that is, a common understanding of doctrine, shared values and beliefs [culture], social norms and expectations. In other words, it stems from the conceptual and moral components of combat

power and should enhance the unity of effort binding activities on both the physical and cognitive planes.

Summary

170. *An effects based approach* complements the *manoeuvrist approach* and enables commanders to more effectively operate on both the moral and physical planes. The principles underlying the manoeuvrist approach remain appropriate at all levels and dovetail neatly within an effects-based approach. As such, in incorporating an effects based approach to the extent that operational outcomes can be translated into coherent tactical activity, existing tactical procedures, terminology and practice can be seen as complementary to effects-based practice at the higher levels of command.

171. As a result, the standard orders process and the principle of m*ission command* remain relevant. The significance of the Commander's unifying theme continues and it is this theme that provides the focus for the campaign plan, which in turn enables operational design. Operational art, intuition and command still have a major part to play, especially in uncertain conditions and in those situations where there is a compelling need to act. In all circumstances, it is anticipated that operational freedom of action is preserved.

Notes

1. Material taken from Draft Chapter 5 of *Conduct of Land Operations – Operational Level Doctrine for the Canadian Army (B-GL-300-001/FP-000).* Produced by Land Force Doctrine and Training System Directorate of Army Doctrine.

2. For example, the failure to protect a civilian populace from exploitation or targeting will result in a loss of legitimacy and loss of popular support for the mission and force.

3. The term *effects* is used widely throughout this publication and doctrine in general. For purposes of Canadian Land Force doctrine, the term effects is SYNONYMOUS with *results.*

4. Moral plane and cognitive plan may be used interchangeably as long as the use speaks to affecting a target's will and in turn behaviour and actions. The use of the term "moral plane" may cause some conceptual or intellectual challenges when dealing with cultures, societies and individuals that do not stem from or practise a Judeo-Christian tradition.

5. For example, an artillery attack will reduce an adversary's capability and thus have an effect on the physical plane. It may have a secondary effect on the cognitive plane by reducing the morale and will of the adversary and thus affect his behaviour.

6. In UK doctrine, physical activities are referred to as "Joint Fires" and include any physical activity applied to create physical or cognitive effects. (See JDN 7/06) In US Army doctrine no distinction is made however the doctrine supports similar concepts of undertaking activities to affect both capability and will of an adversary. (See FM 3-0).

7. The posture and profile adopted by troops interacting with a local populace will have cognitive effects. Their mere presence will show commitment to public security. Their conduct on patrols and at checkpoints and their state of dress will provide certain signals that may engender or undermine support from a populace.

8. This is the essence of the manoeuvrist approach to operations, that is, the attacking of will, shaping of understanding and shattering of cohesion.

9. Although forces would be unlikely to use psychological operations on their own troops, they may launch internal public affairs campaigns in order to counter biased media reports and adversary propaganda.

10. An observation from the USMC Joint Urban Warrior 2005 noted that when insurgents are killed or captured, local media coverage should be maximised in order to dissuade members of the local populace from joining the insurgency in Iraq and Afghanistan. However, consideration of the issue would lead one to believe that such a tactic could probably instil hatred vice fear in many members of the local population and thus undermine support for the campaign and even encourage more to join the insurgents.

11. Despite the rarity of such situations examples of successful models include the British campaign in the 1950s/1960s Malaya, and the Australian experience in the Solomon Islands.

12. Joint, Inter-agency, Multinational, Public framework incorporates all actors whose power and influence will be involved in reached the strategic end-state. They involve other government departments and agencies, NGOs, media and private enterprises. See Chapter 1.

13. The systems and entities that exist in an environment and that will interact and affect the situation are often described by the acronym PMESI: Political, Military, Economic, Social (including religious), Infrastructure, and Informational.

