

**JOINT FORCES STAFF COLLEGE
JOINT ADVANCED WARFIGHTING SCHOOL**

**EFFECTS-BASED OPERATIONS:
ENHANCING OPERATIONAL ART & DESIGN IN THE 21ST CENTURY**

by

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Joint Forces Staff College or the Department of Defense.

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ABSTRACT

The attacks of September 11, 2001 and the resulting combat operations in Afghanistan compelled the Armed Forces to thoroughly review and revise current warfighting concepts to determine if they are adaptable to changing technologies, threats and missions. The Services are moving forward with transformation roadmaps to build a capabilities-based force, but what has not moved as quickly is a clear understanding of how to execute effects-based operations in a complex and challenging contemporary operating environment. Effects-based operations (EBO) are, “Operations 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.” (USJFCOM, 2004, 2) EBO expands our warfighting concepts and capabilities through the dynamic application of selected elements of national power made available to a combatant commander to achieve operational and strategic endstates through full spectrum-operations.

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ACRONYMS

BDA	Battle Damage Assessment/Bomb Damage Assessment
C2	Command & Control
C3	Command, Control & Communications
CC	Critical Capabilities
CCIR	Commander's Critical Information Requirements
CCRP	Command and Control Research Program
CFACC	Combined Forces Air Component Command
CFLCC	Combined Forces Land Component Command
CIE	Collaborative Information Environment
CJTF-180	Combined Joint Task Force-180
CMO	Civil-Military Operations
COA	Course of Action
COE	Contemporary Operating Environment
COG	Center of Gravity
COP	Common Operating Picture
CR	Critical Requirements
CV	Critical Vulnerabilities
D3A	Decide, Detect, Deliver, Assess
DCTS	Defense Collaboration Toole Suite
DEB	Daily Effects Board
DIME	Diplomatic, Informational, Military, Economic
DOD	Department of Defense
EBA	Effects-based Approach
EBO	Effects-based Operations
EBP	Effects-based Planning
EBT	Effects-based Targeting
ECC	Effects Coordination Center
ETO	Effects Tasking Order
FRAGO	Fragmentary Order
HPT	High Payoff Target
HPTL	High Payoff Target List
HVT	High Value Target
HVTL	High Value Target List
IDA	Institute for Defense Analyses
IO	Information Operations
ISR	Intelligence, Surveillance and Reconnaissance
JEWG	Joint Effects Working Group
JIACG	Joint Interagency Coordination Group
JIPB	Joint Intelligence Preparation of the Battlespace
JOA	Joint Operations Area
JWAC	Joint Warfighting Analysis Center
JWFC	Joint Warfighting Center
MCC	Maritime Component Commander
MN3	Multinational Experiment 3

ACRONYMS (continued)

MOE	Measures of Effectiveness
MOP	Measures of Performance
MSC	Major Subordinate Command
nKPA	North Korean People's Army
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
ONA	Operational Net Assessment
OODA	Observe, Orient, Decide, Act Loop
OSC	Operational Strategic Command
PA	Public Affairs
PMESII	Political, Military, Economic, Social, Infrastructure, Information
RDO	Rapid Decisive Operations
SAM	Surface to Air Missile
SJFHQ	Standing Joint Force Headquarters
SOC	Sector Operations Centers
SOF	Special Operating Forces
SoSA	System of Systems Analysis
SPOD	Sea Points of Debarkation
TPFDD	Time-Phased Force and Deployment Data
TSCP	Theater Security Cooperation Plan
UAV	Unmanned Aerial Vehicle
USCENTCOM	United States Joint Forces Command
USSOCOM	United States Special Operations Command

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INTRODUCTION

“We are egregiously mistaking, if we....should [not] be well informed of the nature of the country, the abilities of the general to whom we are opposed, the situation of his magazines, the towns that are most convenient to him, and those from which he draws his forage, and when these various circumstances are well combined together, the plan is to be formed and maturely digested.” (Fredrick, 1757, 17)

Secretary Donald H. Rumsfeld entered office in January 2001, with the mandate to transform the Department of Defense (DOD) during his tenure by restructuring organizations and adopting new operational concepts that would exploit modern technological advances. Since the early 1990s, the Armed Forces have been experimenting with an approach to planning, executing and assessing military operations with an explicit focus on effects as opposed to targets or even objectives--this concept is known as effects-based operations (EBO). Admiral Arthur K. Cebrowski, Director of the Office of Force Transformation, said “as demonstrated by the superb performance of U.S. forces during recent combat operations, we are on course to transform our military into an agile, network-centric, knowledge-based force capable of conducting effective joint and combined military operations against all future adversaries.” (Cebrowski, 2003, 1)

The attacks of September 11, 2001 and the resulting combat operations in Afghanistan and Iraq compelled the Armed Forces to thoroughly review and revise current warfighting concepts such as the Marine’s Operational Maneuver from the Sea and the Navy’s Fleet Response Plan to determine if they are adaptable to changing technologies, threats and missions. The Services are moving forward with transformation roadmaps to build a capabilities-based force, but what has not moved as quickly is the development of doctrine for implementing effects-based operations in this complex and challenging strategic environment.

Because the Information Age provides tremendous capabilities for the improved application of the elements of national power, combatant commanders should exploit this potential by using effects-based operations that enable simultaneous attacks against an adversary's entire system with lethal and non-lethal means, resulting in controlling or altering his behavior. Effects-based operations utilize all or selected elements of national power in concert to achieve strategic goals. The elements of national power are the means by which the nation achieves its national objectives, and are composed of diplomatic, informational, military and economic (DIME) instruments. For example, the diplomatic element possesses numerous policy instruments to address problems, one such, may be an ambassador issuing a demarche to a nation that is violating an international treaty. Another may be the Secretary of State building a coalition or alliance to support U.S. diplomatic pressure or isolation of the offending nation. In concert with these efforts, economic sanctions may be imposed by the U.S. as well as the United Nations, through a U.S. introduced Security Council Resolution to effect a change in the treaty violator. Concurrently, the military element may conduct strikes or raids, combined training exercises, maritime interdiction operations or deploy forces forward for an invasion of the belligerent nation as coercive measures.

When executing EBO the desire is for the elements of national power to impact only the targeted nation, but there is the possibility of producing second or third order effects inside the targeted nation, as well as regionally or internationally. The U.S. invasion of Iraq produced the desired outcome of regime change, and the removal of a safe haven for terrorists. The invasion also produced some positive unanticipated effects, democratic reform in Lebanon, diplomatic overtures by Libya and reform movements in the Caucasus region; negatively, the unintended or undesired effects are the Iraqi insurgency, wide spread anti-

Americanism, and lack of international support (France, Germany, and Russia). Even though effects-based operations are not new, current and emerging technology can enable combatant commanders to receive real-time assessments of actions, make adjustments to plans much faster than previously possible and acquire a better understanding of the enemy before and during operations. Furthermore, joint force commanders can ensure each line of operation not only achieves operational objectives, but is intrinsically linked to strategic goals from the beginning.

One of the first effects-based operations may have been executed by Thutmose III, the 2nd millennium B.C. pharaoh; when he led his army against a numerically superior Canaanite coalition and swiftly defeated them. His “strategic” objectives were to gain complete control of the Egyptian empire and expand his territorial holdings; his “operational” objective was destruction of the armies of the revolting Canaanite kings. During the Battle of Megiddo in 1454 B.C., the world’s first recorded battle, Thutmose used a combination of raids, information operations, military deception and “combined arms” operations to achieve his desired objectives.

The King of Kadesh (modern day Syria) supported by the Mitanni empire, led this revolt and with his allied armies occupied the high ground around Megiddo, a fortress which controlled the three main supply routes to the Hittite Empire and to Mesopotamia. Thutmose sent messages to the cities that were revolting to cause panic; he deployed his army in three wings gaining positional advantage and outmaneuvering the Canaanites by taking a route that was believed to be too difficult to traverse; and before the battle he conducted a full dress parade in view of the enemy, bolstering the confidence of his inexperienced army and causing panic in the Canaanite forces. The Canaanites unable to react to the unexpected avenue of

approach of the Egyptians, and their swift and well ordered attack, became quickly overwhelmed and forced to flee into the city. Thutmose's army then laid siege to the city for seven months and captured rulers of the revolt. (Battle of Megiddo, 2005)

One of the requirements Thutmose placed on the defeated kings was that each send a son to the Egyptian court to be educated in Egyptian customs and traditions and return to their homelands to rule with loyalty to the pharaoh. The resulting effects from this campaign was stability and quiescence within the Northern provinces for the remainder of his reign, and a stronger Egypt whose borders "extended...as far north as Syria and as far east as the Euphrates," and "aroused fear in the Hittite and Babylonian Empires;" which further set the conditions for their eventual defeat by the pharaoh's army. (Brooks et al, 2000, 10) Another example of EBO in military history is MG William T. Sherman's "March to the Sea" in which he explained his concept in a letter to MG Henry Halleck, "...we are not only fighting hostile armies, but a hostile people and must make old and young, rich and poor, feel the hard hand of war, as well as the organized armies." (Sherman et al, 2000, 568) In that campaign he aimed to not only fix and then annihilate the Confederate Army in the southeast, but to attack the will of the citizens of Georgia and South Carolina and their support for the Confederate cause through deprivation and isolation.

Historically, all U.S. warfighting doctrine has revolved around the classical concepts of attrition and annihilation and focused on the destruction of the enemy's people, materiel and infrastructure. However, unlimited and unrestricted warfare are concepts of the past due to globalization, technological advances in weaponry, the international community's uneasiness with inflicting massive casualties and causing collateral damage. This framework requires combatant commanders to have campaign plans that take into account how one or

multiple sets of actions with its desired effects can influence, control or alter the actions and/or behavior of the adversary to achieve operational and strategic objectives. Therefore, operational planning must concentrate on the efficacious employment of military power to achieve objectives with the least expenditure of resources, and mitigate the consequences of second and third order effects which result from unified action.

The question is often asked “haven’t commanders always focused on the effects they want to achieve?” The answer is invariably yes, senior commanders always considered effects when planning and executing battles, but those effects were physical; destruction of lines of communications and mechanized forces, or suppression of enemy integrated air defense systems. Past operational commanders lacked the tools and capabilities to examine an adversary’s behavioral characteristics and the ability to determine how to control or affect an adversary’s behavior. EBO has the potential to provide such capabilities and move operations away from focusing on the physical domain and enable commanders to attack an adversary’s physical, cognitive and informational domains simultaneously.

EBO is an evolutionary concept that does not nullify the traditional concepts of annihilation or attrition, but broadens the options available to the joint force commander. The concept expands our warfighting capabilities through the dynamic application of all or selected elements of national power to achieve operational and strategic endstates. Using EBO the joint force commander can conduct simultaneous operations to overwhelm an adversary with kinetic and non-kinetic means such as, air interdiction/strategic attack operations, computer network attacks, influence operations, maritime interdiction operations and ground operations. Through the use of advanced technologies, such as operational net assessment and system of systems analysis, EBO has the advantage of identifying the targets,

objectives and nodes that will produce the best result from our actions and enable combatant commanders to achieve full-spectrum dominance during major combat operations or campaigns.

EBO requires a systems approach to evaluating the enemy as a system or more specifically a system-of-systems. U.S. Joint Forces Command (USJFCOM), which is tasked with developing new concepts for the Department of Defense, defines system-of-systems as, “a grouping of organized assemblies of resources, methods, and procedures regulated by interaction or interdependence to accomplish a set of specific functions.” (USJFCOM Glossary, 2005) By looking at the enemy as a system-of-systems with dependent sub-systems, the U.S. military in conjunction with the other elements of national power can bring to fruition Clausewitz’s ideal form of war, the striking of blows everywhere at the same time.

In the most recent, *National Military Strategy of the United States of America*, General Richard B. Myers, Chairman of the Joint Chiefs of Staff, stated, “we will transform the Armed Forces...field new capabilities and adopt new operational concepts while actively taking the fight to terrorists.” (Myers et al, 2004, iii) EBO is being used with various levels of success by the U.S. led coalition forces in Operations Iraqi Freedom and Enduring Freedom; however, the question is whether U.S. combatant commands make decisions and take actions faster than the enemy can develop them and act. Doing so creates the probability that the coalition will be able to take advantage of opportunities as they arise on the battlefield--essentially getting inside the enemy’s OODA (Observe-Orient-Decide-Act) Loop.

EBO is a broad subject with no doctrine formally published by any of the services at this time. Therefore, the scope of this thesis is limited to examples from de-classified operations conducted during Operation Enduring Freedom and Operation Iraqi Freedom and

experiments conducted by USJFCOM. USJFCOM initiated EBO experimentation during Millennium Challenge 02 and continues it during Pinnacle exercises; USJFCOM also issued several white papers on the subject, including, “Operational Implications of Effects-Based Operations.” The majority of the theories on EBO have been developed within the U.S. Air Force with two of its officers taking the lead in promoting EBO as a new warfighting framework, Colonel John Warden and Major General David Deptula. Recently, the U.S. Army began experimenting with EBO at its combat training centers and gathering lessons learned through the Center for Army Lessons Learned at Fort Leavenworth, KS.

ANALYSIS

Historical Origins of EBO

The genesis of effects-based operations as it is understood today began with the work of planners on the U.S. Central Command’s (USCENTCOM) “Black Hole” air component planning team which was tasked with developing strategic targets during the Persian Gulf War. These planners developed an air campaign to achieve an “effect” on specific Iraqi systems that if removed from Iraqi control, would enable USCENTCOM to achieve its objectives and thus allow the U.S. and its allies to achieve their strategic goals. Major General Deptula, who worked on the “Black Hole” team as a lieutenant colonel, and is one of the leading proponents of EBO in the military today, asserts that in “using effects-based operations, the determinant success is effective control of systems that the enemy relies upon to exert influence...” (Deptula, 2001, 11) EBO as implemented by the U.S. military today initially focused on kinetic solutions to achieving military and political objectives and can trace its roots through the many centuries of warfare; however, as will be shown later it will

be important to engage an enemy through all the domains: physical, cognitive and information using both lethal and non-lethal means.

