EFFECTS-BASED OPERATIONS: A NEW WAY OF THINKING AND FIGHTING

A Monograph
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Abstract

EFFECTS BASED OPERATIONS: A NEW WAY OF THINKING AND FIGHTING. by MAJ Leonard D. Rickerman, U.S. Army, 46 pages.

This paper analyzes Effects-Based Operations as the most effective way to frame future joint operations in a complex, uncertain environment. This new complex and uncertain environment is characterized by adversaries who have increasingly more access to weapons of Mass Destruction/Effects and whose actions will likely be very unpredictable, and could directly threaten the American homeland. Secretary of Defense, DonaldRumsfeld stated that, "such new, unexpected and dangerous adversaries must be dissuaded, deterred, and defeated without undue cost to American interests abroad or attacks on the U.S. homeland." In a speech presented March 2002, on transformation he stated that what is needed now at the threshold of the 21st Century is a "new way of thinking and a new way of fighting." The Joint Forces Command has adopted and continues to evolve the concept of EBO within a Jointwarfighting construct to answer in part to both challenges.

Analysis of EBO is difficult due to the many evolutionary versions of the concept definition and additionally, the absence of any formalized procedures in the EBO methodology or formally defined terms causing confusion. JFCOM has greatly advanced the concept of EBO through inclusion into joint doctrine and the integration in future force experimentation and exercises. The new evolved and broadened concept of EBO as defined in*Joint Publication 3-0, Doctrine for Joint Operations* best represents a theory that should help select and integrate the various elements of power to attain national security objectives. This new definition has helped the integration of EBO within the Joint community and has helped analysis by reducing the ambiguity of EBO associated with its evolutionary differences in definitions and methodologies.

This paper determined that EBO shows great promise as a broad organizing approach to future warfare but has significant obstacles to overcome to be successfully integrated into a new Joint warfighting construct. EBO has been unfairly scrutinized due service centric views and rivalries. These service centric views must be overcome to ensure joint procurement of compatible C4ISR systems, the development of effective war gaming or modeling tools, and the requirement for the integration of joint, hard realistic training. EBO should provide the framework for service doctrine to expand ensuring a synergy between elements of national power, capabilities of each service, domains in which each service operates and the process of thinking and conducting future warfare.

The full potential of EBO will not be realized without a continued development of the concept integrating the reorganization of planning and assessment functions and the development and application of advanced technologies to support those functions. Advanced technologies should be focused on modeling and simulation that supports both tangible and intangible effects enactment and assessment over differing periods of time. Because EBO is a conceptual process, the development and training of future leaders must evolve to support the conceptual thinking skills required.

Because EBO has far reaching implications across the range of military operations throughout each service and in joint and coalition operations, it must be capable of institutionalizing across the levels of command a holistic approach towarfighting founded on a systems perspective of the battle space and the integrated application of various instruments of power. This paper has determined that EBO helps define a new way of thinking and a new way to fight.

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INTRODUCTION

Transformation ascertains that a new paradigm or way of thinking about warfighting is required due to the changing threat, strategic environment, and new ideas, which continue to challenge the way we think about warfighting. Throughout history, war has remained constant as the most complex and ruthless human endeavor. It has been and will remain a crucible in which men are maimed and killed, things are destroyed, and nations are defeated. What is different, is how the U.S. Military perceives and thinks about warfare and how it will continue to evolve the conduct of military operations. New ideas such as complexity and systems theory and Service operational concepts like the Air Force's Global Strike Task Force, the Navy's Network Centric Warfare, the Army's Objective Force, and the Marines Operational Maneuver from the Sea are currently challenging the way the Department of Defense (DoD) thinks about warfighting.[1]

The DoD plans to transform the force over the years ahead by making organizational changes and adopting new operational concepts that can exploit modern technological advances. DoD has tasked the Joint Forces Command (JFCOM) with "joint concept development and experimentation." The Command is the chief engine for military transformation at the operational level and for the integration of the individual service transformational visions. The Command is currently attempting to develop these new war-fighting concepts to be employed by the U.S. military as it transforms current fighting forces. The Joint Experimentation Directorate, J9, USJFCOM in accordance with the Unified Vision 2001 and in response to the Joint Warfighting Concept for 2015 has identified a new joint construct called Joint Operational

[1] U.S. Joint Forces Command, J9 Concepts Department, "Joint Operational Warfighting (JOW): A warfighting construct for the next decade.", (On-line). Available:https://home.je.jfcom.mil/QuickPlace/innovation/PageLibrary85256AFF00620B2E.nsf/h_Toc/ED6814E19C75A4D785256BFB005607B0/?OpenDocument

Warfighting (JOW). USJFCOM states that JOW is designed to leverage and integrate potential and projected improvements in doctrine, technology, andwarfighting culture as they apply to the battle space, operations, and command. It is focused on setting conditions for adaptability in the complex and uncertain environment of the future.[2]

JOW is the primary focus of transformation, which continues to develop jointwarfighting capabilities that will improve the ability of future force commanders to rapidly and decisively conduct particularly challenging and important operational missions. JOW incorporates and advances the operational concept of Effects Based Operations, which seeks to plan, prepare and execute military operations oriented on what effects must be achieved to bring about the desired strategic outcomes.

EBO as a concept is developing rapidly and becoming better understood throughout the Joint community. Writings such as the USJFCOM White Paper, USAF White Paper and contributing proponents such as Air Force Major General DavidDeptula, Air Combat Command Directorate of Plans and Programs (ACC/XP), Dr. Paul K. Davis (RAND), and Mr. Graham Kessler, Joint Forces Command Joint Experimentation (JFCOM J9) have furthered the development and understanding of EBO.

Joint Forces Command has embraced EBO as a broad concept that includes all means of employing national power, military and non-military focused on a desired effect on an enemy throughout the spectrum of conflict. JFCOM is presently developing a conceptual basis for effects-based operations as a precursor to future experimentation and inclusion in joint doctrine.[3] The JFCOM Joint Experimentation Directorate has furthered integration of EBO by writing Effects Based Planning Tactics, Techniques, and Procedures (Final Draft) and Effects Assessment: Joint Tactics, Techniques, and Procedures (Draft). Both of these papers were

[2] *Ibid.p. 4.*

[3] U.S. Joint Forces Command, "Effects-based Operations White Paper Version 1.0," Norfolk, VA, Concepts Department J9, 2001, p. ii.

incorporated into the conduct of experimentation during Millennium Challenge 02. Though EBO is currently in the beginning stages of development, this paper attempts to answer whether EBO within the framework of JOW is the most effective way to frame future joint operations in a complex, uncertain environment.[4]

REQUIREMENT FOR CHANGE

Future operations are addressed in the U.S. *Quadrennial Defense Review Report*, published September 30, 2001, which emphasizes the requirement for the U.S. security apparatus to adapt to new challenges.[5] The report requires transformation in the way the military will think and fight in the perceived future environment. The report specifically states that the U.S. military forces must maintain the ability to assure allies, dissuade adversaries, deter aggressors, and defeat any adversary if deterrence were to fail, while modernizing the force and exploiting the revolution in military affairs.[6] In an article published in *PHALANX*, March 2002, Major General Dean Cash, Director of Joint Experimentation, Joint Forces Command stated that "The new policy of dissuasion as articulated by the SECDEF will require a new way of thinking about conflict resolution and the application of National power… The concept of EBO may be this new way of thinking that will allow us to achieve this end-state of dissuasion."[7]

Future warfighting concepts to include EBO are evolving in anticipation and response to the changing Contemporary Operating Environment (COE) and potential adversaries. This paper

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[4] U.S. Joint Forces Command, J9 Joint Futures Lab,"Joint Operational Warfighting (JOW): Thoughts on the Operational Art of Future Joint Warfighting.", (On-line). Available: https://home.je.jfcom.mil/QuickPlace/innovation/PageLibrary85256AFF00620B2E.nsf/h_Toc/ED6814E19C75A4D785256BFB005607B0/?OpenDocument

[5] Donald H. Rumsfeld, *Quadrennial Defense Review Report*, Washington, DC: U.S. Government Printing Office, 2001.

[6] *Ibid., p. iv.*

[7] Jacqueline Henningsen, Dr. SES, MORS Fellow of the Society, Director, Air Force Studies & Analysis Agency, "A Dialogue on Analyzing Effects Based Operations (EBO)", (On-line). Available: http://www.mors.org/publications/phalanx/mar02/Lead2.htm

begins analysis of EBO by exploring its evolution in response to the COE and emerging technologies. USJFCOM defines today's adversary as a dynamic, adaptive foe who draws his will and capability to conduct operations from an integrated system of political, military, economic, social, information and infrastructure (PMESI2) systems. They go on to explain that there are key nodes and vulnerabilities within those systems that if engaged with the proper action will generate the effects, which achieve our mission and objectives.[8] The targeting of these effects are the basis for EBO because EBO is highly efficient at achieving basic goals with limited investments and calculated risks to lives and national treasure.[9]

Consequently, new warfighting concepts are evolving because of the two primary driving factors which are: (1) technology has profoundly increased the means to gather, integrate and apply information and knowledge; and (2) the world is increasingly becoming networked and interdependent resulting in vulnerabilities of direct and indirect, desirable and undesirable effects.[10] Technology and globalization can also provide the opportunity for the U.S. to shape our environment and minimize challenges to U.S. interests.