14. For example: in the mission statement, "A Coy will attack to *seize* Objective DOG by 1300 hrs in order to *secure* a Line of Departure for B Coy", the activity is to "attack", the first and second order effects are to "seize" and "secure". Thus, the objective is to secure a line of departure and the tactical end-state will see A Coy prepared to support B Coy and to support a fwd passage of lines. For more details see, B-GL-331-002/FP-000 Staff Duties in the Field.

15. Some allied doctrine refers to the environment as a collection of systems, identified by the acronym PMESII. While all these elements represented in the acronym certainly exist in a society or environment, and they do inter-relate and affect one another, it is believed that there are too many variables, including individual personalities, to allow a scientific "systems approach" to constantly and accurately predict exactly how they will react.

16. Measures of Effectiveness are done in conjunction with Measures of Performance. The latter measures task accomplishment, that is, an assessment of whether or not the activity was done right.

17. The strict definition of decisive points as points from which to attack a centre of gravity must be expanded so that they are viewed as stepping stones to reaching an objective along a specific line of operation. In other words, the decisive points must be viewed as effects to be created that lead to the realisation of an objective. In the UK JDN 7/06, the concept of decisive points has been removed and replaced with Supporting Effects.

18. Despite the AAP 6 definition of a centre of gravity, recent re-evaluation of the concept has clarified the meaning in the original constructs, that is to say, centres of gravity are either moral or physical and are based on an individual or group, for example a leader or an armoured reserve force. They may have capabilities, characteristics and locations, but a centre of gravity is a tangle element based on people, not a characteristic.

19. For a more detailed discussion on the construction of a mission statement, see B-GL-331-002/FP-000.

20. With respect to the term "targets", a broader understanding the term must be used. Targets will include adversary elements, friendly and allied elements and neutral audiences. Nothing nefarious is meant by the term, but it seen in the sense of a business advertisement "targeting" a particular audience. Thus all target engagements are considered together in a complementary and comprehensive fashion.

21. This in itself provides a basis for considering adjustments to the overall plan. This distils itself into the paraphrase, doing the right thing as opposed to doing the thing right (we will ideally like to achieve both):

a. Measure(s) of Effectiveness (MOE) - The criteria used to evaluate how activities have affected system behaviour or capabilities (Are we doing the right things?), MOE are tied to effects and effects assessment, and

b. Measure(s) of Performance (MOP) - Criteria used to evaluate accomplishment of friendly force actions (Are we doing things right?), MOP are tied to task and task assessment.

22. AAP 3.10 Allied Joint Doctrine for Information Operations. Ratified by NATO nations in 2007. This definition replaces all other previous definitions of information operations for Cdn land forces.

23. US doctrine has focussed Info Ops on the concept of Information Engagement and places responsibility for the cognitive effects of PsyOps, public affairs and CIMIC under the G7 and G9 staff branches. UK doctrine has disposed of the concept of Info Ops and has placed the concept of Joint Influence under the Commander and G3, in combination with Joint Fires (that is, cognitive effects and physical effects activities all under the G3 staff branch).

24. Long term effects may include the removal of a C2 system that will be required by coalition forces later or by civilian populations.

25. Civil-Military Cooperation is defined as: *The coordination and cooperation, in support of the mission, between commanders and civil actors, including the national population and local authorities, as well as international, national and non-governmental organizations and agencies.* AAP 6.

26. In order to counter adversary propaganda and other influence activity, internal public affairs may be used.

27. Although some debate has occurred regarding the "information plane" and some segments of allied doctrine refer to such a level of existence, all elements that may be considered under such a description, actually fall to either the physical or cognitive planes. Information itself exists on the physical plane if it can be attacked or physically affected (attacked, blocked by EW, etc) or on the cognitive plane if it rests in an individual's mind and thus affects perception and behaviour.

28. ABCA Armies Program Information Operations Project Team paper, November 2007

29. Activities that create cognitive effects may be viewed as sustaining when they seek to maintain perceptions and opinions, such as the use of public affairs to inform domestic audiences and friendly forces and to counter enemy propaganda or negative, biased media coverage.

