

**A STUDY ON APPLICATION OF EFFECTS-BASED OPERATIONS
INTO SOUTH KOREAN FORCES**

By

Don-Young Jang

THESIS

Submitted to
KDI School of Public Policy and Management
In partial fulfillment of the requirements
for the degree of

MASTER OF BUSINESS ADMINISTRATION

2007

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ABSTRACT

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Modern and future warfare is pursuing the paralysis of adversary, not destruction. The US Forces has developed ancient unearned win concept into **EBO (Effects-Based Operations)** and applied it to the Iraq War. Most states think that EBO is a sample to be followed in military and none-military actions because the U.S Forces verified the effectiveness of EBO through the Gulf and Iraq War.

We have to prepare for urgent North Korean and potential threats of neighbor countries that have strengthened their military strength. After April 2012, the South Korea will get the full operational control in both war and peace time. The capabilities to execute combined operation with the US forces will be more important. Even though the ROK Forces is trying to apply EBO, I think there are no clear directions to do so. So this thesis will suggest the principle to apply EBO into the KOR Military Forces which are the speed, jointness, intelligence and precision.

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ACRONYMS

BDA	Battle Damage Assessment
CAS	Close Air Support
CDR	Commander
CFC	Combined Forces Command
C4ISR	Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance
COA	Course of Action
COG	Center of Gravity
CONOPS	Concept of Operation
COP	Common Operating Picture
DOD	Department of Defense
DIME	Diplomatic, Information, Military, Economic
EBO	Effects-based Operations
ETO	Effects Tasking Order
FOC	Full Operational Capability
FSCL	Fire Support Coordination Line
GFAC	Ground Frontier Air Controller
GMC	Guided Missile Command
IOC	Initial Operational Capability
IPB	Intelligence Preparation of the Battlefield
JCS	Joint Chiefs of Staff
JIACG	Joint Intelligence coordination Group
JSTARS	Joint Surveillance and Target Attack Radar System
LOC	Line of Communications
NCW	Network Centric Warfare
MND	Ministry of National Defense
MOP	Measure of Performance
MOE	Measure of Effectiveness
MOOTW	Military Operations Other Than War
OIF	Operation Iraqi freedom
ONA	Operational Net Assessment
OPCON	Operational Control

OPLAN	Operation Plan
PMESII	Political, Military, Economic, Social, Infrastructure, Information
PGM	Precision Guidance Missile
RDO	Rapid Decisive Operations
SEAD	Suppression of Enemy Air Defense
SoS	System of System
SP	Strategic Paralysis
UAVs	Unmanned Aerial vehicles
USCENTCOM	United States Central Command
USJFCOM	United States Joint Forces Command
4GW	Forth Generation War

Chapter 1 INTRODUCTION

1. 1 The purpose

There are core national interests which all states pursue; security, prosperity, prestige. Because every state seeks after core interests, it is natural to conflict with each other through various means; war, diplomacy etc. According to realism, the nature of international relationship is anarchy. There is no world government to constrain a few hostile and aggressive states. Most states possess armed forces to solve this problem. Military power is necessity for autonomy and sovereignty. That's why most states have strengthened their military forces. This movement has increased the possibility of outbreak in the world. Therefore it is important to understand about war.

Modern warfare is completely different from a past warfare due to advanced technology that has rapidly changed our environment. Before and during the 20th century most warfare focused on attrition or annihilation and sequential or serial concept that resulted in bloody and protracted battles. However, recently stealth weapon, **PGM (Precision Guidance Missile)** and intelligence communication (which

high technology has been applied to) make it possible to execute parallel or simultaneous attack without mass casualty. So the past destruction-based thinking has slowly moved backward. Instead of it, the strategic paralysis concept has been visualized by the U.S forces in Gulf and Iraq War.

As another example, in 1989 William S. Lind defined that **Fourth Generation Warfare (4GW)** is a decentralized form. That means the nation states loss their monopoly on combat forces and the major participants in war is not a state but a violent ideological network. So there are many types of war and enemies that can be state and non-state, and we have faced an ambiguous border line between soldier and civilian, peace and conflict, war and politics. The modern and future warfare will be more uncertain. Therefore, the U.S military introduced the **Military Operations Other Than War (MOOTW)** to enlarge the military operation's domain to rapidly response various enemy and war effectively and efficiently. To cope with irregular enemy and diverse mission the U.S military has developed new concept called **Effects - Based Operations**.

EBO is to achieve rapid victory by attacking the core of enemy's ability and will to fight with the asymmetric advantages in knowledge, precision and mobility etc. EBO

was first introduced in the Gulf War in 1991. At that time EBO was executed by mainly missile and airplane. But EBO has been more developed through the Kosovo War in 1999 and the Afghanistan War in 2001, which proposed the necessity ground forces. In the Iraq War in 2003 the modified EBO played a major role in ending war rapidly within 26 days. Today many military strategy scholars have been interested in the Iraq War which was applied to EBO. They thought the Iraq war as the future warfare which would focus on the paralysis of will to fight and be the fifth dimension, including ground, sea, sky, space and internet. Also most states have developed their military system to apply EBO in weapon system, military structure and communication system etc.

To prepare the future war and potential threat, we have to, because Korea is not big country, develop and enhance our military strength in both quantitative and qualitative aspects. To get the maximum effect with minimum effort we have to develop and study especially military strategy and operation art. Therefore the **Ministry of National Defense (MND)** announced the Military Reform 2020 in 2006 and the MND made law to implement the reform without suspension. But some expert argued that the military reform was lack of operation art. That is, the Military Reform 2020 focuses on the force structure and new weapon system, but don't mention about the

employment military strength. This thesis will suggest directions for applying EBO into the Korea Military Forces in the aspect of rapid speed, precision, intelligence and jointness by examining closely the concept of EBO and analyzing how to apply EBO to the Iraq War.