The technological revolution is shaping the environment of the United States and forcing worldwide change. Technology has increased the speed of interconnectivity around the world and has changed the magnitude, complexity, and rapidity of awareness and its positive and negative effects. Technology is advancing the U.S. into an expanded realm of Information Operations (IO). John Arquilla in his book *In Athena's Camp* described Cyberwar and Netwar as models for future warfare. His basic premise is that the information revolution is redefining how

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[8] UAJFCOM J9 Concepts Department, "Millennium Challenge 02 Week Three; Facilitated After Action Review" 9 August 2002 through 14 August 2002, (On-line), Available: https://home.je.jfcom.mil/QuickPlace/innovation/PageLibrary85256AFF00620B2E.nsf/h_Toc/ED6814E19C75A4D785256BFB005607B0/?OpenDocument

[9] Military Operations Research Society, "Analyzing Effects Based Operations (EBO), Workshop Summary", (On-line). Available: http://www.mors.org/meetings/ebo/ebo_phalanx/

[10] USJFCOM J9 Concepts Department, A Concept Framework for Effects-based Operations, White Paper Version 1.0, Suffolk, VA: JFCOM, 18 October 2001.

societies and or militaries may wage war in the future.[11] EBO is one of the only concepts that integrates the tenants of IO ensuring the nation is capable of taking actions that will achieve explicit policy aims while mitigating unanticipated or unintended consequences.

Additionally globalization has symbiotically tied individuals, businesses, and governments into becoming more interconnected, interdependent, and susceptible to influence from an outside source. LtCol Hammes wrote an article titled "The Evolution of War: The Fourth Generation" in which he supports the concept of Fourth Generation Warfare (4GW). 4GW roughly delineates a difference in warfare due to future enemy forces being something other than a military force organized and operating under the control of a national government and whose cause may be based on an ideology or religion, which often transcends national boundaries. LtCol Hammes surmises that there has been an exponential increase in the number of transnational business associations, research groups, academic societies, and even hobbyists who maintain contact through a wide variety of media. Because these networks tie people together in distinctly nontraditional ways, we can no longer conduct international affairs primarily through official diplomatic and military channels.[12]

LtCol Hammes surmises that future wars will be engagements fought across the spectrum of human activity and that antagonists will fight in the political, economic, social, and military arenas and communicate their messages through a combination of networks and mass media.[13] Hammes theory was largely based on Martin van Crevelds book *The Transformation of* War in which he stated that war will turn to the complex environment of low-intensity conflict simply because computers have come to dominate the relatively simpler environments of mid-to high-

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[11] Arquilla, John and Ronfeldt, David. In Athena's Camp: Preparing for Conflict in the Information Age, RAND, National Defense Research Institute, 1997.

[12] Hammes, Thomas X.. "The Evolution of War: The Fourth Generation," Marine Corps Gazette, September 1994.

[13] *Ibid. p. 3*

intensity conflict.[14] This form of warfare is currently being conducted in the Global War on Terrorism (GWOT) and in the war with Iraq called Operation Iraqi Freedom (OIF). U.S. Joint Forces Command has the responsibility of integrating all U.S. military forces to meet these ever-changing threats and emerging technological advances to achieve the *Joint Vision 2020* charter of "full spectrum dominance."[15] The achievement of dominance requires joint intellectual, operational, organizational, doctrinal, and technical integration.[16] The concept of EBO attempts to answer this challenge by planning, preparing and executing military operations oriented on what effects must be achieved to bring about the desired strategic outcomes.

Structure of the Study

Problem Statement

The U.S. *Quadrennial Defense Review Report*, published September 30, 2001, emphasizes the requirement for the U.S. security apparatus to adapt to new challenges.[17] The report attempts to answer the question of how we will fight in the future by stating the following: U.S. military forces must maintain the ability to assure allies, dissuade adversaries, deter aggressors, and defeat any adversary if deterrence were to fail, while modernizing the force and exploiting the revolution in military affairs.[18]

Traditional American views of war have been based on attrition and annihilation and have historically focused on the destruction of enemy armies and infrastructure. Thus, operational planning has concentrated on the most effective ways of killing people, destroying

[14] *Ibid. p. 3*

[15] Henry K. Shelton, *Joint Vision 2020 America's Military: Preparing for Tomorrow*, Washington, DC, 2000, p. 3.

[16] *Ibid, p. 2.*

[17] Donald H. Rumsfeld, *Quadrennial Defense Review Report*, Washington, DC: U.S. Government Printing Office, 2001.

[18] *Ibid., p. iv.*

things during conflict and occupying what remains. What is changing is possibly the end of unrestricted warfare as demonstrated in recent conflicts to include the Gulf War, Bosnia, Kosovo, and Afghanistan. The military must always be prepared to conduct full spectrum dominance but can no longer plan a post-conflict order independent of the course of the war and the damage inflicted.

The Joint community is currently discussing whether Effects Based Operations can provide the operational framework for the U.S. military to win both a war and the following peace.[19] Future warfighting constructs must view warfare holistically where all elements of national power are employed. Most importantly future warfighting constructs must plan post-conflict conditions of an enemies country and population as desired effects and must be incorporated in order to define boundaries within the operational commander'swarfighting decisions both in pre-conflict and during execution.

Methodology

The research question examines whether EBO within the framework of JOW is the most effective way to frame future joint operations in a complex, uncertain environment.[20] Though, much of the leading thought on EBO has been drawn from the work of Air Force thinkers and USAF concept centers, it has been embraced by JFCOM. To answer the basic question of whether EBO provides a common operational framework for future joint operations, this paper must first provide a basic understanding of the historical evolution of EBO and then provide a commonly agreed upon definition. The paper will then provide a brief discussion of the theory

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[19] U.S. Joint Forces Command, J9 Joint Futures Lab,"Joint Operational Warfighting (JOW): Thoughts on the Operational Art of Future JointWarfighting.", (On-line). Available: https://home.je.jfcom.mil/QuickPlace/innovation/PageLibrary85256AFF00620B2E.nsf/h_Toc/ED6814E19C75A4D785256BFB005607B0/?OpenDocument

[20] *Ibid., p.4*

behind EBO and its practice and will conclude with a focus on what portions of EBO should be incorporated into a broad theory for the conduct of future military operations.

Methodology used will analyze the utilization of EBO as a systematic approach within the continuous operational cycle of analysis, planning, execution, and assessments based on realized outcomes identified in recent experimentations to include Millennium Challenge 02 exercise and the Military Operations Research Society (MORS) Workshops. The two case studies will be divided into categories to facilitate the data analysis. The initial step required to divide the data will be to determine the unit of analysis of each. The units of analysis will be determined by realized commonalities found in the exercise and workshop.

Designing a study that investigates the effectiveness of these units of assessment requires a qualitative analysis. A qualitative analysis will properly describe the attributes and true value of the units of assessment that have been identified. This qualitative approach generates theory from observations and provides the appropriate structure and rigor lacking in some approaches while maintaining flexibility. The results from this type of analysis provide an explanation of specific categories, their properties and corresponding relationships among them. Further analysis may be required to ensure the data's credulity by comparing across a broad range of exercises and operations.

Significance

The U.S. must develop and institute new capabilities and new ways of thinking to ensure the nation can take actions that will achieve explicit policy aims while mitigating unanticipated or unintended consequences. These actions, when taken, will be judged, not only by the effect they have on our enemies and friends, but also by the costs that are incurred in national blood, treasure and moral authority.[21] All U.S. military operations within the past two decades have been

[21] USJFCOM J9 Concepts Department, "A Concept Framework for Effects-based Operations," White Paper Version 1.0, Suffolk, VA: JFCOM, 18 October 2001.

relatively swift and their execution have had profound effects on post conflict events. The U.S. military will continue to fight and win our countries wars but must begin to focus on the broader post-conflict effects from military operations to mitigate the potential outcomes of unintended and undesired consequences. We must not win future wars only to lose the post conflict peace and in turn only plant the seeds of future conflict. DoD is placing all efforts focusing on answering the question of "how will we fight in the future."

Because EBO has far reaching implications across the range of military operations throughout each service and in joint and coalition operations, this paper examines whether the concept of EBO can be applied to help answer that question. Specifically analysis will determine if EBO is capable of institutionalizing across the levels of command a holistic approach to warfighting founded on a systems perspective of the battle space and the integrated application of various instruments of power. It will answer whether EBO is the most effective way to frame future joint operations in a complex, uncertain environment.