30. This refinement of Info Ops doctrine and the alignment of influence activities are operations under a G3 branch is akin to the doctrinal developments of UK and US land forces.

31. All doctrinal concepts begin with a philosophy, then broaden to a set of guiding principles, and then develop as practices and procedures.

32. These physical effects may be termed "fires", defined as the deliberate use of physical means to support the realisation of primarily physical effects. They include lethal and non-lethal physical means to engage a target, such as EW.

33. On the cognitive plane, targets are people, either individuals or groups. They include national and regional leaders, military commanders, social and religious leader, troops and segments of a population.

34. Dragon, Randal A., *Wielding the Cyber Sword: Exploiting the Power of Information Operations*. Carlisle PA: USAWC, March 2001.p.11.

35. Red Teaming is utilised to provide counter-intuitive or counter-factual perspectives in campaign analysis and war gaming, regarding the reactions of neutrals, aligned and non-aligned actors, as well as the traditional focus on the adversary.

36. Adopted from Randal A. Dragon, *Wielding the Cyber Sword: Exploiting the Power of Information Operations*. Strategy Research Project 13 March 2001, USAWC, Carlisle PA, page 18

37. Briand, Maj Noelle J. How to win friends and Influence People: Planning Perception \ management at the Division and Corps level. School of advanced \military Studies, USA Command and General Staff College, Fort Leavenworth , Kansas, AY 03-04. p 42-43.

38. Murphy, Prof Dennis. Information Operations and Winning the Peace: Wilding the Information Element of power in the global War on Terrorism. Centre for Strategic leadership Issue Paper, U.S. Amy War, Vol 14-05 December 2005 College.

39. For a detailed discussion of causality see William S. Murray, "A Will to Measure," *Parameters*, Vol.31, No.3, Autumn 2001. Carlisle PA: USAWC. Pp.134-147.

40. The quantifiable, observable, and timeliness principles are adapted from LtCol. David Grohoski, Steven Seybert, and Marc Romanych, "Measures of Effectiveness in the Information Environment," *Military Intelligence Professional Bulletin,* Vol.29, No.3, July-September 2003. Fort Huachuca AZ: US Army Intelligence Center. pp.12-16.

41. Baker. For example, during a tour in Iraq, 2 BCT, 1st Armored Division monitored and counted local and international media coverage of events in 2 BCT's AOO as a MoE. This allowed positive and negative trends to be identified which contributed to discerning the effectiveness of ongoing IO.

42. The manoeuvrist approach must not be confused with tactical or operational manoeuvre, which is an element of the Act operational function and is defined as*: employment of forces through movement combined with speed, firepower, or fire potential, to achieve a position of advantage in respect to the threat in order to achieve the mission* (AAP 6).

43. For a full discussion of mission command, see B-Gl-300-003/FP-000 Command.

44. Main effort is defined as: *a concentration of forces or means, in a particular area, where a commander seeks to bring about a decision.* It works to achieve a unity of effort across all subordinate and supporting forces and maximises combat power.

Annex C
List of Abbreviations

3-D+C	diplomacy, defence, development and dommerce (often abbreviated as 3-D)
3-D+T	defence, diplomacy, development and trade (often abbreviated as 3-D)
ACTS	Air Corps Tactical School
ACSC	Air Command and Staff College (US Air Force)
AEF	American Expeditionary Force
AO	Area of Operations
AWPD-1	Air War Plans Division's Plan No. 1
C2	command and control
C3	command, control and communication
C4ISR	command, control, communications, computers, intelligence, surveillance and reconnaissance
CA	Comprehensive Approach
CADRE	College of Airpower Doctrine, Research and Education
CAS	complex adaptive system
CEP	circular error probable
CF	Canadian Forces
CFC	Canadian Forces College
CFAWC	Canadian Forces Aerospace Warfare Centre
CFEC	Canadian Forces Experimentation Centre