From campaigns conducted by Thutmose III to those waged by General Creighton Abrams, senior military commanders have in one way or another always attempted an effects-based approach to warfare--linking actions to objectives in order to achieve the desired political endstate, usually with mixed results. That is why extrapolating a definition of effects-based operations from historical works has been difficult; however, the most germane is from Carl von Clausewitz's *On War* in which he states, "even the ultimate aim of contemporary warfare, the political object, cannot always be seen as a single issue. Even if it were, action is subject to such a multitude of conditions and considerations that the aim can no longer be achieved by a single tremendous act of war. Rather it must be reached by a large number of more or less important actions, all combined into one whole....from a greater aggregate of physical and psychological strength." (Howard, et al., 1976, 227, 566)

Historically, militaries have been unable to fully apply Clausewitz's theory or employ the modern concept of effects-based operations, because of the lack of harmonization of the elements of national power against an adversary, understanding the enemy as a system that is adaptive, complex and interdependent, and the ability to conduct rapid assessments of actions and effects.

An EBO example from the American Civil War can be drawn from LTG Ulysses S. Grant's issuance of his commander's intent to MG William T. Sherman for the "March to the Sea" campaign. On April 4, 1864, Grant sent a message to Sherman, outlining his intent for the execution of Sherman's proposed spring campaign. Grant wrote, "take the initiative in the spring campaign, to work all parts of the army together and somewhat toward a common

center,” and he explained how the other lines of operation being conducted by Sherman’s contemporaries would also support this intent. Grant ordered Sherman to “move against Johnston’s army, to break it up and to get into the interior of the enemy’s country as far as you can, inflicting all the damage you can against their war resources. I do not propose to lay down for you a plan of campaign, but simply lay down the work it is desirable to have done and leave you free to execute it in your own way. Submit to me, however, as early as you can, your plan of operations.” Grant understood that this would not be a simple undertaking and because of the long lines of communications he would not be able to make quick adjustments to Sherman’s operation, however, he trusted his judgment and knew that Sherman would accomplish the mission. Due to Sherman’s understanding of General Grant’s intent and his firm grasp of operational art and design, he was able to wage a campaign that overwhelmed Johnston’s army physically and psychologically. Additionally, the civilian populace was isolated and deprived of essential goods and services. Consequently, in an attempt to regain the initiative in the southeast, the Confederate government diverted its limited resources from the forces opposing the Army of the Potomac, however, this did not enable Johnston to regain the initiative, and his army surrendered in mass to Sherman. (FM 3-0, 2001, 5-15)

In addition to the Union military campaign against the Confederacy, there were economic and political campaigns aimed at defeating the secessionists. The Union’s blockade of the majority of the southern ports and the destruction of rail lines essentially bankrupted the Confederacy, preventing planters and manufacturers from trading with the Caribbean, European or Canadian merchants. Diplomatically the Confederacy was isolated; it failed to gain the support of Great Britain and France due partly to northern military victories in the latter half of 1863. Additionally, the neither Europeans nor Canadians wanted to jeopardize

lucrative trading deals with northern merchants by supporting a dying regime. Furthermore, the momentum of Lincoln's re-election campaign coupled with the campaigning by abolitionists and southern Unionists gave rise to small peace movements in the south.

These efforts were coupled with a strong information campaign against the southern cause; with speeches by Lincoln, editorials and commentaries in northern newspapers and weekly magazines blasting the Confederacy for attempting to destroy the Union which had only come into being less than 90 years ago, harangues by abolitionists and pictures documenting the atrocities in southern prison camps, namely Andersonville and Belle Isle, and committed by slave owners. It was believed that "to win the war, Union armies had to conquer and occupy southern territory, overwhelm or break up Confederate armies, destroy the economic and political infrastructure that supported the war effort, and suppress the southern will to resist." (McPherson, 1990, p. 350-353) This example illustrates the timeless applicability of EBO, and highlights the fact that this is not a new form of warfare, but rather a new framework where the emphasis is on the integration of all elements of national power working toward a common strategic goal. Furthermore, this example underscores the importance of understanding the enemy as a system and affecting change in an adversary through a concerted effort and with the least cost to lives and resources--Sherman's campaign was estimated to cause over \$100 million (1864 dollars) in damage.

In the early 20th century, airpower proponents--Guilio Douhet, Billy Mitchell and Edgar Gorrell--were among the earliest advocates of EBO. Witnessing the results of attrition warfare, they began to argue the efficacy of strategic bombing in compelling an adversary to submit to your will. Douhet stated "[a] people who are bombed today as they were bombed yesterday, who know they will be bombed again tomorrow and see no end to their martyrdom,

are bound to call for peace at length.” (Douhet, 1942, 276) Douhet and Mitchell advocated prosecuting a war beyond the linear battlefield and exposing the civilian populace to the effects of warfare, with the hopes of eroding their morale and support for the war effort--thus forcing the national leadership into early capitulation.

These theories were advanced by instructors at the Air Corps Tactical School who developed the idea that victory in war could be attained by attacking an enemy's industrial complex or “industrial web” instead of his military forces. The airpower theories were put to practical use during World War II, when the U.S. and Great Britain developed plans for strategic bombing campaigns against Germany. Simply put, if Allied airpower destroyed the German's ability to wage war then the Germans would lose the will to fight also. However, some might argue that the Allied bombing campaign, even the fire bombing of Dresden had the opposite effect on the people and bolstered their support for the war effort, thus negating effects-based operations.

The Allied leaders believed the German economy was fully mobilized to support the war effort like the U.S. and British economies were, however, this was not true. The bombing of the cities and ball bearing plants was not as disruptive to the German war effort as originally thought--as would be the bombing of their transportation assets and oil production facilities/systems later in the war. This early attempt at EBO may have failed, but without experimentation there is no change.

Today there are nearly 200 countries, of which approximately 30 are in danger of rapidly dissolving, due to their inability to meet the needs of their populations or because of ethnic, cultural, or religious strife. Since 1994, there have been more than 50 ethnic wars, over 150 border conflicts, and three major wars involving forces from outside the region.

(Admiral, et al, 2004, 6) This contemporary operating environment (COE) requires the military to transform operational doctrine, and begin to think differently about the enemy, force application and executing missions now and in the future.

Changing the Way We Think About the Enemy

A significant paradigm shift occurred on September 11, 2001, when Al-Qaeda viciously and unimaginably attacked the United States, ushering in a new operational environment for the Armed Forces as well as new form of warfare. This act of aggression was the first time in world history that a non-state entity attacked and tried to cause the downfall of a recognized nation-state. Since the signing of the Peace of Westphalia in 1648, nation-states have maintained a monopoly on warfare and the conduct of international diplomacy; however, during the decade leading up to the events of September 11th a new entity, the non-state actor, violently entered the world scene using a strategy of trans-national terrorism to fulfill their strategic endstate.

The most significant threat that faces the United States today is trans-national terrorism. The use of terrorism as an extension of traditional warfare has existed for millennia, using violence to coerce organizations, societies or governments to gain concessions or accomplish ideological goals. Trans-national terrorists consider their actions as legitimate military operations, but their focus is not on the actual attack, but the second and third order effects of their actions; withdrawal, concessions, de-stabilization or worse governmental collapse.

Over the next decade combatant commands will have to conduct operations against adversaries that may or may not be supported by a nation-state, and often times transcend national boundaries. These organizations each utilize EBO in a rudimentary manner,

attempting to control their enemy physically or psychologically. These non-state actors may be narcotics traffickers, extremists, warlords or terrorist organizations, such as Al-Qaeda, Armata Corsa, Basque Separatists, Hamas, Revolutionary Armed Forces of Colombia, and the Arellano-Felix Organization drug cartel, operating internally and externally to recognized nation-states. These organizations are unencumbered by reticence, compassion, or remorse and will conduct operations that are characterized by asymmetry and decentralized execution to achieve their desired objectives. Furthermore, our future adversaries are developing techniques to counter our military and technological superiority such as; computer network attacks, use of miniature submarines to support narcotics trafficking, improvised explosive devices, kidnappings & assassinations (U.S. allies in developing nations), and acquiring and using WMD/E (Tokyo subway).

The ancient Byzantine general, Belisarius said, “the most complete and happy victory is this: to compel one’s enemy to give up his purpose, while suffering no harm oneself.” (Hart, 1954, xii) However, this approach to thinking about warfare is still in its embryonic stages. Currently the U.S. military utilizes objectives-based thinking, which examines the strategy at one level and turns that strategy into objectives at the next lower level--which has changed little since the Napoleonic Wars. The outcome or endstate of these operations is the physical destruction of targets; which lacks the dynamic assessment provided in effects-based operations.

In contrast, EBO is a new way of thinking about the means by which the military can accomplish its objectives and achieve the desired endstate at all levels of war. EBO will not prevent the U.S. military from sustaining combat losses, but it promises to “diminish close combat requirement[s]”. (Bingham, 2002, 58) This promise is a worthy ideal, but events

unfolding in Afghanistan and Iraq differ very little at the operational and tactical levels than those witnessed by Napoleon, Sherman, MacArthur or Abrams, and the U.S. is the most technologically advanced country in the world. Colonel Bingham’s assertion may work against an adversary with a well developed politico-military structure, but until we develop the capability to truly identify the “Achilles heel” of our adversaries, dropping precision-guided bombs and computer network attacks will have limited success.

The need for close combat or “boots on the ground” will remain for the foreseeable future, even as EBO matures because war is an inherently human endeavor that requires experience, intuition and judgment to determine the appropriate actions on the battlefield. According to Edward Smith of CCRP, “the key to our working concept of effects-based operations as well as to the non-linear payoff that we hope to obtain from Network Centric Warfare is a process that takes place in the mind of man.” (Smith, 2002, 157) The figure below illustrates objectives-based thinking:

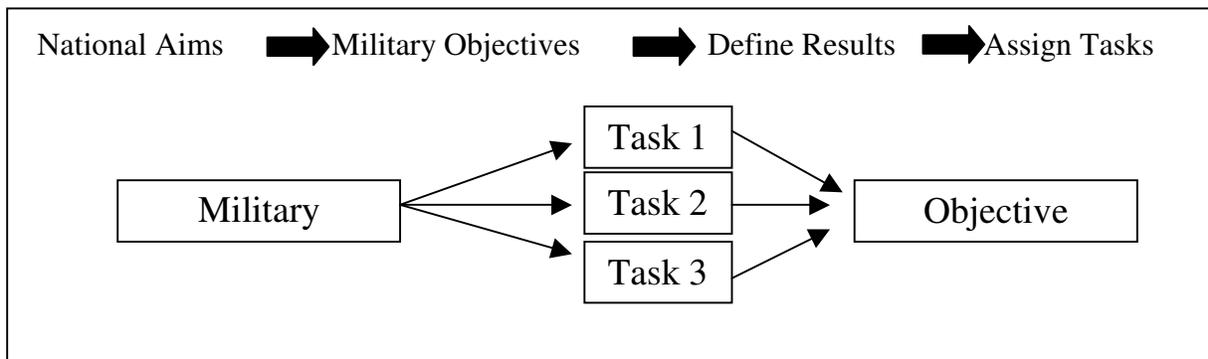


Figure 1: Current Objectives-based Model (Foster, 2002, 5)

Effects-based thinking, leveraging technology to gain decision superiority, can enable combatant commanders and their planners to develop and execute more effective operations and campaigns. Decision superiority is the ability of commanders, based upon information

superiority and situational understanding, to make effective decisions more rapidly than the adversary, thereby allowing one to dramatically increase the pace, coherence, and effectiveness of operations. (USJFCOM Glossary, 2005) Additionally, to achieve success in full spectrum EBO, combatant commanders must utilize a continuous cycle of analyzing & understanding, planning, executing, assessing and adapting. Furthermore, combatant commanders must think about effects not only in conflict but also in peacetime shaping operations, and operations other than war. (Gleeson et al, 2002, 7)

Effects-based thinking requires operational planners to remove “mirror imaging” from the current planning process and begin to incorporate in the decision-making process what is important to the enemy. Mirror-imaging is interpreting the actions of an adversary based on the “reasonable” person concept, which is assuming your adversary reasons in the same way that you do. Mirror-imaging an adversary during operational planning can endanger the force, because you may commit your forces to counter actions that your adversary never intended to execute and possibly present the adversary with the opportunity to exploit vulnerabilities. It is human nature to assume that what you value or think is important must be important to others. However, to avoid mirror-imaging planners must develop an implicit understanding of the enemy’s values, beliefs and culture through modeling him as a complex and adaptive system is needed. The difficulty is attaining such a high level of knowledge of an adversary and determining his actions, because culture, beliefs, religion, personal values and experiences, and language can effect how people think and act. However, with further developments in simulations and modeling there will come a time when combatant commanders will be able to have much of that information readily available to them.