1.2. The Methods and Strategies

This study focuses on the concept of EBO including its background and explains how to apply EBO to the Iraq War by US Forces. Based on basic analysis, one of ways to apply EBO to ROK Forces will be suggested in terms of speed, jointness, intelligence and precision

After 2003, the study on EBO has been carried out with **CFC (ROK/US Combined forces Command)** as center in South Korea Forces. Even though the study on EBO has a short period, many military experts and officers published their theses and books. So methods of my study are to survey existing all journal, theses, research paper and books. Because there are not enough data in the South Korea, I used American web site such as Fighter Tactics Academy and military Journals.

Based on those methods and focuses, this thesis consists of five chapters. Chapter 2 will explain the concept of EBO, and the history of EBO and the procedure to execute EBO. Chapter 3 will show the detail data to prove the effectiveness of EBO through analysis on the Iraq War in four points of view: speed, jointness, intelligence and precision. In chapter 4 I will explain the necessity of EBO and suggest directions for developing EBO in ROK Forces.

Chapter 2 The Background of EBO

2. 1 Concept Evolution

After the Vietnam War the U.S armed forces learned important lessons: they cannot win the war through only destruction and attrition strategy; attacking physical targets such as soldiers, territory can be no benefit; other parts like political, diplomatic aspect must be considered to be winner. Therefore the U.S has developed its military strategy not to make a mistake again. Many new concepts on military strategy, operation and tactics have been studies, which have strategic paralysis of enemy in common.

The notion of **Strategic Paralysis (SP)** had been developed in the past. Over two thousand years ago, the Chinese strategist, Sun Tzu laid the theoretical groundwork for no war win conception. He said " The general rule for the use of the military is that it is better to keep a nation intact than to destroy it. It is better to keep an army intact than to destroy it. Therefore, those who win every battle are not really skillful... those who render others' armies helpless without fighting are the best of all." He did emphasize on the adversary's will to win as a best means, not physical destruction.

Another typical strategist, Prussian Carl von Clausewitz, recognized that there were at

least two distinct forms of warfare: absolute and real war. Absolute war focused on total annihilation of the enemy. In contrast, real war entailed more limited plans of attack in which annihilation was not a strategic option due to restrictions imposed by political ends and/or military means. As a result of war's dual nature, his definition of armed force destruction is as compatible with paralysis as it is with annihilation.

Recently the Strategic Paralysis (**SP**) has been developed by John Boyd's OODA Loop and John Warden's Five Rings model. Those two models are a basis of **SP** and had an important impact on the **EBO**. Figure 2.1 presents the decision-making cycle.

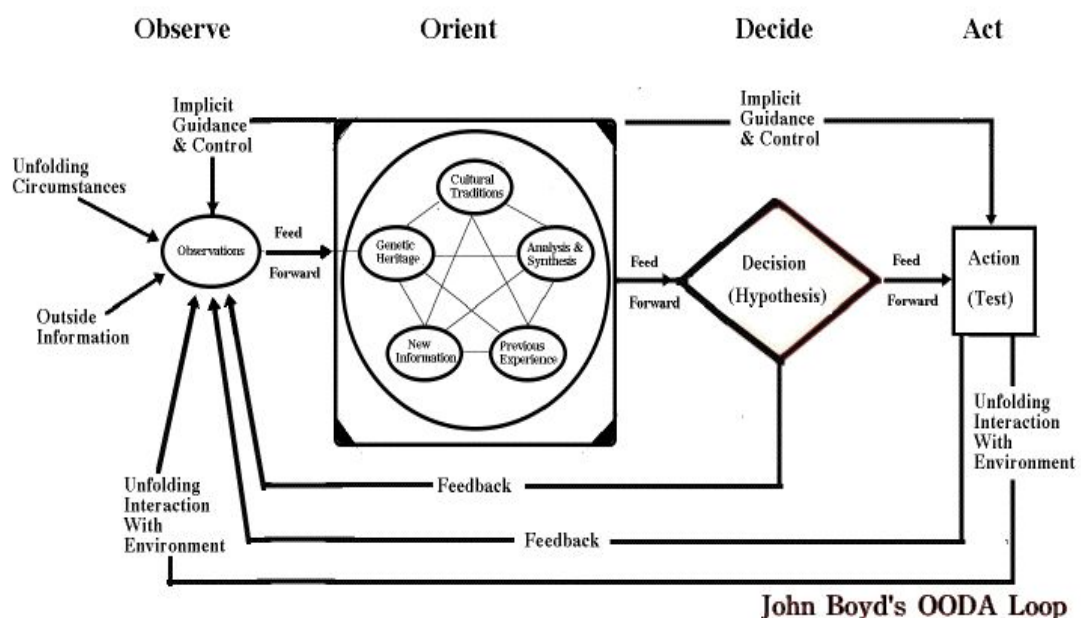


Figure 2.1 The OODA Loop

According to John Boyd, decision-making occurs in a continuous cycle of “**observe - orient - decide - act**” in every individual and organization. Figure 2.1 shows observation of the evolving situation is a basis of all decision: orientation is the filtering of information through heritage, culture and experience. We should operate the OODA Loop to win at a faster tempo than our adversaries', which means we should get inside adversary's OODA time cycle. This generates confusion and disorder among adversaries. This reduction of time cycle can be possible through the development of **C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance)** due to new technology. Warden's thinking on strategic paralysis was different from Boyd's thinking.