CFOPP	Canadian Forces operational planning process (sometimes abbreviated as OPP for operational planning process)
CIACG	Coalition Interagency Coordination Group
CIE	collaborative information environment
CIMIC	civil-military cooperation
CINC	commander-in-chief
CJSOH	Combined and Joint Staff Officer's Handbook
CKA	computerized knowledge assessment
COA	course of action
COG	Centre of Gravity
CONOPS	concept of operations
CROP	common relevant operational picture
CTF	Coalition Task Force
CTFHQ	Coalition Task Force Headquarters
CV	critical vulnerability
DFAIT	Department of Foreign Affairs and International Trade
DIME	Diplomatic, Informational, Military and Economic
DND	Department of National Defence (Canada)
DoD	Department of Defense (United States)
DP	Development Period
DRDC	Defence Research and Development Canada
DS	directing staff
DSTO	Defence Science and Technology Organisation

EBA	effects-based approach
EBAO	effects-based approach(es) to operations
EBO	effects-based operations
EBP	effects-based planning
ETO	effects-tasking order
GWOT	global war on terrorism
IDA	Institute for Defense Analysis
IDC	Imperial Defence College
IGO	intergovernmental organization
IO	international organization(s)
INFO OPS	information operation(s)
ISR	intelligence, surveillance and reconnaissance
JDCC	Joint Doctrine and Concepts Centre
JFC	joint force commander
JFCOM	Joint Forces Command
JIACG	Joint Interagency Coordination Group
JIMP	joint, interagency, multinational and public
JNEPI	Joint NGO Emergency Preparedness Initiative
JOPES	Joint Planning and Execution System
JTF	joint task force

LOE	Limited Objective Experiment
MNE	multinational experiment
MOE	measure of effectiveness
MOP	measure of performance
NATO	North Atlantic Treaty Organization
NCW	network-centric warfare
NDC	National Defence College
NDHQ	National Defence Headquarters
NEC	network-enabled capability
NEOps	network-enabled operations
NEV	national elements of value
NGO	non-governmental organization
NMO	non-military organization
NSC	National Security College
NVA	North Vietnamese Army
OGD	other government department
ONA	operational net assessment
OODA	Observe, Orient, Decide and Act (loop)
OPP	(see CFOPP)

PCO	Privy Council Office
PGM	precision guided munition
PMESII	Political, Military, Economic, Social, Infrastructure, and Information
PME	professional military education
PSYOPS	physiological operations
QDR	Quadrennial Defense Review
RAF	Royal Air Force
RCC	regional combatant command
RDO	rapid decisive operations
RFC	Royal Flying Corps
RMA	Revolution in Military Affairs
RNAS	Royal Naval Air Service
SA	situational awareness
SAM	surface-to-air missile
SJFHQ	Standing Joint Forces Headquarters
SME	subject matter expert
SOC	sector operations centre
SWOT	Strengths-Weaknesses-Opportunities-Threats

TAC	tactical air command
TTCP	The Technical Cooperation Program
UN	United Nations
UK	United Kingdom
USAAF	US Army Air Forces
USAF	United States Air Force
USAID	US Agency for International Development
USJFCOM	United States Joint Forces Command
USMC	United States Marine Corps
USSBS	United States Strategic Bombing Survey
WMD	Weapons of Mass Destruction

Annex D
Contributors

Howard G. Coombs retired from active duty with the Canadian Forces in 2002. He is a graduate of the United States Army Command and General Staff College, where he was one of 11 students who earned the designation US Army Master Strategist in 2001, and the US Army School of Advanced Military Studies, which awarded his Master's degree. He is currently a doctoral candidate at Queen's University in Kingston, Ontario, in addition to being a Teaching Fellow at Queen's, research associate of the Canadian Forces Leadership Institute, Kingston, a part-time instructor at the Canadian Forces College, Toronto, Ontario and a reserve officer commanding the Princess of Wales' Own Regiment, an infantry unit based in Kingston.