According to the Institute for Defense Analyses (IDA), effects-based thinking relies on the following four areas: (Gleeson et al, 2002, 6)

- the importance of linking all actions (political, diplomatic, economic, and military) to operational and strategic outcomes
- continuous assessment of the effect and adaptation, as needed, of plans and actions to the reality of conflict
- thinking about the implication of actions and operations in terms of their second, third, and *n*th order effects
- thinking about the implications and consequences of effects over time

To ensure the combatant command is successful in executing EBO, there must be an explicit linkage of all actions to operational and strategic outcomes. This is only possible when the combatant commander with strategic guidance, articulates a clear vision of what is to be accomplished, identifies the actions needed to achieve the endstate, determines how the proposed actions or set of actions will contribute to the desired end-state, and finally, explains why the operations will work. Combatant commanders must clearly and effectively communicate to their planners and subordinate commanders the linkage between strategic objectives and endstate articulated by the President and Secretary of Defense, desired effects, and the tactical actions executed by the component commands.

Adversaries will seek to shape the battlespace to their advantage, in order to avoid defeat. To do this, they will try to change the nature of the conflict or use capabilities that they believe are difficult for U.S. forces to counter. (FM 3-0, 2001) Combatant commanders conducting operations on the modern battlefield will continue to face friction, ambiguity, uncertainty and an adaptive adversary. Instead of trying to eliminate these factors, combatant commander must ensure their staffs are trained to assess the situation quickly and adapt the

plans accordingly to meet these challenges. Figure 2 illustrates the importance of interaction between the leaders at each level of war.

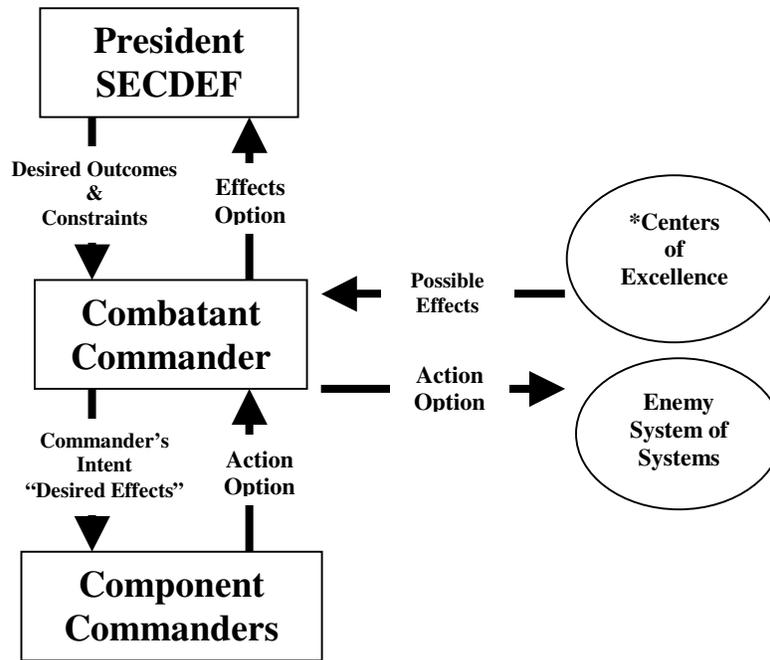


Figure 2: Effects-based Thinking & Linkage Model (IDA, 2002, 8)

*Centers of Excellence are institutions, organization, etc. possessing knowledge & intelligence about adversaries. (e.g., DIA, universities, businesses)

For effects-based operations to be successful, combatant commanders must ensure there is cooperation and coordination across all elements of national power, because military actions never exist separately from the realm of politics. Although combatant commanders do not establish national policy and only contribute in part to the National Defense and National Military Strategies, their Title X responsibilities require them to ensure that the actions of the joint force are consistent with and complementary to the political, diplomatic and economic goals--e.g. flexible deterrent options.

The concept of effects-based operations is as much about how the commander and staff think about operations as about how they employ military capabilities. (Gleeson et al, 2002) In order to turn effects-based thinking into EBO, there must be harmony among the

elements of national power with regard to the area of operation. Furthermore, to execute EBO there must be a clear understanding of the concept and a common language for the planners and executors of effects-based operations.

Defining EBO

Doctrine is defined as the “fundamental principles by which the military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgment in application.” (JP 1-02, 2004, 165) Currently there is a lack of doctrine associated with EBO, but when it is better understood and finally codified it will provide combatant commanders more flexibility in the planning and execution of operations. Words have meaning and without authoritative documents providing the approved lexicon for effects-based operations, combatant commanders will find it difficult to clearly articulate their vision doctrinally. Additionally, their staffs and component commanders may lack a clear understanding and ability to develop concepts of operations using an effects-based approach. According to the Joint Warfighting Center (JWFC), with an emergence of doctrine outlining the EBO construct, new terms and definitions will be added as the joint community begins to fully embrace the concept.

There are a number of definitions of EBO that are being used within the world of military and political science, however, they all attempt to focus on three critical areas: executing operations in the most effective and efficient manner, producing the most desirable endstate/outcome at all levels of war, and recognizing that our adversaries should be seen as adaptive and complex. The three definitions of effects-based operations listed below illustrate the above point:

USJFCOM: “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.” (JFCOM, 2004, 2)

Command and Control Research Program (CCRP): “Effects-based operations are coordinated sets of actions directed at shaping the behavior of friends, foes, and neutrals in peace, crisis, and war.” (Smith, 2002, xiv)

RAND: “operations conceived and planned in a systems framework that considers the full range of direct, indirect, and cascading effects--effects that may, with different degrees of probability, be achieved by the application of military, diplomatic, psychological, and economic instruments.” (RAND, 2002, xiii)

These three examples are only a fraction of the numerous ways military theorists are defining EBO and illustrate the need for a common language that allows for the nuances between military science and political science, but amplifies the understanding of EBO as a concept and framework for conducting operations.

The definitions of EBO associated terms below are meant to provide a better understanding of the concept, ensuring that confusion and ambiguity are minimized so that combatant commanders can present clear and concise intents and their staffs can develop plans that set the conditions for synergy in the operations. There are many more terms that have not been listed, but these are some that planners should comprehend to have a clear understanding of the USJFCOM definition of EBO:

Effect: The physical and/or behavioral state of a political, military, economic, social, infrastructure, information (PMESII) system that results from a military or non-military action or set of actions.

Objective: The clearly defined, decisive, and attainable goals toward which every military operation should be directed.

Node: A person, place, or physical thing that is a fundamental component of a system.

Action: An activity directed at a specific node.

End State: What the President of the United States and Secretary of Defense want the situation to be when operations conclude - both military operations as well as those where the military is in support of other instruments of national power. The set of required conditions that define achievement of the commander's objectives.

System: A functionally, physically, and/or behaviorally related group of elements that interact together as a whole. To facilitate a system-of-systems analysis, EBO currently considers that the operational environment is comprised of PMESII systems. Analysis of these systems and their inter-relationships provide the "holistic understanding" mentioned in the definition.

System of Systems: A grouping of organized assemblies of resources (banking or production system), methods, and procedures regulated by interaction or interdependence to accomplish a set of specific functions.

In EBO one of the keys to success is identifying the effects that are desired as a result of lethal and non-lethal operations. To narrow the focus, an effect is a change in the state or condition of an entity as a result of actions taken against it. Effects can be achieved in the physical, cognitive and information domains and are the goal of an operation; they are fixed conditions whereas the means available to combatant commanders are variable. The physical domain is the material world defined by the dimensions of land, sea, air and space; where human and mechanical actions take place against an adversary. The cognitive domain is the individual and collective consciousness that exists in the human mind. The cognitive domain is where perceptions are formed and decisions are made. The information domain is an abstract space where information exists and flows between receptors. The information domain consists of information itself, but is also the medium in which the functions of information systems occur. The information domain links the physical domain (human actions) to the cognitive domain (human consciousness), because this is how political and military leaders collect, process and disseminate orders throughout the command and control

system. (Romanych, 2005) Outlined below are some of the effects combatant commanders can chose to have on an enemy:

Disorganize	Disrupt	Destroy
Degrade	Co-Opt	Deny
Deceive	Distrust	Damage
Warn	Influence	Isolate

There are several orders of effects that apply to EBO; they are first order (direct) effects and second and third order (indirect) effects. Direct effects are the result of immediate action, for example, a 2,000 pound bomb dropped on a bridge may cause the collapse of the bridge or at least the inability to use it due to cratering. Using this same example, the indirect effects which are created through an intermediate effect or mechanism, might be the severing of a critical line of communication, or enemy supplies and reserves are unable to re-enforce first echelon forces. Regardless of the order of effect, according to CCRP there are two categories of effects, “those that are predominately physical (functional, systemic) in nature, and those that are primarily psychological.” (Smith, 2002, 256) Indirect effects may be functional, systemic or psychological and are difficult to recognize and are typically delayed.

Physical effects are created by the direct application of force on a system, with the purpose of denying its use by the adversary. During Operation Allied Force, the Air Force dropped graphite pellets on electrical power stations in Kosovo to knock out electricity, without physically destroying the infrastructure. Functional effects represent the direct or indirect effects of military action on the ability of a particular target or object to function properly and perform its mission. This can be done by conducting a physical attack through information operations on an enemy’s communications system rendering it unusable.

Systemic effects are those indirect effects aimed at affecting the operation of a specific system. Linked to the physical attack of the enemy's communications system, the inoperable communications system may prevent the enemy from directing his integrated air defense systems against friendly aircraft. Psychological effects which can be direct or indirect are the impact of military actions on the cognitive domain of a target. An operational commander who is unable to communicate with any of his forces or with his strategic leadership, has no protection of friendly air power, and has no ability to re-supply his military may capitulate due to his perceived inability to react to any of his adversary's actions effectively.

The orders of effects combine to form cumulative and/or cascading effects. Cumulative effects result from the aggregate of many direct or indirect effects. This may occur at the same or at different levels of war as the contributing lower-order effects are achieved. However, cumulative effects typically occur at higher levels of war. As an example, increased operational-level air superiority would be the cumulative effect of destroying numerous surface-to-air-missile sites at the tactical level.

Cascading effects result from indirect effects which can ripple through an enemy target system, often influencing other target systems as well. Typically this can influence nodes that are critical to multiple target systems. Most often this cascading of indirect effects flows from higher to lower levels of war. As an example, destroying an enemy's command and control network could produce cascading effects through the enemy echelons to ultimately disrupt numerous tactical units on the battlefield. (USJFCOM Glossary, 2005)

Collateral effects are those outcomes that result when something occurs, other than what was intended. In a negative sense, collateral effects may be incidental direct or indirect effects that cause unintended or unwanted injury or damage to persons or objects. On the

positive side collateral effects may generate outcomes that prove beneficial to ongoing military action. (USJFCOM Glossary, 2005)

Through the use of EBO combatant commanders can affect not only the physical state of the adversary, but the cognitive aspects of an adversary's leadership as well by exploiting an adversary's critical capabilities and vulnerabilities. In order to do this, combatant command staffs must thoroughly analyze the enemy as a complex system to identify the first order effects desired and plan for the potential indirect effects (anticipated, unanticipated, undesired and unintended) produced by lethal and non-lethal military operations. However, if these steps are not taken, there could be cascading effects from friendly actions that ripple through the system resulting in mission failure, exposure to high operational risk or produce conflict within the interagency community.

According to the U.S. Army FM 3-0, *Operations*, "multiple threats to U.S. interests [still] exist. Some are direct, such as a cross-border attack, others are indirect...asymmetric operations..." (Department of the Army, 2001, 1-8) Due to the overwhelming success of the U.S. Armed Forces during Operation Desert Storm, the international community understood that it would be nearly impossible to successfully engage the U.S. in a direct conflict. Therefore, potential adversaries adapted and utilized a number of indirect approaches to attack American power. Al-Qaeda utilized the direct approach of bombing Khobar Towers, the USS Cole, the embassies in Zaire and Tanzania and finally the attacks of September 11th, in an attempt to affect the U.S.

Understanding that they could not "physically" overthrow the U.S. government or any of the major western nations, Al-Qaeda focused on indirect effects against the perceived U.S. centers of gravity--the economy and the will of the people. The second-order effects they

imagined were U.S. economic collapse (third order, international economic collapse), withdrawal of U.S. forces from the Persian Gulf, specifically Saudi Arabia, and the tertiary effects of the fall of the Saudi royal family and potential rise of a Pan-Islamic empire. (Robinson, 2003) These types of operations and the contemporary operating environment that America will have to operate in require the U.S. military to think differently about countering potential and known adversaries.

What is an Effects-based Approach to Warfare?

Sun Tzu said, "...the victorious army first realizes the conditions for victory, and then seeks to engage in battle...," this is the essence of the effects-based approach to warfare; focusing on the desired effects by first determining the outcomes or goals of the operation. Warfare has dramatically changed since the U.S. led coalition campaign during Operation Desert Storm, which successfully employed the operational concept of Air-Land Battle--massed formations combining operational fires and maneuver. Recently warfare has moved away from the classical concept of linear battlefields to non-linear and asymmetric operations conducted in a non-contiguous battlespace. The battlespace is defined as "the environment, factors, and conditions that must be understood to successfully apply combat power, protect the force, or complete the mission." (JP 1-02, 2004, 64). The 21st century physical battlespace may include but is not limited to rural and urban areas, cyber/virtual networks, space, media or individual humans. (Pendall, 2004, 28)

Utilizing the effects-based approach greatly enhances U.S. military capabilities, because it translates strategic and operational objectives into tactical actions through the design, organization, integration, and conduct of a joint campaign and applies all or selected elements of national power in concert against an enemy--which is joint operational art.