EBO CONCEPT DEVELOPMENT

The Joint Forces Command has encountered considerable resistance to the integration of EBO based on the origins of the concept. A panel tasked by the U.S. Air Force Doctrine Center, April 2001, identified reasons for this resistance. The panel presented a White Paper as a key action to advance understanding of the analytical methodology of EBO. The panel identified two significant findings. First, the concept of EBO is not well understood and requires further elaboration to ensure it is used properly and Second, there are currently no formally established procedures in the EBO methodology and very few formally defined EBO terms.[22] To understand the problems associated with the concept of EBO, this paper first addresses its historical evolution.

[22] Air Combat Command, "Effects-Based Operations, White Paper", dtd May 2002. (Handout) , p. iv

Historical Origins

The confusion associated with the concept of EBO is attributed to its evolution as a concept and the resulting difference of versions and definitions. To better understand EBO, this paper attempts to review the historical evolution of EBO to determine whether it is a new concept or just an old idea renamed and repackaged. This chapter utilizes historical evolution of the concept to offer a perspective on the future usefulness and thinking about EBO. It will dispel the notion that EBO is a new concept. Rather it will discuss the evolutionary process and technological advances that have developed EBO as a concept.

Historians and theorists can easily argue that effective warfare throughout history has always utilized the basic principles of EBO. Military commanders and planners throughout history have sought to create conditions that would achieve their objectives and policy goals – an approach that would be considered "effects-based" in today's terminology.[23] EBO has been influenced by thinkers like Clausewitz, Ulysses S. Grant, and by the events of WWII to the Gulf War in 1990-1991, as well as by past technological limitations. "However, effects-based warfighting approaches have been applied only sporadically throughout history and, for a variety of reasons, have met with inconsistent success."[24] The foremost limiting factor has been the limited availability of technology.[25]

Technology enabled the application of EBO methodology at the time of Operation Desert Storm and is the foremost enabler of EBO within the COE. The rapid advancement of military

[23] *Ibid., p. iv.*

[24] *Ibid., p. 1.*

[25] *Ibid., p. 24.*

technologies is providing the U.S. military with new tools and capabilities.[26] These technological advances included the combination of stealth, precision, improved munitions, improved command and control systems, and knowledge that enabled the determination of valid strategic targets, achievement of desired effects against them and measurement of results.[27] U.S. Air Force (USAF) Colonel John Warden was the first to acknowledge and understand that technology had corrected the deficiencies of the Mitchell/Air Corps Tactical School theories and that technology made parallel attack as opposed to sequential attack more possible.[28] Technology changed the principle of mass, because it allowed fewer platforms to deliver precision weapons more accurately onto more targets simultaneously creating a synergistic effect. Stealth bombers with PGMs, which could engage multiple targets simultaneously making strategic attack all the more feasible, brought this about.

Concept Evolution

COL John Warden

The technological advances including the combination of stealth, precision, improved munitions, improved command and control systems, and knowledge have enabled EBO to develop into a viable concept and were validated in the design and success of the Air Operations in the Gulf War. Colonel Warden was the architect of the Gulf War air operation in which he developed a methodology based on a systems approach. At the time, Colonel Warden headed an office called CHECKMATE, an office serving under the Air Force deputy chief of staff for plans and operations and concerned with long-range planning. It was largely fortuitous that Colonel Warden and his office were tasked to assist with the planning because they had no formal

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[26] Donald H. Rumsfeld, *Quadrennial Defense Review Report*, Washington, DC: U.S. Government Printing Office, 2001.

[27] *Ibid., p. 24.*

[28] Mets, David R. The Air Campaign: John Warden and the Classical Airpower Theorists, Air University Press Maxwell Air Force Base, Alabama, April 1999. pg. 59

responsibility for doing so. When tasked, COL Warden adapted his existing concept of EBO to planning for conduct of War. Colonel Warden's concept of EBO and original plan was supplemented with many defensive and tactical features by joint input but he ensured the essence of his original offensive plan was retained within the larger evolving plan.[29] At the conclusion of the War, Generals Schwartzkoph and Powell credited Colonel Warden for developing the original concept that was central to Iraq's defeat. Colonel Warden's initial concepts of EBO as a systems approach were implied in his writings long before the Gulf War. His concept of EBO has focused on an approach that describes required effects to secure strategic objectives and then conduct military actions that would bring about the required effects.[30]

Colonel Warden's core ideas are that the art of air campaign planning is vital and that once air superiority is assured, airpower can be used either in support of the other arms, or can be supported by the other arms, and sometimes can function independently to achieve decisive effects.[31] His first priority for all operations remained command of the air. He believed that command of the air could be better achieved in parallel (simultaneous) attacks rather than serial (sequential) attacks.[32] The difference in parallel war is the exploitation of three dimensions of time space and levels of war. Major General David A. Deptula later defined it as the simultaneous application of force across each level of war uninhibited by geography. COL Warden ascertained that it is pointless to deal with enemy military forces if they can be bypassed by strategy or technology either in the defense or offense and that the real essence of war was doing what was necessary to make the enemy accept our objectives as his objectives. He

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[29] Edward C. Mann III, *Thunder and lightning: Desert Storm and the Airpower Debates,* Maxwell AFB, Ala.: Air University Press, 1995. contains general descriptions favorable to Colonel Warden and his planning for the Gulf War.

[30] John A. Warden III, *The Air Campaign* (to Excel, Incorporated, 1 October 1998).

[31] Mets, David R. The Air Campaign: John Warden and the Classical Airpower Theorists, Air University Press Maxwell Air Force Base, Alabama, April 1999. pg.59-60

[32] *Ibid., p. 60*

developed a model in which centers of gravity could be targeted within five distinct rings. The center ring consists of leadership targets, then means of production, infrastructure, population, and then fielded forces in the outer perimeter.[33] He determined that almost all states and other political entities have the five rings and the center ring is always leadership. Because Warden assumed that human, behavior was unpredictable and that material effects of military action were more predictable, that the capability of the enemy should be targeted as the first priority.

Within the five rings, fewer centers of gravity (COG) exist in the core rather than in the outer rings but they tend to be more decisive. The targeting of the COG in any ring simultaneously is more effective than sequentially and thus, simultaneous targeting of objectives in all rings tends to be even more decisive than attacking only one ring or starting with the outer ring and working inward.[34]

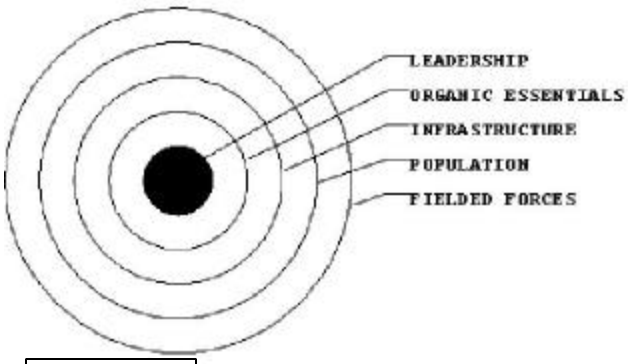

Figure 1

The limiting factor of COL Warden's views of EBO was that it was Service centric weighing heavily on target value analysis and focused on precision engagement and targeting. The difference in COL Warden's views and current analysis is that he placed emphasis in terms of desired outcomes and the importance of using all available assets. This original target value emphasis definition has confused the concept of EBO. The U.S. Army to include units such as the Interim Brigade Combat Team (IBCT) at Ft. Lewis, Washington is testing EBO in this original EBO context of increasing the effectiveness of fires. One of the emerging concepts, the

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[33] *Ibid., p. 59*

[34] *Ibid., p. 60*

fires and effects coordination center, takes into account Colonel Wardens concepts in focusing organizational changes designed to employ fires, lethal and non-lethal, to create desired effects. Because the Army is focused on EBO solely as an aspect of fires, it is severely limiting the concept of EBO in comparison to current analysis. Current analysis has evolved due to work done by Major General David A. Deptula.

MG Dave Deptula

Major General David A. Deptula built on Colonel Warden's methodology to develop practical approaches to targeting and the employment of air power. His first article titled "Effects-Based Operations: Change in the nature of Warfare," was largely based upon Colonel Warden's initial concepts of parallel warfare. However, he expanded Colonel Warden's views of EBO from being USAF Service centric to being applicable across all national powers to include diplomatic, informational, and economic. Most importantly, he placed more emphasis on the understanding of the enemy as a system, and the determination of the linkages between cause and effect. His expanded concept offers better potential for the military to achieve desired effects through a more holistic and systematic approach to planning, executing, and assessing results. This expanded view provides more efficient ways to achieve national goals and allows us to consider shaping the environment to minimize challenges to U.S. interests.[35]

General Deptula's expansion of EBO into a way of thinking proposes an alternative concept of war based on control rather than the traditional concepts of annihilation and attrition taught in service schools. His concept of control is similar to Warden's five ring model in which the destruction of enemy military forces are less important than creating the effect necessary to prevent an enemies organizational structure to operate as desired. He proposes a systems approach in defeating the enemy by focusing targeting not necessarily on the destruction of

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[35] Military Operations Research Society, "Analyzing Effects Based Operations (EBO), Workshop Summary", (On-line). Available: http://www.mors.org/meetings/ebo/ebo_phalanx/

enemy systems but rather on the prevention of the intended use as the adversary desires.[36] In this sense, he maintains that desired effects will be achieved through the successful application of force whether military or non-military to gain control of systems on which the enemy relies. General Deptula's work has matured EBO as a concept and has forced other organizations to begin taking it seriously.