Colonel Jim Cottingham joined the CF army reserve in 1971 as a radio operator. After commissioning under the Reserve Officer University Training Plan (ROUTP) in 1973, he was trained as a communications and electronics officer. He transferred to the Regular Force in 1978, and after receiving his air navigator wings, began his operational flying career in 1980 as a tactical coordinator on the Sea King helicopters. He has served in numerous operational and staff positions since then.

He served as a member of the directing staff at the Canadian Forces Staff College in Toronto, and in August 2005, was appointed the first commanding officer of the Canadian Forces Aerospace Warfare Centre (CFAWC).

Colonel Cottingham is a graduate of the CF Staff School, the Royal Australian Air Force Staff College and is a distinguished graduate of the United States Air Force Air War College. He holds a Diploma in Electronics Engineering Technology, a Bachelor of Military Arts and Science, a Graduate Diploma in Management, a Master of Strategic Studies and a Master of Arts in War Studies.

Lieutenant-Colonel Craig Dalton was commissioned into the Royal Regiment of Canadian Artillery and commenced regimental duty with the 2nd Regiment Royal Canadian Horse Artillery in 1990. Since that time, Lieutenant-Colonel Dalton has been employed alternatively on regimental duty, including operational deployments to both Cyprus and Bosnia-Herzegovina, and a variety of staff positions including his current assignment as an international planner on the Strategic Joint Staff.

Lieutenant-Colonel Dalton is a graduate of the Instructor-in-Gunnery Course (Field), the Canadian Land Force Command and Staff College, the United States Army Command and General Staff College and the United States Army School of Advance Military Studies. He holds a BMASc from The Royal Military College of Canada, an MMAS from the United States Army School of Advanced Military Studies and an MSc in Administration from Central Michigan University.

Allan English was the lead academic for the Advanced Military Studies Course from its inception in 1998 to 2004 and he was co-chair of the Aerospace Studies Department from 2001 to 2005 at the Canadian Forces College. He is an Adjunct Associate Professor of History at Queen's University where he teaches a graduate course in Canadian military history. In the fall of 2005 the Canadian Defence Academy (CDA) Press published *The Operational Art - Canadian Perspectives: Context and Concepts* edited by Dr. English, Major-General Daniel Gosselin, Howard Coombs, and Captain (Navy) Laurence M. Hickey. The next book in the series, edited by Dr. English, *The Operational Art - Canadian Perspectives: Leadership and Command* was published by CDA Press in the summer of 2006. The final book in the series, edited with Colonel James Taylor, *The Operational Art - Canadian Perspectives: Health Service Support* was published by CDA Press in the winter of 2006. His latest book, co-authored with Richard Gimblett and Howard Coombs, *Networked Operations and Transformation: Context and Canadian Contributions* was published by McGill-Queen's University Press in 2007.

Robert Grossman-Vermaas is currently serving with the Operational Experimentation branch, Joint Experimentation, Exercises & Assessment, NATO Allied Command Transformation (ACT). Prior to this assignment, he served as an Effects-based Assessment and Planning analyst to Commander International Security

Assistance Force (COMISAF), NATO ISAF HQ, Kabul, as a member of the Operational Analysis branch. In Afghanistan he was also analytical liaison to Combined Forces Command-Afghanistan (CFC-A) and CJTF-76 and traveled extensively throughout the country. From 2002-2006 he served as a strategic analyst with the Department of National Defence (Canada) and with the Advanced Concept Development cell, Directorate of Defence Analysis and Canadian Forces Experimentation Centre (CFEC). He was, from 2002-2006, the Canadian concept lead for the multinational and national effects-based concept, and has presented and published extensively on the topic. He was a Canadian effects-based concept liaison to US Joint Forces Command (JFCOM), Joint Experimentation (J9), and served as a core concept development contributor to the Multinational Experimentation (MNE) series. Previous assignments have included the US Department of Defense and the UK Defence Science and Technology Laboratory (DSTL). He has been awarded a MacArthur Fellowship and is a PhD candidate at the Department of War Studies, King's College, London.