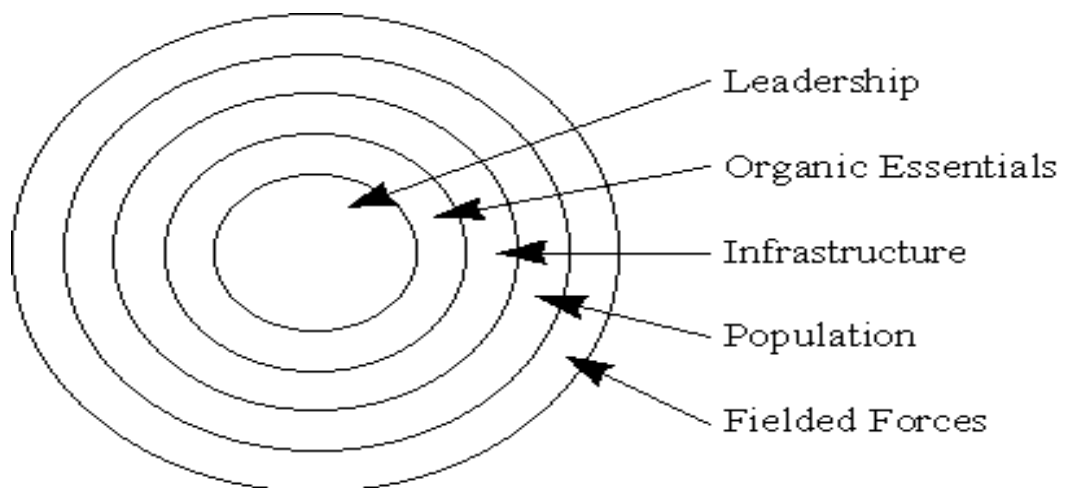


Figure 2.2 The Five Rings Model

According to John Warden, the enemy is a system with five strategic rings. (Figure 2.2) These "rings" are leadership, organic essentials, infrastructure, population, and fielded military forces. Leadership represents the most lucrative target set by which to incapacitate an opponent because it commands and controls all system operations. Finally, strategic attack should predominantly focus on the enemy's center ring called COG¹ (Centers of Gravity).

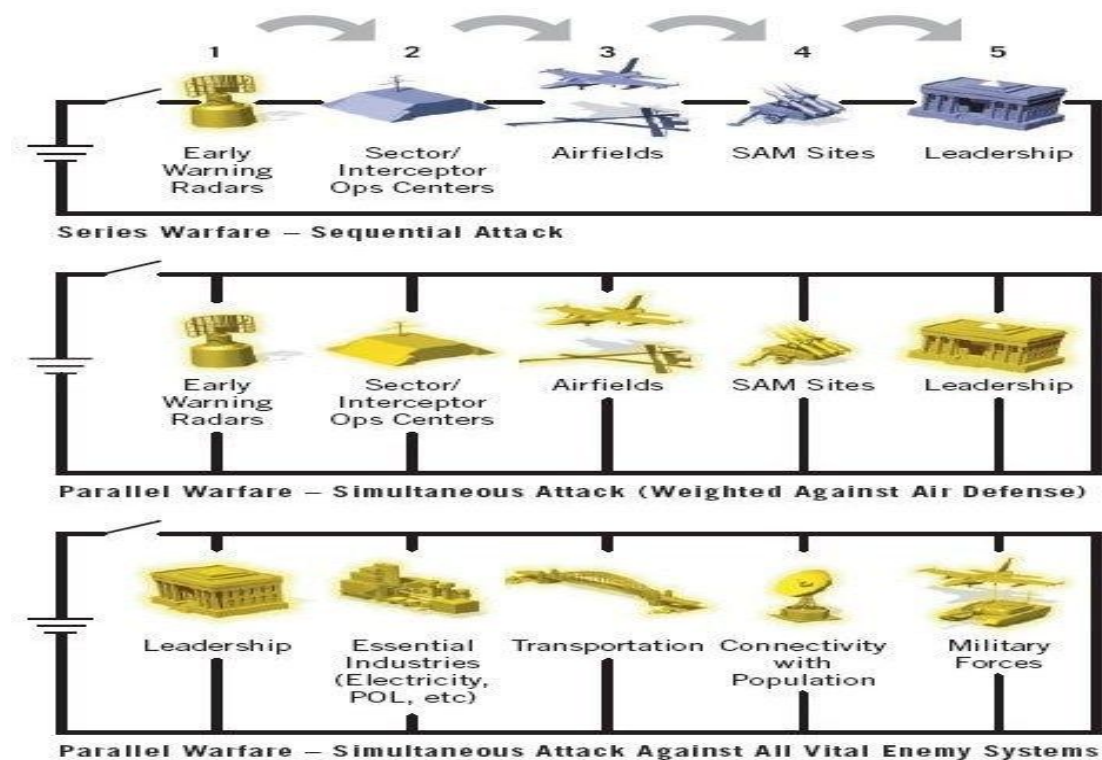


Figure 2.3 Series versus Parallel Warfare

The existent attack was executed in sequential way from military forces to leadership. However, Warden insists the parallel or simultaneous attack to get enemy's paralysis

¹ COG (Centers of Gravity) is defined as those characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight by DOD

of system. He said "In any events, the ultimate target of all strategic attack must always be the mind of the enemy command". This parallel or simultaneous attack can be feasible through the new technology like stealth aircraft, PGM etc. (figure 2.3)

While Boyd focuses on the psychological paralysis in process that leads to disorder and confusion, Warden puts emphasis on the incapacity of system through paralysis of COG. However, these models presents the Strategic Paralysis (SP) is more important than attrition or annihilation. This concept has been improved as **Rapid Decisive Operations (RDO)** in the U.S Army, **Network Centric Warfare (NCW)** in the Navy and **EBO** in the Air Force. Especially the EBO played a decisive role in the Gulf War. Therefore, the United States Joint Forces Command (**USJFCOM**) was established to transform the U.S military capabilities in 1999 and has developed EBO as leading approach to execute MOOTW. Now EBO is essential in the military and none-military actions in U.S Forces. Most states have pursued the application of U.S EBO. So there are many definitions and explanations on EBO. But I will explain the EBO on the basis of U.S concept.