Joint Forces Command

Joint Forces Command along with General Deptula have since further advanced the concept of EBO as a way of thinking[37] which integrates EBO as a holistic and systematic approach to warfare that is applicable across the spectrum of conflict. This third expansion of the concept of EBO states that EBO rests on an explicit linking of actions to desired strategic outcomes. The premise being that the concept must be focused on generating desired effects, rather than on objectives or the physical destruction of targets. This new interpretation and definition requires a new way of thinking rather than just onwarfighting. Under this premise, EBO must focus on future states throughout the operational continuum of peace, pre-conflict, conflict, and post conflict.

This raises the question of whether peace actually exists within the continuum or if that end of the spectrum is merely a state of constant tension, in which the military is constantly shaping the global environment setting conditions for future states of conflict. An example would be when and where do Information Operations begin and against whom to include friend, foes and neutrals in shaping perceptions positive to U.S. interests. An example of such IO campaigns could be focused on the funding and the influence on the curriculum of Middle Eastern schools called madras's in which positive U.S. perceptions are instilled in future generations thus debasing hatred and possible future terrorism.

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[36] *Ibid.,* p. 11.

[37] Ibid., p. 11.

The leading proponents of EBO and primary speakers of the Military Operations Research Society Workshop, see EBO as the following: it is "a way of thinking" (Major General Deptula, Director of Plans and Programs, Headquarters Air Combat Command, Langley Air Force Base, Va.), "a common frame of reference between DoD and other agencies" (Graham Kessler, J9, JFCOM), and it coordinates sets of actions directed at shaping the behavior of friends, foes, and neutrals, in peace, crisis, and war" (Ed Smith, Boeing, Educational Representative, Pennsylvania State University Aerospace Engineering).[38] The consolidations of these ideas are reflected in the publication of a J9 Joint Forces Command White Paper dated October 18, 2001 and titled "Effects Based Operations." The White paper is a topic area exploration that has prompted further concept development and experimentation. Joint Forces Command through this White Paper, has taken the initial step in bringing about consensus in the joint community by defining the parameters of EBO and its associated relevance to each level of war.

CONTEMPORARY CONCEPT

Definition

As seen in the historical analysis of EBO, there are many interpretations of the concept with different descriptions and terms of reference. Just as confusing is a common working definition of what are EBO. Currently there are several definitions, which include definitions from the USAF, the MORS workshop and Joint Forces Command. The Air Force, in a CADRE White Paper dated August 2001, defines EBO "as a methodology for planning, executing, and assessing operations designed to attain the effects required to achieve desired national security

[38] Military Operations Research Society, "Analyzing Effects Based Operations (EBO), Workshop Summary", (On-line). Available: http://www.mors.org/meetings/ebo/ebo_phalanx/

outcomes."[39] Whereas, Dr. Paul Davis at the recent MORS workshop, defined EBO as "Operations conceived and planned in a systems framework that considers the full range of direct, indirect, and cascading effects that may – with different degrees of probability – be achieved by the application of all national instruments: military, diplomatic, economical, and psychological."[40] USJFCOM J9 initially defined EBO in a White Paper dated October 2001 as "a process for obtaining a desired strategic outcome or 'effect' on the enemy through the synergistic and cumulative application of the full range of military and non-military capabilities at all levels of conflict."[41] Each of these definitions is similar with common themes. They each consider EBO as a system or process that utilizes combinations of national power to produce synergistic and cumulative effects to influence behavior.

The critical point in developing EBO into an effective joint concept relies on the necessity of developing a codified definition, which will create a mutual understanding of the concept and develop relevant joint terms and methodology. Joint Forces Command realized this and has incorporated EBO within Joint Doctrine. Effects-based operations are defined within *Joint Publication 3-0, Doctrine for Joint Operations* as "a process for obtaining a desired strategic outcome or "effect" on the enemy, through the synergistic, multiplicative, and cumulative application of the full range of military and nonmilitary capabilities at the tactical, operational, and strategic levels."[42] The definition of "effect" is the physical, functional, or psychological outcome, event, or consequence that results from specific military or non-military

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[39] College of Aerospace Doctrine, Research, and Education (CADRE), "Effects Based Joint Operations." Draft USAF White Paper, (Maxwell AFB, AL: Air University, August 2001).

[40] Military Operations Research Society, "Worshop on Analyzing Effects-Based Operations Terms of Reference," (On-line). Available: http://www.mors.org/meetings/ebo/ebo_tor/.

[41] USJFCOM J9 Concepts Department, A Concept Framework for Effects-based Operations, White Paper Version 1.0, (Suffolk, VA: JFCOM, 18 October 2001), p. ii.

[42] *Joint Publication 3-0, Doctrine for Joint Operations.* Ft. Monroe, Va.: Joint Warfighting Center, 1995.

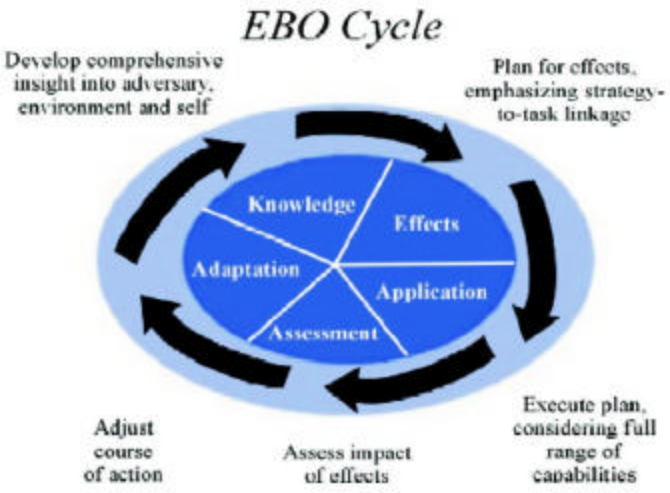
actions. This broadened and refined definition of EBO provides exponential possibilities to improve our way of employing and using military power throughout the spectrum of conflict.

Essentially EBO enhances decision-making in accordance with national security requirements across the spectrum of conflict. This is important because in competition, the system that can outthink and adapt faster will prevail. The current definition of EBO provides the U.S. the ability to integrate all instruments of power into a "deliberate, coherent, precise and timely manner to dictate policy effects – whether managing cooperation or conflict."[43] EBO will always be a part of a national or multinational campaign facilitating the linkages between national policies, actions taken through use of national powers to reach a desired end state. This linkage is best represented in the figure 2 taken from the U.S. Joint Forces Command, "Effects-based Operations White Paper Version 1.0. This figure best represents the EBO thought process as a linear linkage, which is the reverse alignment of a desired end state to effects to actions to the beginning state in order to influence a complex adaptive system. The problem found with this simplistic view of EBO is the confusion of ends with means. Additionally this linear process does not allow a planner to be flexible or innovative in the planning and execution of missions. An example of this problem is seen in target planning of targets for OIF. The problem arises in the number of targets (Actions) with causal links to effects. There are too many targets with innumerable intended or unintended effects. This linear thinking of the process is

[43] USJFCOM J9 Concepts Department, A Concept Framework for Effects-based Operations, White Paper Version 1.0, Suffolk, VA: JFCOM, 18 October 2001. p. 2.

limited and does not provide adequate tools to prioritize targets, analyze effects and adapt accordingly. It does not facilitate a systems approach to conducting warfare.

A better way to view EBO is as a continuous five stage process as depicted in figure 3 taken from a briefing titled "Effects-Based Operations: Change in the Nature of Warfare."[44] The five elements within the center consist of the following:



1.Knowledge 2. Effects

3. Application

4. Assessment and

5. Adaptation. Portrayed on the outer ellipse are the actions associated with each stage. This five-stage process begins with the knowledge stage, which requires comprehensive understanding of the enemy, the operational environment, and ourselves. The effects stage is where planning occurs focused on desired future states or outcomes. Upon execution of the plan, the application stage considers the full range of national powers. The assessment stage then focuses on the effects by collecting, analyzing, and evaluating results of effects. This analysis and evaluation leads to the fourth stage of adaptation where the current course of action is validated or modified which is brought together as the final stage of knowledge. As described in this process, EBO is a way of thinking and systematically planning, executing, and assessing operations designed to attain specific effects and or reach a desired future state.