Commander Ken Hansen graduated from the University of Alberta in 1976 and enrolled in the CF in 1977 through the Direct Entry Programme. He has served at sea and ashore in a number of different operational and staff positions. He completed the Command and Staff Course in 1996, and on completion, was posted to the Canadian Forces College as the Staff Officer Naval Doctrine. His subsequent appointments at CFC have included Senior Staff Officer Joint and Combined Warfare, and Military Co-Chair of the Maritime Studies Program.

Commander Hansen completed a Master of Arts in War Studies at the Royal Military College of Canada in 2005, winning the Barry D. Hunt Memorial Prize as the top graduate student. He has published a number of articles on naval and defence issues and he is

currently the Defence Fellow at the Centre for Foreign Policy Studies, Dalhousie University, Halifax, Nova Scotia.

Lieutenant-Colonel Colin Magee joined the Canadian Forces in July 1980. He completed training as an infantry officer in August 1981 and joined Third Battalion, The Royal Canadian Regiment in Germany. He has served in numerous line and staff positions since then. More recently, he served as the Canadian Exchange officer at the United States Army Command and General Staff College in Fort Leavenworth, Kansas from 2002 until 2006. In addition to his duties as an instructor he was the subject matter expert for peace operations and joint urban operations. He assumed the position as the Chair of the Department of Military Planning and Operations at the Canadian Forces Staff College in Toronto in July 2006.

Lieutenant-Colonel Magee has completed his staff college courses in Kingston and Toronto. He has a Master's in War Studies, with a focus on command and leadership from the Royal Military College of Canada, and a Master's in Military Arts and Science from the United States Army Command and General Staff College focussing on Peace Operations.

Bob Vokac enrolled in the United States Army Reserve Officer Training Corps at the University of Michigan in September 1974. He graduated from the University of Michigan in 1978 with a Bachelor of Business Administration and was commissioned as a Second Lieutenant of Field Artillery. He then served in the United States Army for the next 25 years in a wide variety of progressive command and staff positions. He completed his MSc in Operations Management at the University of Arkansas in 1990. Following completion of the United States Army Command and General Staff Officer Course in 1991, Mr. Vokac had the rare privilege of attending the Advanced Military Studies Program, School of Advanced Military Studies, United States Army Command and General Staff College, where he received a Master of Military Arts and Sciences in Theatre Operations in 1992. In 1999 he was posted as the United States Army Exchange Officer to the Canadian Forces College in Toronto, where he served as a member of the directing staff, Deputy Director Land Studies, and Deputy Director Course. Following his retirement from the United States Army in 2003 he co-founded *Wolverine Consulting*, a small business dedicated to the development and delivery of professional military education curriculum throughout the Canadian Forces. Since 2004 he has served as a Joint and Combined Warfare Coordinator for the Joint Reserve Command and Staff Course while continuing to work with a number of defence-related clients. Mr. Vokac is a Senior Research Fellow for the Canadian Institute of Strategic Studies (CISS), where in his spare time he serves as the executive secretary representing CISS to local and national media.

Colonel Randall T. Wakelam retired from the Canadian Forces in 2005 after 36 years of service. Between 1977 and 1987 he flew Twin Hueys, amassing some 3,000 flying hours and holding appointments as Flight Safety Officer, Tactical Instructor Pilot, Operations Officer and Flight Commander. He commanded 408 Tactical Helicopter Squadron from 1991 to 1993. From 1993 until 2002 he served at the Canadian Forces College holding a variety of appointments including Director of Warfare Studies. While at the college he was a lead

designer for the Advanced Military Studies and National Security Studies courses. After retirement he retained his links to the college as a part-time instructor and returned to the college as Director of Curriculum (a full-time Reserve position) in 2006. He is a graduate of the Canadian Land Forces Command and Staff Course and the Canadian Forces Command and Staff Course, and completed his PhD in History at Wilfrid Laurier University in 2006. His research interests include air warfare, command and leadership, and military education.