2. 2 Defining Effects-Based Operations

According to USJFCOM, EBO is a process for obtaining a desired strategic outcome or effect on the enemy through the synergistic and cumulative application of the full range of military and non-military capabilities at the tactical, operational and strategic level. EBO emphasizes achieving some sort of policy objective in more efficient and effective manner instead of destructing physical capability or finding enemy to be killed. Furthermore, an "effect" is the physical or behavioral outcome, event, or consequence that results from the specific military or non-military actions. Figure 2.4 presents two aspects of effect.

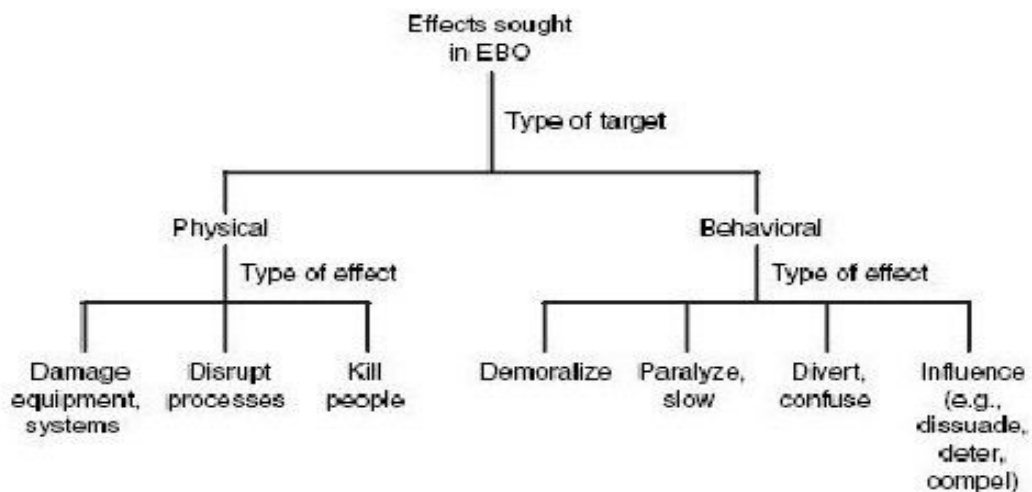


Figure 2.4 Types of Effects

Physical effects include disruption (e.g., delay of an army's maneuver by destroying a bridge), damage (e.g., kills of tanks or installations), and the killing of soldiers.

Behavioral effects are to demoralize and thereby reduce the fighting capability of military forces (or a population), to slow actions (to the point of paralysis), to confuse and deceive local and higher-level commanders, or to influence decisions - e.g., to convince, deter, or compel. In EBO, actions and their effects are not and cannot be isolated. They are interrelated and cumulative, resulting as 2nd, 3rd and nth order effects of an action or combination of actions and effects².

While the existent warfare sought mainly the physical effects, EBO focuses on the behavioral effects including physical effects. EBO regards the enemy as a **System of System (SoS)** consisted of political, military, economic, social, infrastructure, information (**PMESII**) to get these effects. This analysis on SoS can bring victory without widespread damage on infrastructure and casualties through the elimination of key linking parts in SoS. EBO is not new concept. It is revised strategic paralysis reflecting the new technology³ and current and future warfare. The core in EBO is

² Six basic rules of the game define EBO: actions create effects, effect are cumulative, reaction cycles will have active and passive participants, action-reaction cycles occur simultaneously in multiple dimension, all actions and effects at each level and in each area are interrelated, effects are both physical and psychological.

³ The new technology called the triple technical revolution is a sensor technology, information and weapon technology.

attacking pivotal target sets to result in a systemic collapse or paralysis of the enemy with low cost of lives and resources on both sides.

2.3 Effects - Based Operations Cycle

EBO is operated in a continuous cycle with five related steps. (See figure 2.5.) The first step called knowledge, is gaining full complete knowledge of the enemy. Next step is to determine the desired effects to shape the enemy's environment through analysis of knowledge. Third step is the application to determine the best means to achieve the desired effects. Simultaneously, the assessment steps starts to measure the impact of effects created. Final step, adaptation, is to adjust **Course of Actions** (COA) to reach desired end-state efficiently and rapidly.