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[44] Tom Erhard, Lt Col, "Effects-Based Operations: Change in the Nature of Warfare," A briefing presented on behalf of Major General David A. Deptula, slide 22.

This thought process is critical because just as important to establishing a joint definition is the necessity to establish a common joint language because currently there are no formally established procedures in the EBO methodology and very few formally defined EBO terms.[45] To make the concept more confusing, the Air Combat Command's white paper identified that "EBO are only discussed to a limited extent in U.S. military doctrine today, and no methodology is offered to systematically apply it."[46] This paper will discuss proposed methodologies that differentiate between ends and means and can be applied across every level of action to include strategic, operational, and tactical. First, this paper will propose a methodology based upon the definition of effects in the sense that "effects can physically, functionally, or psychologically impact the enemy and coerce or compel him to change his behavior and eventually lead to desired outcomes."[47] By focusing on the enemy as a complex adaptive system (CAS) in which a desired effect or outcome must be coerced or compelled this paper begins to outline the need for establishing a desired end state of the CAS and then determining the actions needed to alter that system.

Implementation

Strategic level of action

The JFCOM White Paper asserts: "If we can plan, execute, assess and adapt our actions in terms of the effects we desire, then we can identify and execute the most effective course of action to bring about the desired change in the adversary's behavior."[48] The question then

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[45] Air Combat Command, "Effects-Based Operations, White Paper", dtd May 2002. (Handout) , p. iv

[46] *Ibid., p. 2.*

[47] Brett T. Williams, LTC, "Effects-Based Operations: Theory, Application, and the Role of Airpower." p. 136.

[48] USJFCOM J9 Concepts Department, "A Concept Framework for Effects-based Operations," White Paper Version 1.0, Suffolk, VA: JFCOM, 18 October 2001. p. 4.

becomes, what are the effects we desire. The determination of the effects or the desired end state occurs at the strategic level of action. It is important to understand the rationale for our choices if the political aim is to change the adversary's behavior. This is where EBO shows the most potential because this is where policies are initiated by the direction given by the president and his National Security council (NCS). These policies must be focused on the adversary's power in order to weaken or transform it and thus achieve our desired political objectives.

EBO contributes extensively at the strategic planning process by providing a clearer understanding of the value of instruments of power that are available and providing a more integrated role of intelligence within the process. EBO helps agency planners to think differently about their agency's contribution to the overall success of the strategy. Additionally EBO provide improved communications and understanding among planners thus creating stronger linkages of assets and better anticipation of capabilities and outcomes. All of these contributions help measure progress and facilitate future planning. However, EBO will not end with planning, but will require continuous strategic adaptation and continuous refinement of agency roles to achieve long-term policy aims.

The Strategic level of action is the most important aspect of EBO because it is where policy makers provide a clear vision of the end state, which is then translated into national objectives, or strategic effects that will ultimately define a successful operation. First policy makers must think about, understand the enemy, friendly, and neutral's perceptions, and anticipate decisions. To ensure that the envisioned end state is capable of being met, policy makers must also match options, capabilities and effects so the most advantageous instruments – diplomatic, economic, law enforcement and, or military – are selected and resourced.[49] In a key note address titled "A policy-makers view of Effects Based Operations," Mr. Hawley stated that "Consequently, at the strategic level the most important responsibility of the policy makers is to

[49]*Ibid., p. 4.*

maintain congruence between the desired end state, the desired effects and the instruments of action: to integrate interagency and multinational actions into a single coherent campaign."[50]

Operational level of action

It is at the operational level that the Combatant Commander begins to align the military instrument of power within the larger national or multinational campaign. The critical link remains with the sources of data, information, and knowledge to assess the measurements of effectiveness which must be provided from the interaction with the national interagency community. The importance of this interaction was highlighted in the recent MILLENNIUM CHALLENGE 02 Exercise in which it was noted that the national intelligence community must support EBO to enable the concept and its processes to work. BG (ret) Wayne Hall hasnoted that "The EBO process is a voracious consumer of fine-grained knowledge – knowledge that the JTF and the Combatant Commander's staff cannot hope to produce."[51] The exercise concluded that "the national intelligence community helps the EBO process by assisting collaboratively in the design of actions leading to effects, advising how to assess the effectiveness of effects, particularly intangible effects, and actually helping conduct the assessments of the effectiveness of actions leading to desired effects"[52] The Combatant Commander utilizes this support to develop a system view of the battle space and thus determines his area of responsibility and operational effects. The primary problem at the operational level is the determination of the division of labor for effects assessment between the combatant commander level to the joint task

[50]Jacqueline Henningsen, Dr., SES, MORS Fellow of the Society, Director, Air Force Studies & Analysis Agency, " A Dialogue on Analyzing Effects Based Operations (EBO), (On-line), Available, http://www.mors.org/publications/phalanx /mar02/Lead2.htm

[51] Wayne M. Hall, BG (Retired), "Notes, The Pieces of Information Superiority, Millennium Challenge 02, 10/9/2002, p. 12.

[52] *Ibid.*, p. 12.

force and finally to the functional components. An additional problem is the full integration of joint intelligence, surveillance, and reconnaissance assets to support this assessment process.

The USJFCOM white paper version 1.0 states that the inherent shortfall of EBO is that "Effects-based operational art deals mainly in the realm of command."[53] EBO does not provide adequate tools to the operational level planner. EBO focuses rather on Commander's realm of providing guidance to include: the commander's intent, mission, and operational effects. "The aim is to give the components the maximum freedom of action in how to conduct tactical operations while ensuring the operational end state and effects achieved are what the combatant commander intends."[54]

This intent is well intentioned but currently inadequate to ensure operational planning is effective. Planners will be required to establish a common interagency visualization of the battle space to determine how enemy, friendly, and neutral systems are currently interacting. Currently organizational structures are adapting to ensure adequate interaction and support between the strategic, operational and interagency, military. Without this interaction, the operational planner would be required to conduct assumption based planning which would jeopardize future decisions. Planning that would be required would include risk assessment and the development of operational effects and measures to determine success and focus future operations.

Current tools that allow the commander to change desired effects into military tasks include the following: the Effects Tasking Order (ETO) and the Priority Effects List (PEL). Additionally a conceptual tool that continues to evolve is the Integrating Task/Effects Matrix (ITEM). "Components execute tasks (which they helped develop) to support their effects tasking order (ETO), assigned effects-based missions and conduct additional planning prior to execution to more succinctly tie tactical units into the operation… An integration matrix is part of the ETO.

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[53] USJFCOM J9 Concepts Department, "A Concept Framework for Effects-based Operations," White Paper Version 1.0, Suffolk, VA: JFCOM, 18 October 2001. p. 5.

[54] *Ibid.*, p. 5.

It is the synchronization of component actions in time, space, and outcome gains increased importance in effects-based operations."[55]

Because EBO attempts to achieve synergy between the elements of national power, capabilities of the military, and the ultimate process of thinking, planning, deciding, acting, receiving feedback, measuring and modifying then it makes sense to have an automated and visual way to track and understand these interactions.[56] The Integrating Task/Effects Matrix (ITEM) provides an extensive, automated, synchronized portrayal of effects so that the commander and staff may visualize effects, singularly, in groups or completely. This tool will provide the commander the ability to merge and supervise the automated interaction of all elements into a coherent picture. The commander will utilize this tool to help understand what actions are positive and which are not in the complex interaction of tangible and intangible effects. Some of the elements that have to be synchronized are: JISR, Objectives to task to effects linkages, IO synchronization, Combatant Commander effects, and national effects across elements of national power.[57]

Another inherent information related challenge found during the implementation of EBO is prediction through the observation and measurement of effects. It is the assessing, predicting, and observing of effects that is extremely challenging even with extensive knowledge. "EBO demand an effects assessment process that accurately measures the level of success while at the same time allowing commanders to determine whether to adjust the current or future course of action… Effects assessment during EBO is a continuous process that allows collection, processing, exploitation, and dissemination of information to the appropriate operational and

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[55] USJFCOM, "Millennium Challenge 02: Week One Facilitated After Action Review, 24 July 2002 through 31 July 2002," (On-line). Available: http://www.jfcom.mil/about/experiments. Slide. 15.