(USJFCOM, 2004, 6) The effects-based approach requires and envisages strong interagency coordination and assistance in developing and maintaining a fluid information assessment, creating potential ‘effects’ and actions linkages, and pursuing actions based on capabilities. To this end, the Standing Joint Force Headquarters (SJFHQ) and Joint Interagency Coordination Group (JIACG) are the conduits for doing this and they enable a combatant commander to have reach-back to centers of excellence to assist in his decision-making. (Grossman-Vermaas, 2003, 10)

DOD defines operational art as “the translation of the joint force commander’s strategy into operational design and, ultimately, tactical action, by integrating the key activities at all levels of war” (JP 1-02, 2004, 387) According to USJFCOM there are three essential contributions of EBO to joint operational art leveraged through technology and new concepts:

- Improved agility and flexibility at the strategic level in achieving national and theater strategic objectives.
- Improved unity of effort and integrated planning adaptation at the operational level.
- Enhanced economy of force and more precise execution at the tactical level. (USJFCOM, 2004, 6)

These contributions enhance combatant commander’s battlespace visualization (See yourself, See the Enemy, See the Terrain), and his planning and execution of joint operations.

Furthermore, USJFCOM asserts that campaign planning and assessment is improved through the effects-based approach by:

- Linking of operational objectives to tactical-level actions through a specified set of effects.
- Systemic situational awareness and understanding of the adversary and operational environment enabled by a system-of-systems analysis (SoSA).

- Synchronization of “ends, ways, and means” using a harmonized application of the instruments of national power.
- Command and staff interaction across multiple echelons enabled by significant collaboration capabilities.
- Enhanced unity of effort between joint, multi-national, and interagency organizations.
- A more accurate, rigorous assessment of the attainment of campaign objectives focused on system behavior rather than discrete task accomplishment.
(USJFCOM, 2004, 6-7)

The effects-based approach takes the elements of DIME and leverages them through PMESII with the desire of achieving operational and strategic objectives. Although, it may seem that most operations are focused on the physical domain, EBO also attempts to attack an adversary’s cognitive domain principally through dissuasion. That is utilizing various means or media, such as communities of interest, familial links, sub-group leadership or regional leaders/interests, to affect an enemy’s ability to act or breaking his will. In order to successfully utilize an effects-based approach to warfare, the President and Secretary of Defense, advised by the Chairman of the Joint Chiefs of Staff, as well as combatant commanders must have a system or process to anticipate and understand the consequences of actions ordered then executed. There must be constant feedback, assessment and adaptation relating the national strategy to actions (operational and tactical) executed by the combatant commands.

Looking at the effects-based approach model (Figure 3), a combatant commander translates national and international objectives and incorporates these objectives into the command’s theater campaign objectives. Additionally, combatant commanders work with the U.S. ambassadors and country teams within their areas of responsibility to better understand

regional and specific country issues. To ensure unity of effort within the region, these objectives are used to build a common operating picture (COP) that enables development of and support for theater security cooperation plans and concept plans.

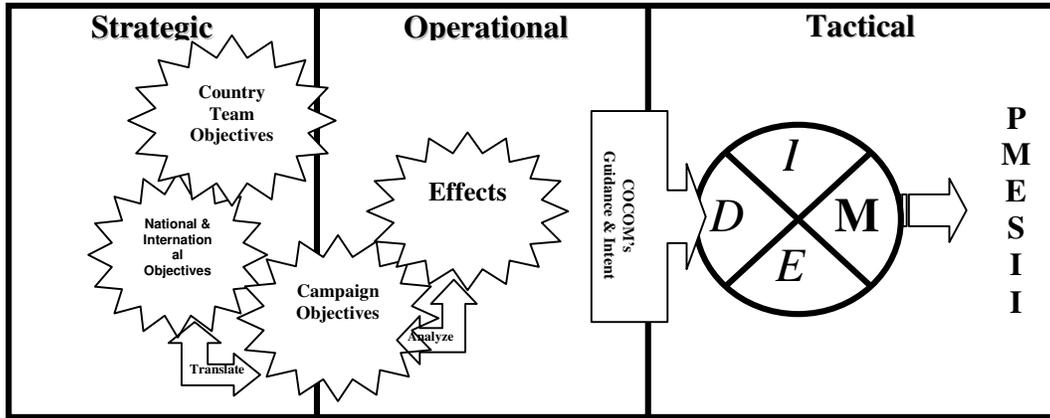


Figure 3: Effects-based Approach Model (USJFCOM)

From these objectives and the COP, the staff and component commands begin the planning process which is enabled by collaborative capabilities and operational net assessment (ONA). By conducting a mission analysis and utilizing these tools, the commander and staff can then gain a better understanding of their operational environment, and they are able to determine the specific PMESII effects required in order to achieve theater and national aims.

The combatant commander then issues his intent to his staff, components and other supporting commands and agencies, which provides a framework for planning and focuses the military resources that can and may be integrated with the other elements of national power. At the conclusion of the planning process, the combatant commander outlines the measures of effectiveness & performance and his endstate. The plan synchronizes the DIME actions to affect the PMESII systems within the battlespace in order to achieve desired effects, resulting in achievement of operational and strategic goals. (USJCOM, 2004, 7-8)

The effects-based approach focuses on influencing the mind of the adversary with the aim of neutralizing his politico-military capabilities--thus minimizing U.S. casualties and collateral damage. Instead of utilizing the Powell Doctrine of overwhelming combat power, the effects-based approach combines physical and psychological effects in order to overwhelm and adversary creating paralysis throughout the PMESII system, allowing the U.S. to achieve its desired objectives. However, the balance between the two areas must constantly be assessed and if necessary changed.

According to USJFCOM there are three key enablers of the effects-based approach; the collaborative information environment (CIE), operational net assessment (ONA) and the system-of-systems analysis (SoSA). The CIE is a virtual aggregation of individuals, organizations, systems, infrastructure and processes to create and share data, information, and knowledge needed to plan, execute, and assess joint force operations. (USJFCOM, 2004, 9) CIE consists of five elements which will improve combatant commanders' situation awareness: infrastructure (hardware & networks), capabilities (applications & commonality), users, procedures and information & knowledge. With these elements commanders will be able to increase their situational understanding, because CIE promises to provide them with the right information, in the right format at the right time--thereby accelerating decision superiority.

Moreover, operational command and control is enhanced through CIE, because commanders can speed their decision-making through self-synchronization, information sharing and robustly networked forces. CIE furthers the harmonization of DIME, through its use by the SJFHQ and JIACG at combatant commands, by enabling the creation of a shared

situational awareness so planning and executing can be conducted with a focus on unity of effort. Figure 4 illustrates the elements that enhance situational awareness in the CIE.

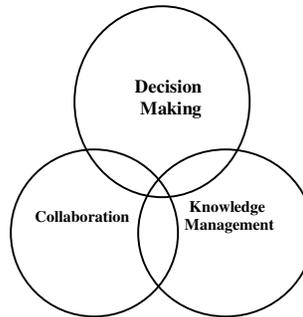


Figure 4: CIE enhances Operational C2

Knowledge management (information superiority, situational understanding, & content management) techniques and procedures are also a part of the CIE, which govern collaboration within the combatant commands and within components. Using these techniques and procedures the staff can more efficiently integrate and synchronize the activities of the various command elements to generate supporting information and directives such as the effects tasking orders, operational reports, and time-phased force and deployment data (TPFDD). (USJFCOM, 2004, 9)

ONA is a decision support tool for the joint force commander that provides analysis of the enemy's decision cycle, potential actions and command and control structure in relation to the same on the friendly side. ONA is defined as “the integration of people, processes, and tools that use multiple information sources and collaborative analysis to build shared knowledge of the adversary, the environment, and ourselves.” (USJFCOM, 2004, 9) ONA could also be defined as the synthesis of information and intelligence by a commander to determine the effectiveness of a set of actions during a campaign, based on experience, knowledge, and intuition. ONA will not remove the fog and friction of war, but it can enable combatant commanders to focus capabilities or resources when, where and how needed to

generate decisive effects. According to USJFCOM, ONA is focused on the operational level of war and is a process that frames our

understanding of a potential adversary's PMESII systems through systems analysis:

- Revealing critical nodes and vulnerabilities that may be used in EBO.
- Recognizing the adversary's goals, intentions, strengths, weaknesses, and behaviors.
- Generates understanding and knowledge that may be used to predict indirect and unintended effects of the application of DIME.
- Determining what the adversary values most and how to affect it decisively.

ONA is both a process and a product; as a continuous and collaborative process it improves the command's understanding of the enemy and provides options for dealing with the adversary--neutralizing, coercing, etc. The process of analyzing the enemy's system and gaining an understanding of his systemic structure never ends, because the enemy is a thinking entity and his environment can change with him. Currently, Joint Warfighting Analysis Center (JWAC) has the lead within DOD for developing ONA, but eventually each geographic combatant command will have a workable database specific to their region.

The SJFHQ supported by the JIACG within each combatant command, will manage the ONAs and be linked to national sources so combatant commands can share information and conduct vertical and horizontal planning and assessments. These baseline ONA databases from JWAC are updated by standing up blue teams (friendly) and red teams (enemy) to produce current information about the region, a specific country or an organization (Al-Qaeda, Hamas, etc.). These teams can be activated pre-crisis/conflict and during the conflict, and having two different teams reduces the chance for mirror imaging during planning. The blue

team must conduct two analyses, a friendly view of the friendly PMESII system and a friendly view of the enemy's PMESII system.

The self analysis identifies friendly strategic and operational objectives, centers of gravity (COG), capabilities, requirements and vulnerabilities. It can also provide recommended courses of action for the potential operation. The friendly view of the adversary, or blue view of red, produces an intelligence estimate that determines the enemy's strategic and operational objectives, intentions, COG, capabilities, requirements and vulnerabilities. For example, the U.S. must deter Country X from invading Country Y for its rich deposits of bauxite and installing a radical new leader. The friendly view of the Country X's PMESII system identifies the strategic COG as the Premier Larimda, who has been in power for over 40 years and controls every aspect of the country. The analysis determines that the ruling class in Country X maintains its control through patronage and coercion, but there has been a growing dissident movement within the country that wants to change the current form of government. The operational COG is the mechanized forces, which are formidable compared to the U.S. ally, Country Y and other countries within the region. Country X's objectives are to become the dominate power in the region, annex the rogue "province" as it calls Country Y, and expand its political ideology within the region. Through ONA, the military recommendations for addressing this growing problem might be: to conduct strategic attack and air interdiction operations against the critical infrastructure, conduct an aggressive influence operation targeting the dissidents and senior government officials or conduct computer network attacks to disrupt the country's C2 structure. The red team in turn, conducts the same analysis of red

on red; and red on blue gaining a detailed understanding of himself and how he can best counter blue operations/efforts.

As a product, it is a one stop web-based source of synthesized information about an adversary's PMESII system and contributes to the development of the effects tasking order. Some of the items ONA provides for the effects tasking order are: desired effects, ISR requirements, effects to tasks linkages for subordinate commands, and MOP & MOE. Additionally, it assists the commander and his staff in identifying the challenges and risks in an operation and developing plans that are inherently flexible and capable of reducing the level of uncertainty. When it is fully on line, the ONA database informed by a system-of-systems analysis will produce a model that clearly identifies the linkage of a range of possible actions, both kinetic and non-kinetic, to effects. This model would also provide information on second and third order effects of the actions taken by the combatant command or other instruments of national power. Furthermore, a target database would be linked to the ONA to recommend critical nodes that can be affected by lethal or non-lethal capabilities. Finally, the database provides intelligence summaries on the friendly and enemy capabilities and vulnerabilities in relation to each other across the PMESII system. (Biggie, 2003)

ONA allows the U.S. and its allies to understand the systemic linkages that sustain an adversary's behavior and ability to continue the fight. We may avoid conflict by engaging a competitor or opponent in influence-and-deter maneuvers, which comes from increasing our understanding of a potential enemy and the conditions of our relationship with them. However, if influence-and-deter operations fail to achieve our national objectives, and if conflict is imminent, then ONA offers defeat mechanisms to accomplish our objectives decisively, as well as to deny the enemy the ability to accomplish his. (USJFCOM, 2004, 9)

Colonel John A. Warden, USAF, a leading proponent for the third enabler of the effects-based approach, SoSA, states “fighting is not the essence of war, nor even a desirable part of it. The real essence is doing what is necessary to make the enemy accept our objectives as his objectives.... [and in order to achieve this] we must think in terms of systems; we and our enemies are systems and subsystems with mutual dependencies.” (Warden, 1995, 55) The SoSA concept is the foundation of ONA, and enables a combatant command to develop an effect-node-action-resource-consequence construct, by providing baseline data on PMESII systems and their organization, characteristics and relationships. SoSA is an analytical process that comprehensively examines a potential adversary and operational environment. Furthermore it models the enemy as a complex, adaptive system, including its structures, behavior, and capabilities in order to identify and assess strengths, vulnerabilities and inter-relationships. SoSA provides a range of options by determining leverage points, where actions can be applied to influence an adversary’s capabilities, perceptions, decision-making and/or behavior. (USJFCOM, 2004, 10)

Warden postulates that at the strategic and operational levels of war every adversary is composed of systems and sub-systems in one or all of the domains (physical, cognitive, information) and the focus must be on the entire system. He believes that all systems follow a general pattern and are composed of five components or rings; and that military planners must analyze these components to determine the actions that will best affect the rings. At the strategic level these rings are: the central leadership or direction, organic essentials (food, energy, money), infrastructure, population and a fielded military to protect the system. The rings Warden discusses are essentially the adversary’s COG(s), but we may not be able to

affect them during certain phases of an operation. The inability to affect the COG(s) could be due to incorrectly identifying the COG or the level of protection placed around it by the enemy, which is why it is important to use a system-of-systems approach. Using a system-of-systems approach enables the combatant commander to correctly identify the COG(s) and determine decisive points that may have to be targeted in the event the enemy's center of gravity cannot be attacked directly.