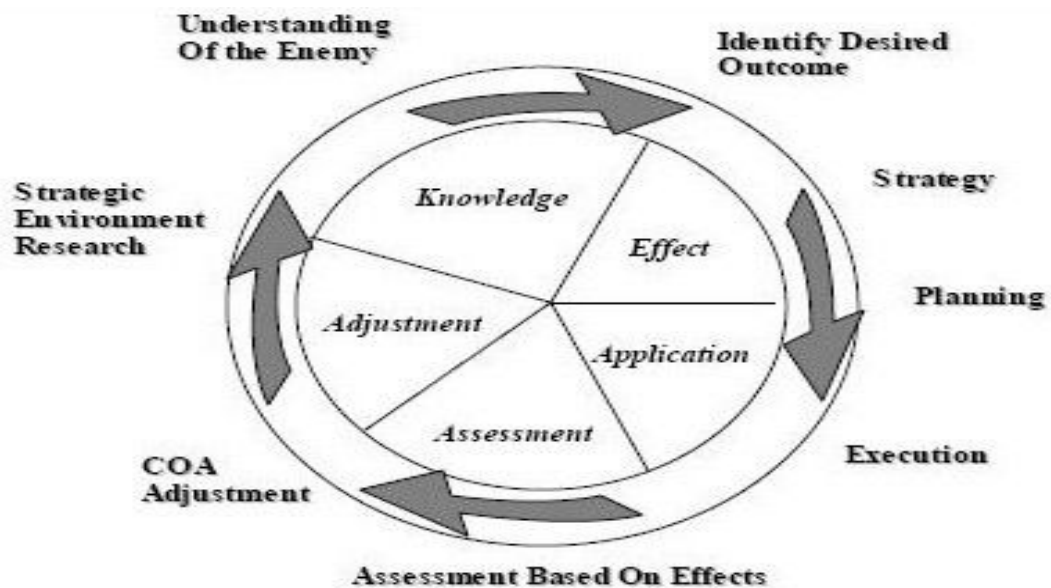


Figure 2.5 Effect-Based Operations Cycle

2.3.1 Knowledge

In EBO, the enemy is regarded as a complex system. Therefore, EBO needs a complete and clear understanding of the political, military, economic, cultural and informal environment that shapes the behavior of adversary at a given moment. Knowledge step is to gain clear knowledge, co-own its knowledge among user at all military level and build a system, process or organization to do so. In this step, decision makers or planners can identify potential effects and decisive linking pots, called nodes, which lead to the desired effects. The identification of effects and node, which is at the core of this step, is related to the achievement of commander's intent. That is possible through the **Operational Net Assessment (ONA)**.

The Operational Net Assessment is an integrated plans, operations, and intelligence process: 1) to synthesize information available across the interagency community into a coherent understanding of the enemy as a complex adaptive system, ourselves as a nationally networked set of available all national power, and ourselves as seen through the eyes of the adversary; 2) to convert information to actionable knowledge. The ONA can help planners and decision makers focus capabilities when, and how needed to achieve pivotal effects. The key elements of ONA are; 1) strategic context – strategic / political guidance and understanding the adversary vs. friendly intentions/

capabilities; 2) Knowledge of the adversary - the full knowledge through system of system analysis; 3) knowledge of national DIME capabilities - diplomatic, information, military, and economic ways and means; 4) effects model - 2nd, 3rd and nth effects, simulates cause and effects. (Figure 2.6)

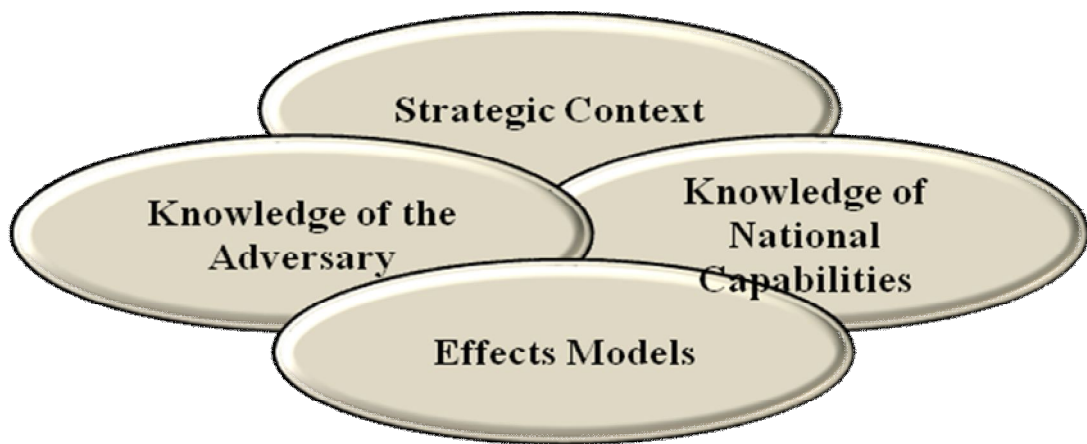


Figure 2.6 ONA Key Components

Especially, the knowledge of enemy is acquired through the fusion of information from a broad spectrum of sources, which is a **System of System Analysis (SoSA)**. SoSA is done by a team of cultural, behavioral, technical, economic, military and political expert.

Figure 2.7 presents the system of system analysis, which examines the enemy as a complex system to understand key relationships, dependencies, nodes, vulnerabilities, strengths and weakness from the viewpoint of PMESII.