[56] *Ibid, p. 14.*

[57] Wayne M. Hall, BG (Retired), "Notes, The Pieces of Information Superiority, Millennium Challenge 02, 10/9/2002, p. 14.

tactical levels in time to exploit targets of opportunity."[58] This concept sounds great but belies the fact that presently we do not have the analytical tools needed to measure EBO. Major General Cash, Director of Joint Experimentation JFCOM, specifically stated that there is a need to develop tools to measure the magnitude and impact of potential problems for national security. We must also develop models that can play out a long temporal dimension because current models have a problem with time. Finally, we must develop methods to examine the two questions of how to measure national will and how to achieve decision superiority and how to measure it.[59]

Tactical level of action

EBO at the tactical level initially is determined with the collaboration of the Combatant Commander and component commanders in which they apportion, allocate, and assign forces and effects to them. Upon receipt of mission, component commanders begin with the planning cycle, which is knowledge intensive. Tactical commanders require the support of a collaborative information environment to develop better knowledge than the enemy and thus be able to anticipate and make effective decisions better and faster. The basic challenge to the tactical level commander is determining how desired effects and tactical actions are synchronized and integrated with regard to time, space, desired outcome, and resources. Additionally he must determine how information operations are to be integrated and synchronized with fires and maneuver. To do so, the staff and commander must have detailed knowledge to understand how the enemy thinks, perceives, plans, decides, acts, receives feedback, and modifies his actions. Secondly, the staff and commander must anticipate and attempt to gain understanding through

[58] USJFCOM, "Millennium Challenge 02: Week One Facilitated After Action Review, 24 July 2002 through 31 July 2002," (On-line). Available: http://www.jfcom.mil/about/experiments. Slide. 18.

[59] Jacqueline Henningsen, Dr. SES, MORS Fellow of the Society, Director, Air Force Studies & Analysis Agency, "A Dialogue on Analyzing Effects Based Operations (EBO)", (On-line). Available: http://www.mors.org/publications/phalanx/mar02/Lead2.htm

war gaming. War gaming should produce indicators and behaviors that can be confirmed and analyzed to determine conclusions enabling the commander to make better decisions faster and thereby seizing and sustaining the initiative.

ANALYSIS

This paper attempts to answer whether EBO within the framework of JOW is the most effective way to frame future joint operations in a complex, uncertain environment. [60] To do so it must analyze the utilization of EBO as a systematic approach within the continuous operational cycle of analysis, planning, execution, and assessments based on realized outcomes identified in the recent experimentation of Millennium Challenge 02. It must also analyze the discussion efforts and synthesized recommendation provided by the Military Operations Research Society (MORS) EBO Workshop.

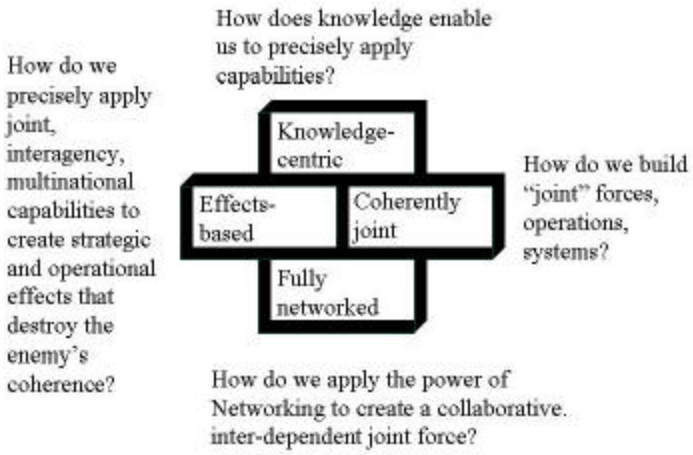
MILLENIUM CHALLENGE

Millennium Challenge 2002 (MC02) was sponsored by U.S. Joint Forces Command (USJFCOM) and was conducted July 24 to Aug. 15, 2002 focused on joint integration, bringing together both live field exercises and computer simulation. The exercise incorporated elements of all military services, most functional/regional commands and many DoD organizations and federal agencies. The Secretary of Defense directed that future force concepts to include the Air Force's Expeditionary Aerospace Force, the Army's medium-weight brigades and the Navy's Forward from the Sea vision to be incorporated into the exercise. The goal of the exercise was to integrate Joint experimentation that would foster an operational decision-making culture responsible for defending our nation by exploring future threats. The transformation of DoD is carried out within the joint context of concept development and robust joint experimentation.

[60] U.S. Joint Forces Command, J9 Joint Futures Lab,"Joint Operational Warfighting (JOW): Thoughts on the Operational Art of Future Joint Warfighting.", (On-line). Available: https://home.je.jfcom.mil/QuickPlace/innovation/PageLibrary85256AFF00620B2E.nsf/h_Toc/ED6814E19C75A4D785256BFB005607B0/?OpenDocument

"The basic premise is that critical decisions on future military doctrine, organization and technology should be based on solid empirical results."[61] "MC02 was designed to maximize our joint warfighting capability in this decade and minimize materiel adjustments to our current military resources."[62] The result of MC02 has been an increased insight in our national defense and has made a difference in joint interoperability as demonstrated in recent operations.

The MC02 scenario was of a simulated high-end, small-scale contingency that had potential to escalate into a major theater of war. The experiment objectives include the following: 1. Establish and maintain Information superiority 2. Rapidly set the conditions for decisive operations 3. Assure access into and through the battle space 4. Conduct decisive effects-based operation and 5. Sustain the force.[63] The exercise utilized the construct of JOW to frame the characteristics of future Joint Operations. As seen in figure 4, the four basic characteristics were knowledge-centric, effects-based, coherently joint, and fully integrated. Each of these characteristics attempted to answer specific questions. The primary question that was posed about effects-based was "how do we precisely apply



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[61] USJFCOM, "Millennium Challenge 02,"(On-line). Available: http://www.jfcom.mil/about/experiments/mc02.htm, p. 1.

[62] *Ibid.*, p. 2.

[63] USJFCOM, "Millennium Challenge 02: Week One Facilitated After Action Review, 24 July 2002 through 31 July 2002," (On-line). Available: http://www.jfcom.mil/about/experiments.

joint, interagency, multinational capabilities to create strategic and operational effects that destroy the enemy's coherence?"[64]

The experimentation exercise identified and focused on EBO as being a knowledge-based operation.[65] BG (Retired) Wayne Hall was the Senior Concept Developer for the exercise and was responsible for focusing the exercise on knowledge centric organizations and their abilities to build new or improve existing knowledge. He assisted the integration of knowledge-based operations to include EBO by defining key terms, which include:

> Knowledge Superiority – A condition created by knowledge that enables one side in a struggle to make better decisions than its adversary, thereby creating momentary advantages.
>
> Knowledge Readiness – A status of the constituent elements comprising a leader's knowledge environment, which contribute to the determination of both capabilities and preparedness of a command or organization to seek, find, and sustain knowledge advantage.
>
> Knowledge Management – Purposeful and systematic quest for quality, efficiency, and effectiveness of knowledge to support decision-making brought about by retrieving, processing, organizing, analyzing, synthesizing, and sharing data, information, and knowledge among knowledge workers, leaders, and organizations.[66]

These definitions were critical to the success of the experimentation and implementation of EBO. BG (Ret) Wayne Hall stated that "EBO use superior knowledge to anticipate what the adversary will do, when he will do it, where he will act, that could enable us to 'be there waiting when he acts,' and provides feedback on the effects created by those actions."[67] These definitions provided the construct in which EBO was utilized because it is the commander who is required to make effective decisions, which now involve a wider range of people, organizations, and stakes. EBO provided the linkage between decisions, actions, and desired effects. EBO is a knowledge-based operation

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[64] *Ibid.,* Slide. 5.

[65] Wayne M. Hall, BG (Retired), "Notes, The Pieces of Information Superiority, Millennium Challenge 02, 10/9/2002," p. 3.

[66] *Ibid., p. 7-9*

[67] *Ibid. p. 21*

because to perform EBO, people in the intelligence system need to think about and understand the adversary's perceptions, decision cycles, and information technology that support these processes.[68]

MORS Workshop

A workshop hosted by the Military Operations Research Society (MORS) was held 29-31 January 2002 to analyze the concept of EBO. The original concept for MORS holding the workshop on analyzing EBO arose more than a year prior and was focused on "the very real question of whether EBO was a useful concept at all."[69] To determine the answer, the workshop initially attempted to determine what exactly "Effects Based Operations" meant. The workshop began with a mini-symposium featuring speakers presenting leading thoughts on EBO. Mr. Len Hawley, former Assistant Secretary of State, provided a policy-maker's view of EBO as the keynote address. Additionally, Major General Deptula, USAF, and General Charles Wilhelm, USMC (Ret), who served as CINC, USSOUTHCOM and currently works with JFCOM J-9 in developing and experimentation presented practical views of the concept of EBO.