At the operational level the fielded military which more than likely is the center of gravity for the adversary is a five component system composed of: the enemy commander, logistics (fuel, ammunition, food), infrastructure (facilities, roads, communications lines), support personnel and units (mechanized forces, air squadrons, ships, etc.) Since an enemy must protect his COG(s) to survive, a combatant commander must aim action toward the COG(s) to achieve his desired endstates. Presumably neutralizing an enemy's operational COG(s) will induce him to capitulate. This is enabled by ONA which will inform a combatant commander of the places to attack an enemy's system and the recommended course(s) of action.

To fully realize the benefits of ONA, Col Warden believes the parallel attack method, which is essentially what "Clausewitz called the ideal form of war, the striking of blows everywhere at the same time;" should be used. (Warden, 1995, 54) By utilizing this approach, an adversary is not given the time to react or recover from the overwhelming effects of DIME and is consumed by strategic or operational paralysis. This differs from the Powell Doctrine in that the focus was on the concentration of forces (units) with the implied mission of physical destruction of an enemy or coercion by the threat of force, whereas, in EBO, this is

the concentration of effects, lethal or non-lethal against the physical, cognitive or informational domains.

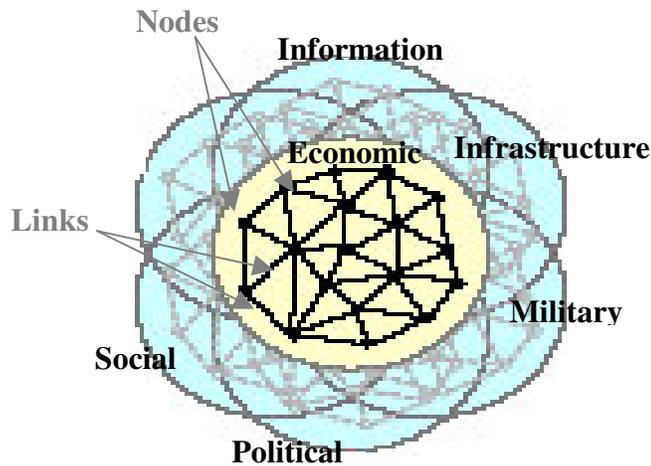


Figure 5: System-of-System (USJFCOM)

The above figure illustrates SoSA’s emphasis on a multi-dimensional approach toward understanding the battlespace, characterized by an analysis of six interrelated PMESII systems. Within each of these systems are nodes (person, place or physical object) or centers of gravity and links (behavioral, physical, or functional relationship between nodes) which are fundamental components of a system. Nodes and their associated links (inter-system and intra-system) are identified through SoSA and then targeted for DIME actions to influence or change system behavior and capabilities in order to achieve desired objectives.

Combatant commanders and their staffs can gain a clearer understanding of the operational environment by analyzing and synthesizing the inter-relationships in systems. This approach enables the intelligence analysts to identify potential sources from which to gain indications and warning and allows planners to consider a broader set of options to achieve objectives and focus limited resources. It also increases the understanding of how individual actions on one element of the system can affect other inter-related system components--effects-node-action construct. SoSA does not replace, but rather complements

country studies, intelligence estimates and the joint intelligence preparation of the battlespace (JIPB) process conducted in combatant commands--contributing to the situational awareness and understanding required to plan and execute EBO. (USJFCOM, 2004, 10-11)

An approach to winning the Global War on Terrorism may be for the National Security Council to develop an effects-based campaign against terrorist groups and insurgents, *War against Terrorists and Insurgents*. The instruments of national and international power should be used in concert to affect nations, groups or organizations that actively or passively support these bandits--denying safe havens, financial support or a recruitment pool. The intent of this campaign would be to bring peace and prosperity to the world and demonstrate that the U.S. was not a hegemonic power bent on world domination and annihilation of the Islamic culture. Additionally, the regional combatant commands in concert with their *counterparts* in the State, Treasury and Justice Departments could execute a more coherent fight against this growing threat.

Diplomatically, the U.S. must work through the United Nations and regional alliances to demonstrate to and convince developing nations as well as those nations unwilling (China, India) to take up the fight against terrorists and insurgents. The U.S. must show that these criminals are a danger to world stability and global interdependence. This could be done through incentive packages (grants, support to reformists), increased involvement (policy) in developing regions, diplomatic agreements and alliances being established. The international community must be convinced that this war is not an American war, but truly a world war prevents individuals, groups and nations from intimidating, coercing and undermining the authority of established governments through violence.

Using the information element of power, the U.S. must develop a very aggressive

campaign targeting not only the people in regions where terrorists mainly operate, but the governments as well. This information campaign must counter the negative perceptions of the U.S. that are pervasive in the Muslim world. First the current combat operations must be presented as a war against criminals who have distorted the true beliefs of Islam and not a war against Islam and its followers. Secondly, the U.S. must saturate the airwaves (internet, newspapers, radio, TV) in Muslim countries with positive themes, images, and messages concerning U.S.-Muslim relations. Additionally, we must show that a nation can and must modernize to function globally, while not losing deep rooted traditions, customs and values. Next, we must leverage non-governmental agencies and private-voluntary agencies to help in winning the “hearts and minds” of the people. Al-Qaeda and its associated networks have done this by building schools (madrassas), clinics and housing for the poor--this can and should be done by the U.S. government and other western nations.

The military instrument provides the most immediate results in the war against terrorists and insurgents, but it cannot be the main effort throughout the entire campaign. No country can match the U.S. in its combat capability, our forces can kill thousands of radical Islamists, that is why the instruments of national power must be interconnected and focused to win this war. In support of current operations, the U.S. must increase its intelligence sharing without compromising national security, to build and gain support within the developing world. These nations for the most part do not have the ability to identify and track illegal organizations within their borders, but with shared awareness these countries could become partners in the U.S. led “coalition of the willing.” Along with that our intelligence community must re-focus efforts on developing human-intelligence. Working with

indigenous sources could bolster our efforts in tracking and eliminating terrorists and insurgents in their home bases. Additional emphasis should be placed on special operating forces and paramilitary forces who can work with the developing nation, covertly or clandestinely, to conduct actions against terrorist organizations and insurgent groups. Some leaders may have a tenuous grip on power within their nation, and would not publicly support U.S. efforts, but may support covert action. With improved diplomatic relations with developing nations, unconventional forces supported by host nation forces could be more effective in targeting and destroying these rogue organizations.

There is an old saying that “money makes the world go around,” and as such the economic strategy should be to cut off all funding to Al-Qaeda and other illegal organizations. The U.S. must deter nations that have lax banking standards (Cayman Islands, Nigeria, Belize) from allowing these organizations and their supporters from laundering money through their system. Along with that the funds of these organizations and their supporters should be seized and turned over to the United Nations or United States Agency for International Development for use in the developing world. Additionally, financial grants should be made to the poorest of nations to prevent terrorist organizations and insurgent leaders from recruiting or coercing destitute young men into their ranks. These grants would help in improving infrastructure, developing industries and creating the conditions for foreign investments. Furthermore, those individuals, organizations or nations that are found to be supporting these illegal individuals could either be exposed to the international community or co-opted into supporting U.S. efforts for fear of exposure. As a final point, the tactic of placing rewards on the leaders of terrorist organizations and insurgencies should be continued. However, the government must ensure that there is an understanding of the culture and how

the people view money; \$25 million is probably incomprehensible to a peasant in Pakistan, but he can probably understand a new rifle, cold weather gear, or farm equipment. This is only a basic example of one way to execute an effects-based approach to the on-going campaign, but with refinement and a better understanding of how to integrate the elements of national the country could move away from attempting to solve problems with military action.

EBO Concepts

In the “*The Advent of a New Way of War: Theory and Practice of Effects-based Operations*,” LTC Joshua Ho of the Singapore Army, put forth that there are six EBO theories (called concepts in this paper) that must be understood to effectively execute effects-based operations:

- Effects-based Planning
- Effects-based Targeting
- Application of DIME
- Rapid Dominance
- Interaction and collaboration through all levels of war
- Network Centric Warfare

Effects-based planning (EBP) is an operational planning process to conduct EBO within rapid decisive operations (RDO). RDO is a concept that attempts compel an adversary to undertake certain actions or deny the adversary the ability to coerce or attack others. An RDO campaign is typically characterized by immediate, continuous, and overwhelming operations to contain the adversary, destroy their ability to coordinate offensive and defensive operations, and neutralize their capabilities. (Global Security, 2005) One part of the USJFCOM definition of EBP that is flawed is that “EBP is results-based vice attrition based,”

EBO is nothing more than a variation of attrition warfare. The objective of EBO is to wear down an enemy and break his will to fight or affect/control his behavior through the use of selected elements of national power against his systems. Stating that EBP is results-based implies that all military operations conducted by the U.S. prior to the advent of what we know as effects-based operations today were wasted efforts. Previous U.S. military operations may not have integrated all the elements or selected elements of national power well, but we have suffered few defeats in modern warfare (since World War I).

EBP changes the way we view the enemy, ourselves, and what is included and emphasized in the planning process. This process emphasizes a flexible battle rhythm that leverages a collaborative knowledge environment and capitalizes on the use of fewer formal joint boards. The collaborative knowledge environment includes all echelons of command and is enabled by the use of the Defense Collaboration Tool Suite (DCTS). (USJFCOM Glossary, 2005) DCTS is an integrated set of applications providing interoperable, synchronous and asynchronous collaboration capability to all DOD commands and agencies. This system enables simultaneous crisis action or deliberate planning (vertically and horizontally) across operational theaters. Additionally, it provides operational units and defense organizations with simultaneous access to real-time operational, tactical and administrative information. (Defense Collaboration Tool Suite, 2004)

According to USJFCOM, EBP closely mirrors the current joint planning process, but focuses upon the linkage of actions to effects to objectives (strategy to task linkage). For example, President George W. Bush's strategic guidance was linked to General Tommy Franks' operational objectives during Operation Iraqi Freedom (OIF). Franks turned the national strategy of conducting regime change, eliminating weapons of mass destruction and

capturing the terrorists in Iraq into eight operational objectives: 1) finish the regime; 2) eliminate weapons of mass destruction; 3) capture or drive out terrorists; 4) gain intelligence on terrorists and weapons of mass destruction; 5) secure oil fields; 6) deliver humanitarian relief; 7) create the conditions for representative government, and 8) ensure territorial integrity. These eight operational objectives became missions for his component commanders, which in turn translated into tactical actions. Subsequently, his functional component commanders (air, land, maritime and special operations) executed tactical tasks to support those strategic objectives: seizing the oil platforms and oil fields, destroying the integrated air defense systems, destroying SCUD missile launchers and destroying forward deployed mechanized forces. (Ho, 2003)

Effects-based targeting (EBT) is the second concept and the focus of this process is to produce courses of action that will change the enemy's behavior and compel him to comply with our will. The behavioral changes we attempt to create are the result of effects caused by the employment of our lethal and non-lethal capabilities. (USJFCOM Glossary, 2005) EBT seeks to

exploit critical weaknesses of the enemy by analyzing his capabilities as a total system. This type of targeting attempts to use parallel warfare; focusing on the destruction of critical nodes rather than the destruction of the entire infrastructure to achieve the desired effect.

Parallel warfare, although currently an Air Force concept is a tactic used to strike several decisive points or centers of gravity simultaneously with a high degree of accuracy, lethality and tempo. It is believed that this type of attack aided by technology can be executed so rapidly and with such overmatch of capabilities that the enemy's decision-making capabilities and reaction would be paralyzed and his system would collapse. An example of a

parallel warfare operation may be, an adversary's command, control, communications, and computer system is neutralized by a computer network attack, his electrical power grids destroyed, selected key leaders killed, critical command and control nodes destroyed and his field forces defeated by a combined air and ground offensive. These operations may be executed with such swiftness and lethality that the adversary is unable to react in a timely manner to his rapidly deteriorating situation.

Effects-based targeting proved successful during Operation Desert Storm, when two sector operations centers (SOC) providing the command and control of the air defenses were targeted for attack. During the targeting process the air planners determined that six 2,000 pound laser guided bombs were required to destroy the hardened bunkers; however the decision was made to use one 2,000 pound bomb which degraded the functioning of the building and caused the survivors to abandon the building. This approach rendered the facilities ineffective, neutralized the Iraqi air defense systems, and allowed more aircraft to be used to strike four additional SOCs that were identified. (Ho, 2003)

The third concept is the effects-based approach to operations which focuses on the application of all elements of national power against all elements of the enemy's national power.

Some believe that attacking an enemy with a single source of national power will inevitably reduce the overall effectiveness of a campaign and make it relatively easy for an adversary to adapt to this single form of attack. However, this view seems short-sighted or flawed because one might infer that using multiple lines of national power might be an end in itself.

The effects-based approach is using selected elements and the correct elements based on

a thorough understanding of the enemy as a system-of-systems, and targeting his strategic and operational centers of gravity with the lethal and non-lethal capabilities. Ho believes that Operation Iraqi Freedom was a successful example of an effects-based approach to warfare. (Ho, 2003) However, it took the invasion of Iraq for a second time by a coalition of like minded nations to remove Sadaam Hussein from power. Hussein remained in power despite diplomatic and economic isolation in the world for 12 years.

From 1991 to 2003, the U.S. and United Kingdom enforced the northern and southern no-fly zones over Iraq, there were United Nations' sanctions against Iraqi oil, support given to Iraqi dissidents, and diplomatic negotiations used to either cause Hussein's acquiescence or removal from power. OIF was not a successful example of an effects-based approach to warfare; it was a means to an end. The Iraqi regime lasted for 12 years under conditions that would have caused lesser regimes to collapse, and the results of coalition actions in OIF have been: 1,500+ U.S. deaths, \$200+ billion in costs, infighting between elected officials and a growing insurgency set on de-stabilizing the fledgling democracy.