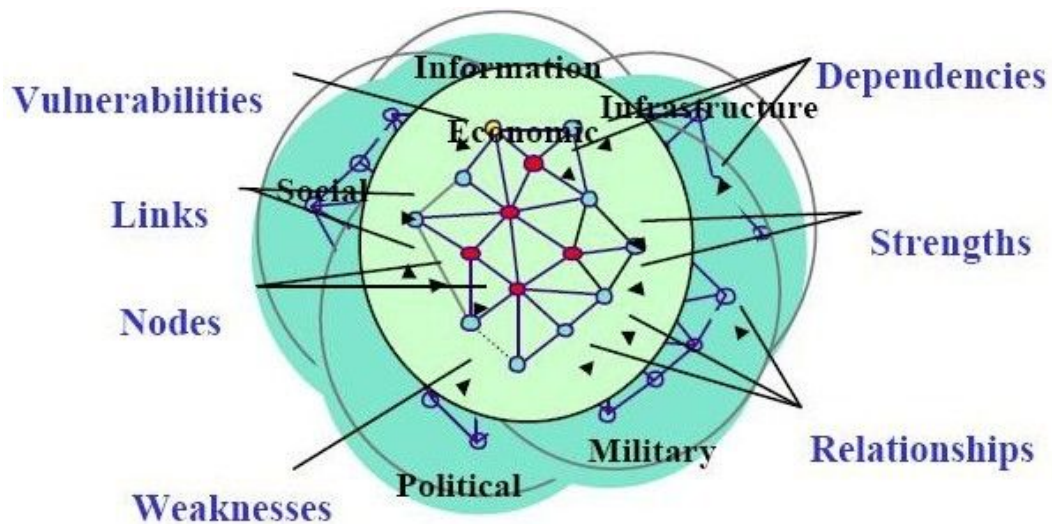


Figure 2.7 System of Systems Analysis

Figure 2.8 illustrates the ONA process. This process is to build actionable knowledge base, which contains effects, actions, and enemy's view including ours. This base is a result of consideration of: potential effects, actions / resources, and nodes / relationships acquired by SoSA.

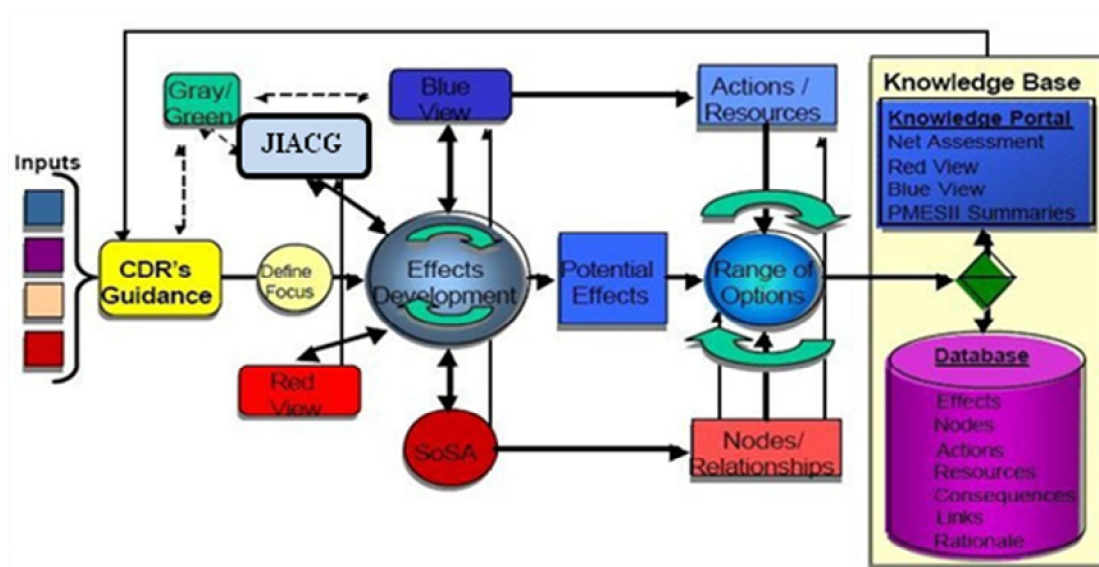


Figure 2.8 ONA Process

In conclusion, the knowledge stage is to provide decision makers with right information at right time, which give them to decision superiority. Commanders must be able to find the COG and core targets of the enemy through knowledge stage.

2. 3.2 Effects

After commander receives his objective from high-level commander, he will identify the desired effects to achieve his objective. Figure 2.9 explains the process of planning effects. Final addressed effects, the result of comparison between desired and potential effects, have to be linked means and tasks.

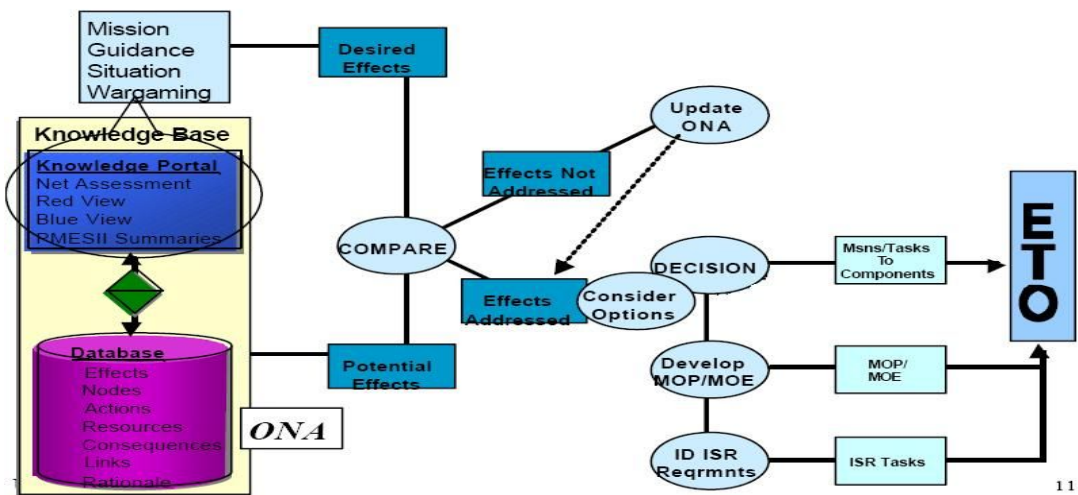


Figure 2.9 ONA Support to Effects-Based Planning

Also all available resources: DIME, close coordination with subordinate commands; have to be considered to develop and decide COA. The decided COA needs the measures to judge its success, called **Measures of Performance (MOP)** and

Measures of Effectiveness (MOE)⁴. Additionally, ISR is required to achieve commander's objective.