The MORS workshop provided two distinct areas of understanding within the evolution of EBO as a concept. The workshop outlined the basic principles of EBO which maintain that: (1) warfare should include all the instruments of national power and (2) each instrument should be applied in a way that maximizes its desirable impacts, minimizes undesirable ones, and complements actions taken in other arenas.[70] Secondly, the workshop further concluded there are two crucial differences between EBO and the ways we have been thinking in the past. The first is that EBO challenges us to move from an era of increasing Jointness to an era of "Meta-Jointness"

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[68] *Ibid. p. 12.*

[69] Military Operations Research Society, "Analyzing Effects Based Operations (EBO), Workshop Summary", (On-line). Available: http://www.mors.org/meetings/ebo/ebo_phalanx/

[70] *Ibid., p.*

that integrates DoD's actions into coherent sets of actions that involve a broader set of participants (e.g., interagency and coalition partners, International Organizations (IOs), Non-governmental Organizations (NGOs). The second is that EBO requires both greater knowledge and greater capability to deal with uncertainty than traditional military operations.[71]

The workshop then attempted to determine what analytic challenges EBO presented to the Operations Research (OR) community and what approaches or tools may already exist that could meet those challenges. Presentations by Paul Davis of RAND and Lee Wagenhals of George Mason University discussed the key attributes of EBO and the implied challenges and helped guide the workshop to determine actions that the OR community should recommend to ensure quality analysis in support of EBO. One of the challenges they specifically focused on was Measures of Merit (MoM) and indicators of success. Additionally, they discussed existing approaches, tool and techniques that help to visualize EBO, to track resource allocation with EBO, and to trace effects to include second and third order, and cascading effects. They identified the need for a "multi-perspective, multi-resolution model" because they determined that EBO was too difficult to support with individual tools.

The workshop then divided the participants into working groups to examine specific topics. These topics researched were: Wargaming, Experimentation and Exercises; Indicators of Success; Fundamental Sciences; and, Effects Based Analysis for Counterterrorism. The insights from each of the working groups was then collected and summarized. "As a consequence of the Workshop, there is enhanced understanding of the nature of this highly complex and multidimensional problem…However, we are keenly aware of the major challenges that remain in assembling and applying the needed expertise, tools and data to analyze real world

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[71] *Ibid., p.*

operations."[72] In summary, the workshop provided insight to each issue but determined that a great deal more analysis must be done.

The workshop determined that "Effects Based Operations, as a broad organizing concept, appears promising as an approach that will help decision makers inDoD and other organizations in the national security arena to protect US national interests and achieve US goals."[73] The workshop concluded with recommended changes that would support the implementation of EBO within DoD. These recommended changes included areas such as education, information sharing, joint and interagency integration, creation of databases and support for analysis and units of measurement.

SUMMARY AND CONCLUSIONS

As demonstrated in the Millennium Challenge 02 exercise and determined in the recent MORS workshop, "the analysis of EBO is not as straightforward, clean, or quantitative as attrition-based analysis."[74] This paper analyzed EBO as the "most effective way to frame future joint operations in a complex, uncertain environment."[75] Analysis determined that the concept of EBO as defined in *Joint Publication 3-0, Doctrine for Joint Operations*[76] will play a central role

[72] Richard Hayes, Dr. Evidence Based Research, Inc and Sue Iwanski, Ms. Systems Planning and Analysis, Inc., "Analyzing Effects Based Operations (EBO) Workshop Summary," PHALANX: The Bulletin of Military Operations Research, Vol. 35, No. 1, March 2002, p. 23.

[73] *Ibid.*, p. 25.

[74] Military Operations Research Society, "Worshop on Analyzing Effects-Based Operations Terms of Reference," (On-line). Available: http://www.mors.org/meetings/ebo/ebo_tor/.

[75] U.S. Joint Forces Command, J9 Joint Futures Lab,"Joint Operational War fighting (JOW): Thoughts on the Operational Art of Future Joint War fighting.", (On-line). Available: https://home.je.jfcom.mil/QuickPlace/innovation/PageLibrary85256AFF00620B2E.nsf/h_Toc/ED6814E19C75A4D785256BFB005607B0/?OpenDocument

[76] Joint Chiefs of Staff, *Doctrine for Joint Operations*, Joint Publication 3-0, Washington, DC: U.S. Joint Staff, 2001, p. B-1-3. "a process for obtaining a desired strategic outcome or "effect" on the enemy, through the synergistic, multiplicative, and cumulative application of the full range of military and nonmilitary capabilities at the tactical, operational, and strategic levels."

in meeting future challenges as outlined in the U.S. *Quadrennial Defense Review Report (QDR),* published September 30, 2001.

The QDR emphasizes the requirement for the U.S. security apparatus to adapt to new challenges.[77] The report specifically states that the U.S. military forces must maintain the ability to assure allies, dissuade (emphasis) adversaries, deter aggressors, and defeat any adversary if deterrence were to fail, while modernizing the force and exploiting the revolution in military affairs.[78] Secretary Rumsfeld in a recent speech on transformation stated that what is needed now at the threshold of the 21st Century is a "new way of thinking and a new way of fighting." The concept of EBO answers in part to both challenges.

In response to a "new way of thinking," Major General Cash, Director of Joint Experimentation, Joint Forces Command, stated "the concept of EBO may be this new way of thinking that will allow us to achieve this end-state of dissuasion."[79] Advances in technology and the ever-changing operating environment are continually driving military transformation. Within the COE, there now exist adversaries with increasingly more access to weapons of Mass destruction/effects and whose actions will likely be very unpredictable, and could directly threaten the American homeland. The military must meet this challenge by developing new force capabilities or enhancing current force capabilities to better protect U.S. security interests.

Secretary Rumsfeld has directed, "such new, unexpected and dangerous adversaries must be dissuaded (emphasis), deterred, and defeated without undue cost to American interests abroad or attacks on the U.S. homeland.[80] Though the core mission of the U.S. armed forces continues to

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[77] Donald H. Rumsfeld, *Quadrennial Defense Review Report*, Washington, DC: U.S. Government Printing Office, 2001.

[78] *Ibid., p. iv.*

[79] Jacqueline Henningsen, Dr., SES, MORS Fellow of the Society, Director, Air Force Studies & Analysis Agency, " A Dialogue on Analyzing Effects Based Operations (EBO), (On-line), Available, http://www.mors.org/publications/phalanx /mar02/Lead2.htm

[80] *Ibid., p.*

be winning the nation's wars, the policy of dissuasion will require the U.S. to apply all instruments of national power to contain adversaries or potential adversaries from taking action and reduce those actions if taken. EBO is an important new approach in meeting this challenge "because this new way of thinking seeks to forecast how a defiant adversary would respond to a range of U.S. (or those of a coalition) coercive actions-both military and non-military measures-to bring about decisive results without unduly compromising other U.S. interests at stake."[81] EBO currently represents a construct that should help policy makers determine how to use the various elements of power to attain national security objectives with application across the spectrum of conflict.

This construct depends on and requires extensive knowledge of potential adversaries for policy makers to most effectively plan and take action. Mr. Len Hawley surmised in his MORS keynote address that EBO supports the policy of dissuasion by attempting to provide policy makers with answers to the following questions: How would an adversary react if the U.S. were to take specific actions? How long will it take to achieve the desired effects on him? What are the possible unintended consequences? What is the range of realistic choices available that can be used in the near term?[82] This knowledge of adversaries will enable policy makers to determine the effects needed to convince or compel an adversary to change his behavior. These effects will play the critical role in the determination and linking of desired strategic outcomes with operational objectives down to the necessary tactical actions. Execution of the Strategic plan will aim at the use of all applicable and available capabilities. EBO helps to focus this aim by creating a coordinated and synergistic operation that will produce the desired effects. EBO provides a holistic and systematic approach to warfare that is applicable across the spectrum of

[81] *Ibid., p. 3.* Comments made by Mr. Hawley, as former Deputy Assistant Secretary of State in a presentation as the MORS key note address titled "A Policy-maker's View of Effects Based Operations – regarding the newly important role of effects-based analysis in crisis decision-making."

[82] Len Hawley, Mr., Former Deputy Assistant Secretary of State, MORS keynote address, "A Policy-makers View of Effects Based Operations", (On-line), Available, http://www.mors.org/publications

conflict. It rests on an explicit linking of actions to desired strategic outcomes focused on generating desired effects, rather than on objectives or the physical destruction of targets.

EBO is also responsive to "a new way of fighting," as described in *Joint Vision 2020* as "Full Spectrum Dominance."[83] The achievement of such dominance requires the integration of service core competencies at the operational level. The building of effective military forces for 2020 requires joint integration, intellectually, operationally, organizationally, doctrinally, and technically.[84] JFCOM is responsible for such integration and is continuing to develop EBO as the integrating concept to meet this charter. This is critical in building the foundation upon which all other transformation and reorganization initiatives will be based and focused.

It can be argued throughout history that for organizational and cultural reasons, elements of the military have never worked well together. Transformation ascertains that the "new way of fighting" requires changes in organizational structures to wage modern war. As defined in *Joint Publication 3-0, Doctrine for Joint Operations,* EBO allows for the most efficient use of force. This is required due to the nature of U.S. military engagements during the past decade which have become "increasingly joint in nature, combined with the finite base of troops and equipment to draw capabilities, means that the services must work more closely together to produce a synergistic effort."[85] EBO is essential in this new way of conducting operations by determining the most capable force for action, integrating core competencies and focusing them on generating desired effects in accordance with national policy.