Rapid dominance is the fourth concept of EBO, and aims to affect the will, perception, and understanding of the adversary to fit or respond to our strategic policy ends through imposing a range of capabilities that renders an adversary completely impotent. It is further defined as the ability to act and counteract faster than the enemy, while achieving a level of control that overwhelms the enemy physically and psychologically. (Ullman, 1996) In British defense literature rapid dominance is having "full knowledge of self, adversary and the environment; brilliance of execution; rapidity; and control of the operating environment." (Ho, 2003, 9) This type of effects-based operation is suppose to enable a combatant commander to

employ a series of continuous, multi-dimensional strikes to affect the adversary's perception and
can include invasion and seizure of territory if necessary.

One of the problems with this concept is the heavy reliance on airpower, at the expense of joint action and the ability to control the environment. Strategic attack and air interdiction used to target critical nodes may compel an adversary to change his actions, but more often than not an adversary can and will adapt to the overwhelming lethality of these fires and change the face of the battlefield. Additionally, controlling all aspects of an environment where U.S. forces must fight is impossible and delving into the minds of our adversaries and determining or predicting their every move is a worthy goal, but may not be achievable for many years.

The 'Shock and Awe' plan demonstrated the fragility of this concept; cruise missiles, Global Strike and air interdiction destroyed Iraqi infrastructure, materiel and personnel. While attacking ground forces moved so quickly they reached Baghdad airport, just 20 kilometers from the city center in 13 days. (Ho, 2003, 7) Even though USCENTCOM rapidly dominated Sadaam Hussein's forces and command and control structure, two years later Multi-National Force-Iraq is still fighting a growing insurgency and must adjust its tactics while engaged with the enemy.

The fifth concept focuses on the interaction and collaboration between the operational commander and the other key actors in a campaign, who must deal with uncertainty in operations arising from a thinking enemy. To operate effectively and achieve the strategic goals and operational endstate, all elements of the operational environment (threat situation, political affairs, unified action, and information) must be understood, and the parties involved

and the plan to deal with each element must be coordinated to achieve synergy. Synergy is defined as “integrating and synchronizing...actions...in joint operations and in multiple dimensions enabling joint force commanders to project focused capabilities that present no seams or vulnerabilities to an adversary to exploit.” (JP 3-0, 2001, III-10) When operations are not synchronized across the elements of national power, the U.S. presents a potential vulnerability to the adversary and fails to capitalize fully on American strengths. The interaction between civilian leaders, the operational commander, and his tactical commanders must be a learning experience not only in planning but also in the execution phase. (Ho, 2003, 8)

The final concept centers on network-centric warfare, which promises to increase the speed and precision of military operations through advanced technologies and a collaborative information environment, which promises to reduce the uncertainty of modern warfare. (Ho, 2003, 9) Network-centric warfare offers combatant commanders the use of information technology to gain information superiority that increases the efficacy of force application. Furthermore, network-centric warfare will enable combatant commanders to overwhelm the enemy through information warfare, precision strikes, space warfare, and dominant maneuver.

Dominant maneuver is the ability of joint forces to gain positional advantage with overwhelming operational tempo in the achievement of assigned military tasks--power projection. Widely dispersed joint air, land, sea, amphibious, special operations and space forces, capable of scaling and massing force or forces and the effects of fires as required, will secure advantage across the range of military operations through the application of information, deception, engagement, mobility and counter-mobility capabilities. (USJFCOM Glossary, 2005) Dominant maneuver is and will be enabled by strategic lift, global

telecommunications, pre-positioned equipment, the Navy's Sea-Basing concept, and smaller more deployable units like the Army's Heavy Brigade Combat Teams/Units of Action and the Future Combat System units of the 2012 and beyond.

Another key concept in network-centric warfare is self-synchronization, which requires the nesting of concepts throughout the levels of command to ensure there is a common operating picture and understanding of the commander's vision and intent. Self-synchronization enables synergy and unity of effort, by which commanders and their subordinates can gain decision superiority and eliminate enemy options before the enemy can act or react. Network-centric warfare promotes the idea that units will be able to operate at higher tempos over an increased battlespace due to shared knowledge.

EBO and Centers of Gravity

Clausewitz said "the first task...in planning for war is to identify the enemy's centers of gravity, and if possible, trace them back to a single one." (JP 5-00.1, 2002, II-6) Centers of gravity are "those characteristics, capabilities, or sources of power from which a military force derives its freedom of action, physical strength, or will to fight." (JP 1-02, 2004, 80). An effects-based approach to warfare requires a clear understanding of the centers of gravity (both adversary and friendly) involved in an operation or campaign, and as the definition of EBO states, it is an operation that attempts to affect the system behavior or capability of an adversary. Conducting EBO focused on an adversary's center of gravity, requires an understanding of what the enemy derives from the COG--physical or moral strength or will. Furthermore when this is understood, planners can determine where the enemy is most vulnerable and develop a course of action that creates the conditions for optimal operational approach of COG(s)--"destruction or neutralization of adversary COGs is the most direct path

to victory.” (JP 3-0, 2001, III-22) However, if a thinking enemy has strongly defended his COG(s) and our forces cannot directly attack the COG(s), then the indirect approach must be utilized. The indirect approach attacks the enemy COG by applying lethal and non lethal means against a series of decisive points to avoid enemy strengths. (FM 3-0, 2001, 5-10) The figure below illustrates the linkage between COG-CC-CR-CV:

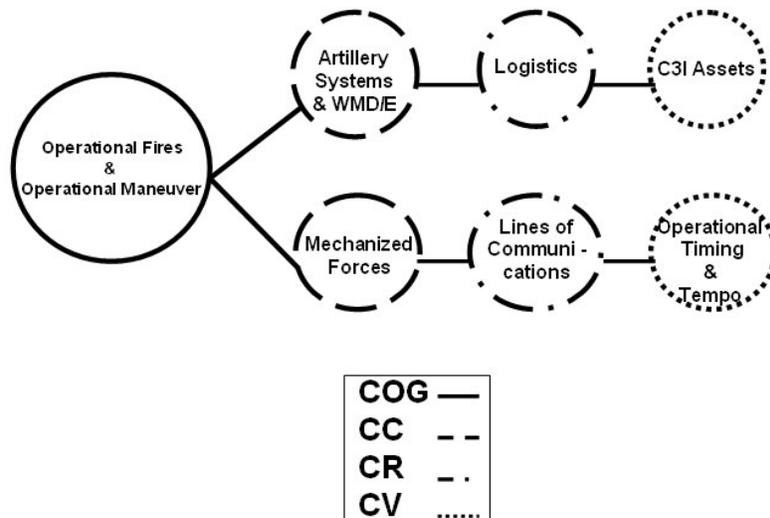


Figure 6: North Korean Operational COG

To correctly determine COGs the combatant commander and his planners must have a thorough understanding of the adversary’s critical capabilities (CC), critical requirements (CR) and critical vulnerabilities (CV). Addressing and understanding these three elements, before determining COGs enables planners to have a better understanding of how an adversary organizes for combat, fights, makes decisions, and what the adversary’s physical and psychological strengths and weaknesses are. (JP 5-00.1, 2002, II-8) Critical capabilities are those adversary capabilities that are considered crucial enablers for the adversary’s COG to function and are essential to the accomplishment of the adversary’s objective(s)--put simply it is what the COG can do. For example, the critical capability of an armored corps

(operational COG) is its ability to move rapidly, concentrate lethal fires and operate self-sufficiently for an extended period of time.

Critical requirements are those essential conditions, resources, and means for a critical capability to be fully operational. Without its critical requirements, a center of gravity ceases to exist. Critical vulnerabilities are those aspects or components of the adversary's critical capabilities which are deficient, or vulnerable to neutralization, interdiction, or attack in a manner achieving decisive or significant results, disproportionate to the military resources applied. (JP 5-00.1, 2002, II-7) For example a CV is something that becomes a target set or objective for a military force, such as a petroleum storage and distribution hub, bridges classified to support an M1 tank, or C3 systems.

Important to understanding COG analysis is determining the linkage between the COG and its critical vulnerabilities. Understanding this linkage enables operational planners to develop the appropriate lines of operations and determine the decisive points that must be achieved and that are tied to the adversary's critical vulnerabilities. When these actions are applied at the right time and place within the battlespace, the combatant commander can achieve his operational objectives and endstate. Figure 6 illustrated one linkage, but another may be a look at the U.S. operational COG--the Armed Forces. The U.S. Armed Forces represents one of our sources of power. Power projection through the use of strategic lift and Global Strike are critical capabilities for this operational center of gravity. The U.S. is unmatched in its ability to transport, re-supply and reposition forces world-wide, however, the critical vulnerability is access to air points of debarkation and sea points of debarkation. If an adversary was determined to disrupt our ability to wage war, one of the focuses would be on

anti-access operations, and one of the lines of operations would be to attack this critical vulnerability. Preventing access to a theater for a certain amount of time could achieve the desired endstate an adversary may have against the U.S. operational COG.

When combatant command planners utilize EBO, they have a more comprehensive way of determining the enemy's COG, based on a holistic understanding of the enemy as a complex, adaptive system-of-systems. This is because through the use of operational net assessment and system-of-systems analysis planners can determine the linkages between systems and sub-systems, thereby focusing the defeat mechanism toward the decisive points. Moreover, identification of these decisive points and the proper application of force at the right time and place can cause the complete collapse of the enemy's system. Additionally, an effects-based approach allows the combatant commander to direct multiple lines of operation through parallel warfare at several decisive points which will set the conditions for neutralizing adversarial COGs across all levels of war.

The U.S. military is operating at a tempo not seen in almost 40 years and as such, combatant commanders must plan for and operate in a resource (budget, personnel, materiel) constrained environment. With these considerations in mind, joint force commanders are limited in their options for a direct approach against enemy COGs within their areas of responsibilities or potential joint operations area (JOA). This is where the indirect approach to achieving operational objectives becomes important and why it is critical for operational planners to identify decisive points that when achieved will enable to combatant command to accomplish its strategic and operational endstates.

A decisive point is “a geographic place, specific key event, critical system, or function that allows commanders to gain a marked advantage over an adversary and greatly influence the outcome of an attack.” (FM 3-0, 2001, 5-7) When determining the decisive points, the planners must also determine the effects that are desired and will result from the application of lethal or non-lethal capabilities. Using an effects-based approach for determining decisive points, an example relating to U.S. power projection and maintaining maritime freedom of maneuver could be ‘deny the enemy control of littoral waters within the JOA’ rather than the objectives-based approach which would probably be ‘achieve maritime superiority.’

In order to achieve this decisive point, the maritime component commander (MCC) may have to destroy naval assets, conduct maritime interdiction operations, mine-countermeasure operations, and anti-submarine warfare among numerous others. When combatant commanders direct lines of operations through decisive points, the application of force can produce a causal link between action and effect on the enemy’s center of gravity, and those decisive points will become objectives at the tactical level. Determining or describing objectives in terms of decisive points or effects on the enemy’s centers of gravity is critical to establishing the principles of war; objective, unity of effort and simplicity within a campaign plan.

EBO Practical Application (OEF & OIF)

EBO is being embraced by the Armed Forces and although doctrine is lacking on the subject, the Services are experimenting with techniques and procedures as evidenced by operations in Afghanistan by Combined Joint Task Force-180 (CJTF-180) and by the USCENTCOM Coalition Forces Land Component Command (CFLCC) in Iraq. CJTF-180

developed three lines of operations to focus the efforts of its units and achieve a desired endstate: enable Afghan institutions to thrive, help remove the causes of instability, and deny the enemy sanctuary and counter terrorism. The CJTF-180 planners based their understanding of EBO on two definitions of EBO the USJFCOM definition and one from, COL Allen Batschelet, who in his Army War College monograph defined EBO as the “identification and engagement of an enemy’s vulnerabilities and strengths in a unified, focused manner and uses all available assets to produce specific effects consistent with the commander’s intent.” (Herndon, et al, 2004)

From these definitions they developed a framework for organizing their staff and a process for evaluating the threat, identifying available assets and focusing the efforts of their units to meet the commander’s intent. The planners understood that they had to shape the operational environment through lethal and non-lethal means in order to meet the strategic objective for Afghanistan: a government of Afghanistan committed to and capable of preventing the re-emergence of terrorism on Afghan soil. The threats to this stated objective that required action and management of effects were:

- Anti-Coalition and Anti-Government Militants
- Domination of Security Institutions by former Northern Alliance leaders
- Potential loss of International Community support
- Destabilizing efforts by neighbor countries
- Internal Issues: Warlordism and Corruption

To plan EBO in the Afghan JOA, the commander developed a Joint Effects Coordination Board (JECB), similar to a targeting board and a Joint Effects Working Group (JEWG). The JECB executed the commander’s intent for effects by synchronizing lethal and

non-lethal fires to achieve the commander’s endstate. This task is done continuously through the Decide, Detect, Deliver, Assess (D3A) process with input from the feedback/assessments from the staff sections and captured quantitatively through the Joint Intelligence Support Element (JISE) or qualitatively by Information Operations (IO), Civil-Military Operations (CMO), Public Affairs (PA), etc. elements. The D3A methodology is an Army and Marine Corps planning process for targeting, which synchronizes maneuver, intelligence and fire support in support of an operation. The JEWG determined the effects desired and the actions required for accomplishing the commander’s lines of operations--based on the assets available (Figure 7). With a focus on synchronizing and de-conflicting actions, the JEWG provided operational targeting solutions for achieving the commander’s desired effects.