Effects Tasking Order (ETO), the result of this process, provides guidance in terms of effects, priorities, constraints, and intent to components and other agencies. According to the USJFCOM concept, ETO maintains “the explicit linking of strategic objectives and desired outcomes to tactical actions, the strategy-to-task linkage, so that as resources are tasked to take actions, every tactical action has a clear and traceable link to the strategic objective.” So related units follow and develop ETO, and ETO has to be concrete for preventing misunderstanding. Figure 2.10 shows the process of forming ETO.

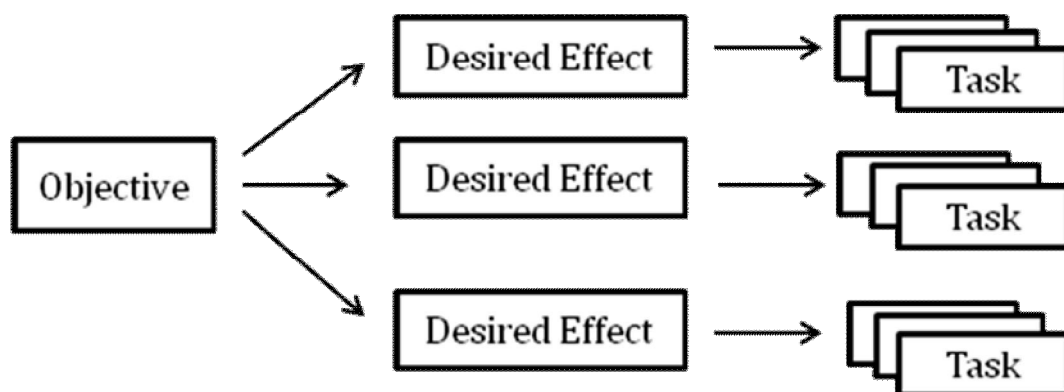


Figure 2.10 The Procedure of establishment of ETO

⁴ According to the USJFCOM, MOE is defined as the subjective criteria used to evaluate how actions have affected system behavior or capabilities, and MOP is defined as objective criteria used to evaluate accomplishment of Blue (friendly) actions. (USJFCOM, 2004, 17)

In this process, objectives have to be first to be considered. The desired effects are for achieving objectives, and tasks are linked to get the desired outcomes at tactical, operational and strategic level.

2.3.3 Application

This application phase is an execution stage of plan, and deciding and applying all applicable and available capabilities including diplomatic, information, military and economic to achieve the desired effects in most effective ways. The close cooperation, communication, coordination and synergistic operation among components are needed to control the enemy, and to get the desired effect.

2.3.4 Assessment

Commanders or planners can judge whether or not to adjust the current course of action through assessment step. Assessment has to include 1) if military actions produced some or all of the desired effects; 2) what collateral or unintended effects were produced; 3) the overall impact on joint effort; and 4) how the tactical action contributed to achievement of the desired outcome. This assessment is a continuous,

dynamic evaluation of associated MOPs and MOEs. Commanders must reflect the result of assessment through changing their COA.

This step is closely related to intelligence. Only ISR assets including human intelligence can identify the result of military actions as well as target to strike for acquiring desired effects. Therefore, MOPs and MOES are treated by intelligence cycle. Joint Pub 2-0 describes the intelligence cycle as consisting of planning, collecting, processing, analyzing, exploiting, and disseminating. (Figure 2.11)

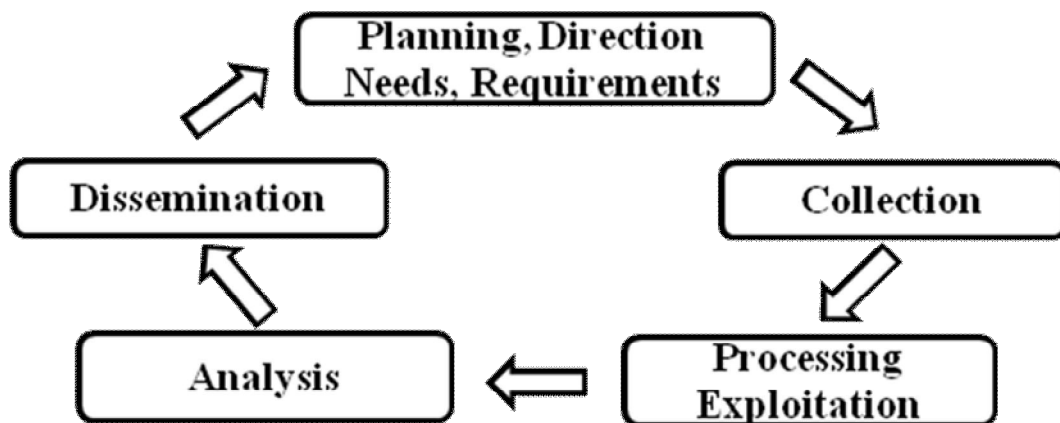


Figure 2.11 Intelligence Cycle

In Planning, the development of MOPs and MOEs are done by analyzing the clear connection in the knowledge on the enemy: how it fails, and how it operates. These measures must meet two conditions: 1) they are related to objectives; 2) they consider the capabilities of available Intelligence, Surveillance, and Recognizance (ISR) assets.