In this sense, EBO provides guidance to apply the right tools at the right time by approaching six-dimensional operations (sea, air, land, space, electro-magnetic spectrum and

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[83] Henry H. Shelton, *Joint Vision 2020 America's Military: Preparing for Tomorrow,* Washington, DC, 2000, p. 3.

[84] *Ibid., p. 2.*

[85] Michael P. Noonan & Mark R. Lewis, "Form, Function, and U.S. Defense Transformation," *Foreign Policy Research Institute,* (on-line), Available, http://www.fpri,org/enotes/military.20021108.noonanlewis.formfunctionusdefensetransform

psychological realm) in a unified and comprehensive manner, while maximizing the effectiveness of service core competencies as combat multipliers enhancing one another. Though EBO has been used to a varying extent throughout history, technology is enabling it to come to the forefront of "a new way of fighting." Technology is now allowing the separate services to communicate and share information quickly, enabling them to work more closely together. Additionally technological advances in munitions has created an additional synergy among the services allowing a greater yield of combat power within smaller force packages that can be employed with exacting precision. This was recently exemplified in the conduct of operations in Afghanistan in which Special Forces Soldiers called in precision air strikes on enemy positions utilizing technologically advanced communication systems while riding on horseback with Northern Alliance troops. These new capabilities combined with the emerging requirements posed by the COE have pushed EBO to the forefront.

EBO best represents a theory that should help select and integrate the various elements of power to attain national security objectives and that the current definition found in *Joint Publication 3-0, Doctrine for Joint Operations* best supports this goal. EBO best supports policy makers and commanders in providing a common framework for decision making which aligns strategic goals with operational objectives and tactical actions. Taken outside of this context, EBO has many hurdles to overcome to be jointly accepted.

The two most prevalent problems lie in Service centric biases towards EBO and, the misunderstanding of EBO associated with its evolutionary difference in definitions and methodologies. Historically the U.S. has conducted military campaigns primarily on the lines of separate services in which each service has had a distinct role and operated nearly independently. "As recently as the Second World War, many if not most, of the battles were either primarily land (the European campaign), primarily maritime (the Pacific campaign), or primarily air (the Battle

of Britain or the strategic bombing of Germany's industrial centers)."[86] This Service centric independence continues to foster inter-service rivalry, hindering military effectiveness and fostering competition amongst the services for missions and money, which equate to relevance. Because EBO was initially an Air Force concept, it is heavily scrutinized as merely being a tool to further the budget of the Air Force by justifying anticipated modernization. "To many senior leaders in the U.S. Army, the concept of effects-based operations is another attempt by strategic bombing advocates to line Air Force coffers at the expense of land forces."[87] JFCOM must break down the walls that these service centric views have created.

Additionally, further development of EBO is hindered due to the varied definitions and interpretations of procedures that currently exist. As identified in the White Paper developed by the U.S. Air Force Doctrine Center, April 2001 the concept of EBO is not well understood and requires further elaboration. Additionally, there are currently no formally established procedures in the EBO methodology and very few formally defined EBO terms.[88] The misunderstanding of EBO as addressed in this paper resulted from the various stages of evolution and the resulting difference in definition and methodology. Current discussions and analysis are confused and hampered because of the various definitions and descriptions of the concept. JFCOM has addressed this problem by defining the concept and publishing current papers to include Effects Based Planning Tactics, Techniques, and Procedures (Final Draft) and Effects Assessment: Joint Tactics, Techniques, and Procedures (Draft). Additionally JFCOM is currently integrating the concept within current force experimentation to include the recently conducted Millennium

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[86] *Ibid.,* p. 2.

[87] Gary Cheek, Colonel, "Effects-Based Operations: The end of Dominant Maneuver?", *Strategic Studies Institute Study,* (On-line), available, http://carlisle-www.army.mil/ssi/pubs/2002/tranxcon/tramscpn.htm, p. 73.

[88] Air Combat Command, "Effects-Based Operations, White Paper", dtd May 2002. (Handout) , p. iv

Challenge 02 and inclusion into joint doctrine to include *Joint Publication 3-0, Doctrine for Joint Operations.*

Though the groundwork has been laid, full implementation of the EBO concept will not be easy. Machiavelli states: "There is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things."[89] It is clear that the implementation of EBO within the Joint construct provides distinct advantages; it also poses numerous challenges for individual services. The following recommendations are based on a qualitative analysis. This qualitative approach generated theory from observations that were based on primary source material in the form of government documents and secondary sources such as books, journals and periodical articles, and monographs. Additionally, interviews with senior leaders and subject matter experts were used to supplement the research.

Challenges associated with the implementation of EBO include procurement of compatible C4ISR systems, effective war gaming or modeling tools that accurately portray the intangibles of effects, and the requirement for the integration of joint, hard realistic training. Service doctrine must be expanded to ensure a synergy between elements of national power, capabilities of our services, domains in which we operate, and the processes of thinking, planning, deciding, acting, receiving feedback, measuring and modifying.

Modeling and simulation to support EBO must change. Future modeling must support both tangible and intangible effects enactment and assessment over differing periods of time. As stated by Mr. Watts, Director of Program Analysis and Evaluation on the Office of the Secretary of Defense, "I believe focusing on higher-level effects is the right direction for the American military…However, we should not kid ourselves about the inherent difficulties of quantifying,

[89] *Ibid.* p. 25.

much less predicting, emergent effects."[90] The need for this anticipatory assessment and high-order analysis may be one of largest conceptual problems facing implementation of EBO.

EBO as defined by JFCOM is a conceptual process and "because the conceptual thinking skills required by practitioners of effects-based operations will change the way the military must develop and train leaders," the military will be required to invest in the continued development of the intellects of its members throughout their careers.[91] Because producing knowledge is expensive and time intensive, the military must determine what knowledge is necessary to enable fast and effective decisions. EBO will require extensive conceptual development, years of education and training, reorganization of many planning and assessment functions, and development and application of advanced technologies of many kinds. "Without the intellectual capabilities to synthesize, to view the environment holistically, to be creative, and to be inquisitive, the great potential of EBO will not be realized."[92]

"The evolutionary, refined, and broadened concept of EBO has large potential to improve the way of employing Army forces and using military power."[93] Upon completion of analysis, EBO will allow the U.S. to transform the nature of warfare by embracing all elements of national power in an integrated and focused methodology. Because EBO has far reaching implications across the range of military operations throughout each service and in joint and coalition operations, it must be capable of institutionalizing across the levels of command a holistic approach to warfighting founded on a systems perspective of the battle space and the integrated

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[90] Jacqueline Henningsen, Dr. SES, MORS Fellow of the Society, Director, Air Force Studies & Analysis Agency, "A Dialogue on Analyzing Effects Based Operations (EBO)", (On-line). Available: http://www.mors.org/publications/phalanx/mar02/Lead2.htm

[91] Allen Batschelet, LTC, "Effects-Based Operations: A new Operational Model?" *Strategic Studies Institute Study*, (On-line), available, http://carlisle-www.army.mil/ssi/pubs/2002/tranxcon/tramscpn.htm, p. 125.

[92] Wayne M. Hall, BG (Retired), "Notes, The Pieces of Information Superiority, Millennium Challenge 02, 10/9/2002, p. 13.

application of various instruments of power. EBO shows great promise as a broad organizing concept, which will help transformation of our military forces and help to define a new way of thinking and a new way to fight.

Suggested Further Research

In the process of researching and writing this monograph, several related topics surfaced that warrant further research. These topics will add to the body of research regarding EBO and its implementation within joint doctrine:

1. Modeling and simulation support of EBO.
2. Development of databases and data structures to support integration and measurements of EBO.

[93] Allen Batschelet, LTC, "Effects-Based Operations: A new Operational Model?" *Strategic Studies Institute Study*, (On-line), available, http://carlisle-www.army.mil/ssi/pubs/2002/tranxcon/tramscpn.htm, p. 129.

GLOSSARY

ACC/XP – Air Combat Command Directorate of Plans and Programs
C4ISR – Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance
CAS – Complex Adaptive System
COE – Contemporary Operating Environment
COG – Centers of Gravity
DoD – Department of Defense
ETO – Effects Tasking Order
GWOT – Global War on Terrorism
IBCT – Interim Brigade Combat Team
IO – Information Operations
IOs – International Organizations
ITEM – Integrating Task/Effects Matrix
JISR – Joint Intelligence, surveillance, and Reconnaissance
JFCOM – Joint Forces Command
JOW – Joint Operational Warfighting
MC02 – Millennium Challenge 2002
MORS – Military Operations Research Society
NGOs – Non-governmental Organizations
OR – Operations Research
PEL – Priority Effects List
PMESI2 – Political, military, economic, social, information and infrastructure systems
4GW – Fourth Generation Warfare

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