Lethal	Non-Lethal	Non-Military
Fixed-Wing Aircraft	Civil-Military Operations	Provincial Reconstruction Teams
Rotary-Wing Aircraft	Information Operations	Interagency Elements: USAID
Field Artillery	Psychological Operations	International Organizations
Mortars	Public Affairs	Non-Governmental Organizations
Conventional Forces	Theater & National Intelligence, Surveillance & Reconnaissance	
Special Operations Forces	Conventional Forces	
Coalition Forces	Special Operations Forces	
Afghan Militia Forces & Afghan National Army	Coalition Forces	

Figure 7: CJTF-180 Assets

An example of how CJTF-180 utilized an effects-based approach involved denying sanctuary and countering terrorism within the JOA. The planners developed Operation Mountain Viper, which focused on disrupting C3 targets through the use of lethal attacks. CJTF-180 developed a pattern analysis of the enemy in the Sami Ghar Mountain region by

increasing intelligence, surveillance & reconnaissance (ISR) efforts--leading actionable targets. Face-to-face contact was made with civilians and radio broadcasts warned them to avoid this area. Prior to and during this time, IO and PA activities were increased to influence the local populace and gain support for coalition operations. Approximately a week after planning the operations, intelligence sources identified the target and it was cleared for engagement by an AC-130.

The attack resulted in eight enemy killed, additionally, 25 Taliban were destroyed after being identified by an unmanned aerial vehicle. Immediately after these attacks, teams went out to assist the civilians by providing aid packages and medical assistance; the desired effect was winning support from the civilians in the area. Based on CMO teams and intelligence sources in the area, Taliban operations in the area were severely affected by the fires. As a further result of these operations, Taliban operatives broke into two- to five-man teams to avoid presenting large targets to coalition forces--a successful effects-based operation for CJTF-180. (Herndon, et al., 2004, 26-30)

Taking lessons learned from CJTF-180, LTG David McKiernan, commander of the 3rd U.S. Army (CFLCC), re-structured his coordinating and special staffs into functional staffs focused along six lines of operations: Operational Effects, Operational Maneuver and Movement, Operational Protection, Operational Command and Control, Operational Intelligence and Operational Support. He did this to synchronize the staff's efforts and in his the words, "[produce] simultaneous, multidirectional, continuous effects: combined arms maneuver, operational fires, information operations--synchronize conventional, special operational forces & other governmental agencies." LTG McKiernan's deputy became the

director for operational effects and chaired the Daily Effects Board (DEB), which was nested in the targeting cycle of USCENTCOM and the air component command. Additionally, the land component command nested its objectives horizontally and vertically to ensure unity of effort and purpose as it pertained to achieving desired effects: USCENTCOM objectives--CFLCC objectives--effects objectives.

The deputy commander issued 72 hour effects guidance, 96 hour planning guidance and approved the air apportionment approval for the DEB. The DEB in turn issued operational guidance/intent to the major subordinate commands (MSC) and an effects fragmentary order (FRAGO) was produced. This effects FRAGO included the effects objectives by phase, the anticipated focus of effects from 96 to 120 hours, priority intelligence requirements, essential fire support tasks, essential information operations tasks, essential support task and themes/messages for the area of operations. MSCs took these daily FRAGOs and determined the appropriate actions they needed to execute for each echelon to achieve its desired endstate. Below is an example of an effects objective during Phase II (Shaping Operations) of OIF:

USCENTCOM Strategic Objective: Occupy Key Terrain & Secure Key Nodes
CFLCC Objective: Secure southern Rumaylah Oil Fields

EO II-8: Protect infrastructure in Phase IV to provide rapid restoration of public services and prevent a humanitarian crisis.

EST II-B-C
Task. Maintain functionality of the Rumaylah Oil Fields...the off-shore loading platforms, and protect the associated workforce.

Purpose. The preservation of these oil fields and associated facilities is necessary for Iraq to maintain and develop a viable economy.

Method. It is best to reach the oil workforce through a non-lethal process designed to keep them at their workplace. Their presence at work is the best action they can take for their country and their livelihood.

Effects. Preserve the production capacity of the South Rumaylah Oil Fields, allowing Iraq an income-producing capability in the future as a nation-state in transition.

Figure 8: Example of Nested Objectives (Black & Smith, 2005, 31)

In early 2003, CFLCC established an effects coordination center (ECC) which included a plans section, operations and intelligence section, fire support element and IO section; replacing the deep operations coordination cell and IO cell, and taking on the many of the functions associated with the DEB--FRAGO production, target development and executing IO missions. The area that presented the greatest challenge to CFLCC was the assessment portion of EBO, because current doctrine focuses solely on battle/bomb damage assessment (BDA) and often times the assessments received were inaccurate, late or incomplete. Inadequate assessment prevents the commander and staff from mitigating operational risk to forces and may require changes to the plan that are not desired or result in unanticipated or undesired effects. (Black and Smith, 2005, 28-32) Assessment which many people consider the “Achilles heel” of effects-based operations includes more than just combat assessment. Assessment must provide the commander more information than the physical and functional effects of weapons employment. For CFLCC to truly achieve McKiernan’s intent for effects it needed a capability to assess both systemic and psychological effects on the Iraqi soldiers and people. The ability to do this is limited and still in the development stages at the Joint Warfighting Center and JWAC. (Mann, et al., 2001, 6)

EBO Cycle & Planning Concept

In February 2004, USJFCOM conducted Multinational Experiment 3 (MN3) to test effects-based planning and assessment and the supporting tools for EBO; examining processes, organizations and technologies needed to assist operational and joint task force commanders in future operations. The participants in the experiment found that through the synergistic

application of the elements of national and international power, the operational commander can neutralize the adversary's critical capabilities and unity of effort more effectively. This was due in large part to the collaborative planning environment required to properly execute EBO. Conducting collaborative planning allowed the expertise of people representing a wide range of knowledge to be incorporated in the plan earlier and more efficiently. Furthermore, the participants in MN3 saw a huge benefit in focusing on effects rather than destruction of the enemy, which enabled a highly coordinated level of joint, interagency and international cooperation.

Where the participants saw the greatest challenge or difficulty in implementing effects-based planning was in defining success and the need to develop measures of effectiveness (MOE) and measures of performance (MOP), in order to complete the cycle of assessment and adaptation. According to USJFCOM, the assessment process is the “underpinning of EBO” and ask the questions, “Are we doing things right? (MOE)” and “Are we doing the right things? (MOP).” MOE is defined as the criteria used to evaluate how actions have affected system behavior or capabilities, and MOP is defined as criteria used to evaluate accomplishment of Blue (friendly) actions. (USJFCOM, 2004, 17)

Effects-based planning begins with the commander's intent (purpose, method (key tasks), associated risk and endstate), which is a concise expression of the purpose of the operation and the desired endstate that serves as the initial impetus for the planning process. One of the key inputs the commander must have to develop his intent is the staff's mission analysis where objectives, desired effects, specified and implied tasks, constraints and restraints and other needed information are identified. According to JP 3-0, joint operational

planning links the tactical employment of forces to strategic objectives and the other critical input to the planning process is the requirement for the President and Secretary of Defense to outline the desired strategic effects. From this effort, combatant commanders can develop their intents, focused or expressed in a manner that supports achievement of strategic objectives. In turn, the tactical commanders can determine the correct actions that must be executed to ensure success at all levels of war. (Refer to Figure 2)

Planning is the means by which the commander envisions a desired outcome, lays out effective ways of achieving it, and communicates to his subordinates his vision, intent, and decisions, focusing on the results he expects to achieve. (FM 3-0, 2001, 6-1) According to USJFCOM, effects-based planning (EBP) is fundamentally about integrating the appropriate DIME actions within the battlespace in time, space, and purpose to create the desired effects to achieve the combatant commander's objectives. In EBP, planners seek to promote unity of effort--to harmonize joint, combined, and interagency actions associated with the DIME instruments of power into an integrated, comprehensive plan to achieve desired effects. (USJFCOM, 2004, 11)

EBP is a continuous and iterative process that attempts to provide a framework that helps identify and predict how actions taken by our forces and the full range of potential results of our actions will lead to successful mission accomplishment. The diagram below illustrates the five phases of EBO cycle and planning concept.

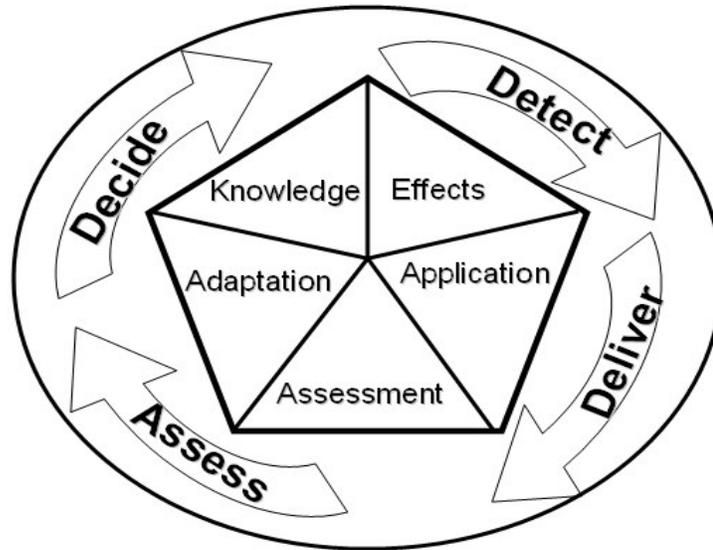


Figure 9: EBO Cycle and Planning Concept

The first step is developing a comprehensive knowledge of the battlespace (see your, see the enemy and see the terrain), this is accomplished by conducting an operational net assessment, which provides continuous actionable information/ intelligence about the adversary as well as recommended tasks and effects for each operation or campaign. Planners begin this step with an ONA and attempt to answer broad questions such as, “What kind of functional, systemic and psychological effects might one seek in certain situations and how might one produce them?” and “What kind of indicators are available to gauge the nature and extent of effects in an enemy’s system?” To answer these questions, designers of the EBO process envision fusing and leveraging information from across all U.S. governmental agencies and the private sector. Operational planners then take this information and develop a profile of the enemy’s system by identifying key links and nodes, strengths, weaknesses, and vulnerabilities using advanced predictive models and systems analysis. It is believed that the output of this effort is a “deeper understanding of the enemy” an understanding that points to what he values and how to hold it at risk. This understanding forms the foundation for EBO

when a real world situation occurs and handling such a situation begins by identifying outcomes and designing strategy at the national level. (Foster, 2002, 9-10)

The second step focuses on articulating the desired effects necessary to disrupt the enemy's cohesion and to affect his behavior--emphasizing the strategy to task linkage. During this process, "national objectives are determined, options are reviewed and the appropriate instrument of national power or a combination of instruments is identified to apply to existing [military] capabilities to produce effects that accomplish the desired outcome." (Foster, 2002, 10) One could argue that military success is impossible without the combatant commander participating in the national process. Guidance from the President and Secretary of Defense provides the joint force commander with the "overall objective to be achieved, the underlying rationale for courses of action, and most importantly, a knowledge of the depth and breadth of actions to be conducted by all elements of national power and influence--with this the combatant commander begins the process of planning for effects." (Foster, 2002, 10-11)

Step three considers the full range of capabilities and DIME instruments available and applies those that will achieve the desired effects. An effects-based Commander's Intent or Commander's Critical Information Requirements (CCIR) that identifies the desired effects and measurements for success is critical to executing successful effects-based operations. Planning for the military component of EBO begins with the issuance of commander's guidance and intent. This guidance defines the endstate in terms of desired effects; directs appropriate interagency coordination; and outlines constraints and restraints that govern how effects may be achieved given an understanding of the enemy and the potential collateral direct or indirect effects.

(Foster, 2002, 11)

Using this guidance, COA development builds on a comprehensive understanding of the enemy as a complex, adaptive system, to plan operations against those systems that the adversary values most. Developing COAs is a collaborative and iterative process that includes close coordination with national leaders, supporting commands, subordinate commands, and other government agencies involved in the operation. The result is a mission order that provides guidance in terms of effects, priorities, constraints, and intent to components and other agencies. Mission orders provide maximum freedom of planning and action to subordinates and allows them to determine the “how” of mission accomplishment. By using mission orders, the combatant commander can maintain the explicit linking of strategic objectives and desired outcomes to tactical actions, so that as resources are tasked, every tactical action has a clear and traceable link to the strategic objective. In addition, the articulation of MOPs and MOEs on which assessment is based for both military and non-military actions later in the EBO cycle is equally important. USJFCOM acknowledges that defining and measuring MOEs for intangible entities will prove one of the more difficult facets of EBO, however, events like MN3 prove promising that this obstacle will eventually be overcome. (Foster, 2002, 11)

The fourth step involves assessing the application of the capabilities in terms of desired effects and assessing the impact of the effects created. EBO assessment gives the combatant commander options and provides him with the knowledge needed to determine whether or not to adjust the current COA. Effects-based assessment must go beyond traditional attrition-based combat assessment to determine 1) if some or all of the desired

effects were produced; 2) what collateral or unintended effects were produced; 3) the overall impact on joint effort or unified

action; and 4) how the tactical actions contributed to the desired outcome. (Foster, 2002, 12)

In the final step the planners make decisions regarding the ways the commander can adapt and adjust the course of action to more effectively attain the desired endstate. The planners use a two-step process to assess the progress of the current COA. The first step seeks to identify what physical and non-physical effects have been created in the enemy's system. Using the MOP and MOE developed in planning, this analysis assesses 1) if the predicted or intended effects were produced; 2) the magnitude of the direct effects produced; 3) what indirect effects, if any, were produced; and 4) what delayed effects are in motion and how long/what additional effort is needed to produce these effects. The second step involves identifying whether direct or indirect collateral effects were produced and why these effects occurred. The purpose of this review is to 1) identify what events led to the collateral effect and why it was not predicted in the planning process and 2) to identify deficiencies in the information used for planning (Was information missing? Was it misunderstood? Was enemy deception acted upon?). The current COA is reviewed, branch plans are developed if required, and recommendations to modify the current COA are made to achieve the desired effects. (Foster, 2002, 14)

RECOMMENDATIONS

The U.S. military is faced with numerous challenges in the world today, trans-national terrorism, narcotics-trafficking, and emerging regional threats; however, military force may not produce decisive results and could result in unintended or undesired effects. Therefore an effects-based approach which seeks to affect the PMESII system behaviors or capabilities of

an adversary should be used within this operational environment to maximize the opportunities for attaining strategic aims. The U.S. military must make the effects-based approach a tenet of joint operations in order to increase mission effectiveness when confronting adversaries in the Information Age.

Critical to the success of EBO is the development of an effects-based planning process that goes beyond the conceptual EBO Cycle and enables dynamic (continuous and rapid) assessment and refinement of the plan and adjustments to the mission when necessary. The diagram on the next page is a recommended EBP process that enables operational planners to develop plans based on the commander's intent and desired endstate. This process changes the focus of our operations and current planning process from friendly operations to affecting enemy systems through the synergistic application of selected elements of national power. Additionally, the process integrates all staff sections, agencies, and other resources available to the combatant commander through a knowledge base, which will be discussed later, to achieve the commander's intent. This process enables the operational planners to identify the methods of engagement and resources required to accomplishment the mission--fulfilling the commander's vision and intent for the operation or campaign. Effects-based execution (EBE) is a method of conducting operations designed to achieve the effects needed to meet the commander's desired endstate; and effects-based assessment (EBA) is a formalized assessment of the mission desired to determine overall effectiveness, how and why an effect was or was not achieved, and determine if further operations are required. The EBP process (Figure 10) should consist of six steps:

- Commander's Guidance (Receipt of Mission)

- Mission Analysis & Effects Assessment
- Effects Development
- Capabilities Analysis
- Commander's Decision & Resource Assignment
- Mission Refinement & Effects Execution

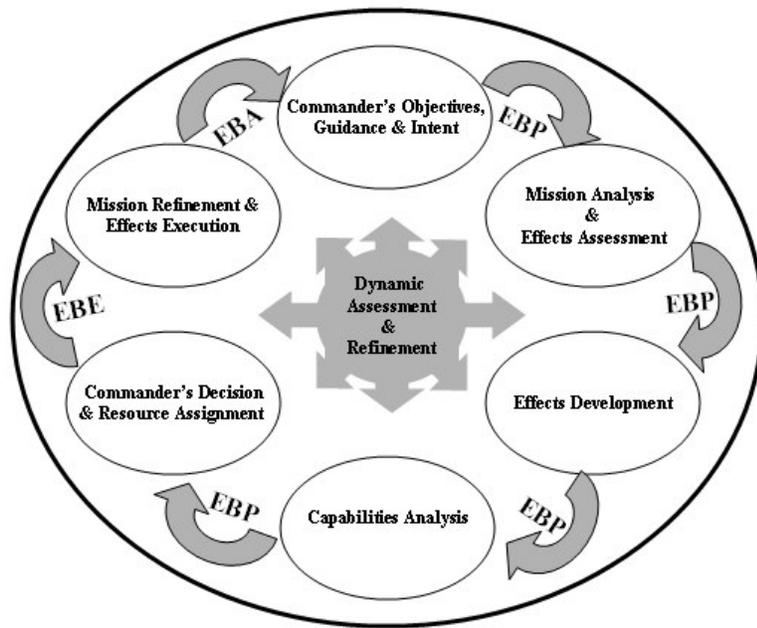


Figure 10: Recommended Effects-based Planning Process

Theater-strategic or operational planning begins when the commander receives strategic guidance from the President and/or Secretary of Defense for a regional crisis or derives a new mission from an ongoing operation. The combatant commander then formulates the military objectives for the operation and issues initial guidance to the staff, in the form of commander's visualization, which is a clear understanding of the friendly force's current state with relation to the enemy and environment, and developing the desired endstate that achieves the operational objectives and strategic aims. The guidance and objectives given to the staff and subordinate commands must enable the planners to link components'

tactical actions to the strategic aims and outline the ends or effects desired for an operation. This is possible through the development of a holistic and dynamic knowledge base, which provides constant input about the operational environment to the process.

The knowledge base includes information from national strategy, international agreements & alliances, ONA, JIPB, and national & theater ISR products. The commander's guidance and the knowledge base enable the staff to have better situational awareness and attain situational understanding, allowing for a more focused mission analysis. In EBP, the commander's guidance should provide a summary of the strategic guidance and intent, a description of the desired endstate, and a description of how the commander will know that the endstate has been achieved. (Joint Experimentation Directorate, 2004, 94) The most important part of the commander's intent is his expression of the purpose of the operation. However, EBP requires commanders to provide an assessment of the enemy's intent, as well as the effects desired upon the enemy's physical and behavior states. Examples of some of the effects that a combatant commander may desire are:

- North Korean People's Army (nKPA) does not disrupt force flow through sea ports of debarkation
- Anti-government/anti-coalition strategic messages cannot co-opt the local populace and discredit U.S. involvement
- nKPA does not have unfettered access to sea lines of communications
- Destroy nKPA ability to conduct integrated air defenses
- UN supply routes in Darfur region are secure

Mission analysis and effects assessment allows the staff to define the problem(s) and begin the process of determining viable solutions. At the beginning of this step questions the staff may ask are, "What conditions must be produced to achieve the desired endstate?", and

‘What means should the command use to attack (lethal and/or non-lethal) the adversary’s system directly or indirectly?’” Those conditions are created by identifying a set of effects which may be the most productive and which high-value targets will produce the desired effects. High-value targets (HVT) are those assets that are considered essential for the enemy commander to accomplish his mission, and the staff will produce a high-value target list (HVTL) that contains enemy assets that if controlled or damaged in some way will cause enemy mission failure. Additionally, the planners determine during this step where the adversary’s assets are located, what friendly assets can locate and engage the target sets, and how the adversary’s asset should be attacked.

The third step is effects development, validation and prioritization which allows operational planners to understand the linkages within an adversary’s system or sub-systems and then harmonize the elements of DIME to achieve desired effects. Critical to effects development is the ONA, informed by the knowledge base, which provides the effects-nodes-actions linkage, enabling the staff to determine first order effects, cascading and cumulative effects. The planners develop effects focused on the enemy system(s) that will ensure unpredictability in the friendly plan, provide flexibility to mitigate unforeseen events and creates the conditions for maximum initiative by the subordinate commanders. Furthermore, the planners take the HVTL and the approved effects (from Step 2) and quantify them for inclusion in the effects matrix and for success by developing measures of effectiveness.

Quantifying the effects provides a framework for determining when the task can be terminated and if the desired result has occurred. Additionally, the planners can determine when, where, and the methods by which targets should be attacked to produce the desired

effects. The effects matrix is composed of effects objectives which are the results desired from a system or systems based on military or non-military actions against one of the adversary's domains (physical, cognitive or information), the critical tasks that must be planned, coordinated, resourced and executed; expressed as task, purpose, method, endstate.

An example of an effects objective could be:

- Effects Objective: nKPA does not disrupt force flow through air/sea ports of debarkation
- Task: Destroy Operational Strategic Command (OSC) 1 & 2 headquarters to deny the enemy the ability to command, control and execute anti-access operations
- Method: Strategic Attack and Operational Fires
- Effects: OSC headquarters destroyed, decision-making process delayed and unable to conduct coordinated and cohesive operational maneuver

The final part of this step is effects prioritization which pertains to identifying those enemy systems that should be attacked to produce the effects desired and the right time, right place and right sequence (cascading & cumulative) and producing a Priority Effects List that is distributed to subordinate commands for further development by their effects working groups and analysis for the tactical actions needed to accomplish the higher commander's intent. Prioritization is done because assets available to combatant commanders are finite and effects must be focused to ensure the appropriate friendly resource is tasked to achieve the most beneficial result possible. When this step is complete the planners can take the effects-node-actions linkage and analyze the assets available to complete the chain with resources that will be directed at key enemy nodes.

Capabilities analysis considers the full range of DIME resources that will be made

available to the combatant commander, and answers the question ‘What resources must be used or are needed to accomplish the sequence of actions; and what are the likely costs or risks?’ and ‘What resources and sequence of actions can most likely produce the desired condition and effects?’ Additionally, this step requires the planners to determine if they have the assets to achieve the desired effects and/or endstate, and if there are shortfalls the staff must identify the requirements needed for success. Then the staff goes through the process of determining which of those resources should be allocated to the appropriate enemy systems or high-payoff targets. High-payoff targets (HPT) are HVTs whose loss to the enemy will contribute significantly to the success of the friendly COA and they are included on the high-payoff target list (HPTL) which prioritizes the HPTs by phase of the operation. The HPTs are then synchronized in an effects synchronization matrix which coordinates the actions and operations within a JOA to ensure the effects meet the commander’s intent and achieve the strategic objectives. The effects synchronization matrix should be based on the D3A methodology to ensure the lethal and non-lethal effects and their mechanisms are in concert and focused at the correct systems and the right times and places.

Step four is the commander’s decision and resource assignment. In this step the combatant commander is presented the proposed effects-based courses of action and he will approve the COA that he believes is the most advantageous. This is based on the staff’s recommendation of effects-based actions with the relative advantages and disadvantages of each COA. The commander will then issue his final planning guidance, which may include a refined commander’s intent, new CCIR and priorities for the assignment of resources.

Step five is mission refinement and effects execution which includes adjustments to the approved COA based on input from the focused ONA, changes within the JOA or changes

that the commander may direct. The mission refinement is influenced by measures of performance which ensures that the command is executing the appropriate actions to achieve the effects desired. The effects execution is conducted by the component commands as directed in an effects tasking order. The effects tasking order (ETO) provides the subordinates with attack guidance that supports the commander's intent. Additionally, the ETO synchronizes military and non-military resources in time and space to achieve short and long term effects.

The final step is effects-assessment which must look at the physical, behavioral and functional "damage" caused by military and non-military actions. Effects-based assessment must be enabled by technology that goes beyond battle/bomb damage assessment, because the primary focus of EBO is behavioral control or damage of our adversaries. This assessment step looks at the changes that occur with in an enemy's system as a result of actions and informs the process so that adjustments and refinement can be made to the ETO if necessary. Additionally, effects assessment must enable the planners and the combatant commander to determine if:

- Some or all of the desired effects were produced
- What unintended, unanticipated, or undesired effects were produced?
- Was the sequence of tactical actions appropriate?
- What were the collateral effects on neutral parties?

With a common language and a codified process for planning EBO, combatant commanders can effectively implement the resources they are allocated to combat the adversaries the U.S. will face in the 21st century operational environment--Al Qaeda, narco-traffickers, rogue states and emerging regional threats.

CONCLUSION

“Our first priority must always be the security of our nation
...we will win this war...” President George W. Bush, 2002

The operational environment since the end of the Cold War has resulted in a fundamental shift of focus from unrestricted warfare against a well-defined enemy to operating in urban terrain, mountainous terrain and deserts against a wide variety of military threats--terrorists, asymmetric threats and warlords. Recent events have revealed that terrorists groups like al-Qaeda, emerging regional threats like China and other asymmetric threats continue to challenge the U.S. and attempt to prevent the spread of freedom and democratic values around the world. Failing states with weak or corrupt governments that do not enforce the rule of law, acquiesce to the wishes of illegal organizations, and fail to create opportunities for the betterment of their citizens enable groups like al-Qaeda, narco-terrorists, and warlords to operate uninhibited and recruit disenchanting youth.

These states, organizations and ultimately these young people are what the U.S. and its like minded international partners have to engage in order to bring about peace and prosperity--through military and non-military actions. EBO will enable U.S. national leaders and operational commanders to continue to improve the coordination and harmonization of military, interagency, and coalition assets against future adversaries. Furthermore, EBO will prevent U.S. responses to international crises from being predictable and will enable flexible deterrent options to be more viable as well as ensuring that if kinetic operations do occur that the end result is winning the war and winning the peace.

Effects-based operations demand that the [services] produce leaders able to think and execute conceptually, leaders who focus on outcomes vice process and are able to integrate all elements of national power to achieve desired effects. (Batschelet, 2002, 18) EBO is a new

way of thinking about an old problem, how do I achieve my desired endstate by defeating the enemy rapidly, with the least commitment of resources and time, and sustaining fewer casualties? EBO expands our warfighting concepts and capabilities through the dynamic application of selected elements of national power to achieve operational and strategic endstates through full spectrum operations. EBO exploits technology and dynamic assessments, enabling combatant commands to conduct shaping or decisive operations not just against and enemy force, but the entire operational environment--achieving full spectrum dominance.

EBO goes beyond the current objectives-based approach, enabling operational planners to examine the causal linkages through which actions lead to objectives--the effects-actions-node-resources construct. Determining causal linkages and conducting EBO assessment provides planners with the appropriate actions needed to achieve the desired effects. For EBO to be successful it requires a comprehensive understanding of the adversary as a system-of systems, the identification and management of direct, indirect and cumulative effects, and the synergistic application of selected elements of national power. Effects-based operations and concepts are still in an inchoate stage, but with lessons learned from the ongoing campaign against terrorists and insurgents and the continuing experiments this concept will enhance operational art and design in the 21st century.

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