Collection, Processing, and Exploitation use the measures developed in planning to task ISR assets and fuse intelligence information following the execution phase.

Processing and analyzing is the core of assessment. According to EBO concept in the JFCOM, it is a two-step process. Step one seeks to identify what physical and non-physical effects have been created in the enemy's system. Step two identifies whether direct or indirect collateral effects were produced and why these collateral effects occurred. 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.

2.3.5 Adaptation

Based on assessment, the current COA is reviewed. Contingency plans are formulated, if required, and recommendations to modify the current COA are made to achieve the desired effect. In adaptation, the commander can adjust his course of action to more effectively achieve the desired end-state through the continuous assessment of the enemy, military and political actions including friendly situation.

To sum up, EBO is a renewal of unearned win concept to quickly response to various threats from military and non-military enemy. EBO is seeking after Strategic Paralysis (SP) and parallel warfare or simultaneous attack. In addition, EBO include objective-oriented and target-oriented operation. To do so, EBO is operated in continuous 5 steps; knowledge, effects, application, assessment and adaptation. Knowledge base, which is built through ONA and SoSA, is the foundation for identification of COG. The desired effects for neutralizing COG should be linked tasks in detail and also develop the means to verify the result of military actions like MOPs and MOEs, finally the assessment must be reflected in current COA to achieve desired outcome. Up to now the background, definition and process of EBO were explained. Now I will explain how the US Forces applied EBO in the Iraq War.

Chapter 3 The Case of the Effects-Based Operations in the Iraq War

EBO is just theory, not reality. The analysis on application of EBO into reality is important to understand the concept of EBO, and to study how to adapt it into the Korean Military Forces. The guide to analyze can be found in characteristics of the Iraq War.

Characteristics of the Iraq War can be understood by Secretary Rumsfeld. He said that **Operation Iraqi Freedom (OIF)** had yielded several key lessons: 1) **The importance of speed**, and the ability to get inside enemy's decision cycle and strike before he is able to mount a coherent defense; 2) **The importance of jointness**, and the ability of U.S. forces to fight, not as individual de-conflicted services, but as a truly joint force. Maximizing the power and lethality they bring to bear; 3) **The importance of intelligence**, and the ability to act on intelligence rapidly, in minutes, instead of days and even hours; 4) **The importance of precision**, and the ability to deliver devastating damage to enemy positions, while sparing civilian lives and the civilian infrastructure.

Finally, keynotes of OIF are speed, jointness, intelligence and precision, which enable the U.S forces to make a parallel and simultaneous attack, and are the core for executing Effects – Based Operations. That is, four parts is essential in executing EBO in the real war. I will show how four elements were applied to execute EBO in the Iraq War.

3. 1 Speed

If one can seize the ground with vital importance, or make a decision faster than enemy expected, then enemy would be struck with panic. Speed implicates two aspects, ability to attack faster than enemy's response as well as fast decision cycle.

Firstly, from the viewpoint of the number of troops, although many military experts have insisted three to one advantage in mass to defeat enemy, U.S forces thought that mass was not the best measure of power in a conflict. This is true: when Baghdad fell, there were just over 100,000 American forces on the ground. In spite of 100,000 American forces, they overwhelmed the enemy with advanced capabilities, and using those capabilities in innovative and unexpected ways.

Comparison of Force Numbers between the Gulf and Iraq War

	Gulf War		Iraq War		
	U.S	Coalition	U.S	British	Others
Army	295,000	105,000	67,000	26,000	659
	tank/armored vehicle: 3,100/4,050		tank/armored: 1,800 attack helicopter: 200		
Air Force	56,000	-	37,000	81,000	470
	aircraft: 2,600		aircraft: 1,003		
Navy	82,000	-	70,000	4,000	1,153
	naval vessel: 191		naval vessel: 120		
Marine	94,000	-	70,000	4,000	-
	-		aircraft: 372		
Others	-	100,000	5,000	1,000	430
subtotal	527,000	295,000	249,000	43,100	2,703
total	822,000		294,803		

Table 3.1 shows force numbers of coalition in the Gulf and Iraq war. The number in the Gulf War is around three times as much as that of coalition forces in the Iraq War. Also, table 3.2 explains the number of Iraq forces during the Gulf and Iraq War. The total number of Iraq forces is about 1.5 times as that of coalition forces in the Iraq War. Especially, the number of Iraq ground forces, 375,000 is about two times than that of coalition, around 170,000 including marine. Although the number of coalition

forces was smaller than that of Iraq, coalition forces won the war. This illustrates that three to one advantage in mass is not useful.

Table 3.2
Comparison of Iraq Force Numbers between the Gulf and Iraq War

	Gulf War	Iraq War
Army	955,000	375,000
	tank/armored vehicle: 5,500	tank/armored: 5,900
	field artillery: 2,518	field artillery: 2,500 helicopter: 375
Air Force	40,000	20,000
	aircraft: 689	aircraft: 775
Navy	5,000	2,000
	naval vessel: 60	naval vessel: 18
Others	Scud launcher: 66	Air Defense Commander: 17,000 paramilitary forces: 44,000
total	1,000,000	429,000

This small-scale force has useful advantages in deployment and maneuver. In the Gulf War U.S. Forces took six months to deploy troops in the vicinity of Iraq. In contrast, in the Iraq War U.S. could deploy about 250,000 forces to the Iraq in only two months, which is one third of the period in the Gulf War. This rapid deployment made the Iraq surprised; finally the Iraq guidance division did not make a careful preparation for war. In the aspect of maneuver, U.S. forces had already moved the distance of the longest maneuver in the 1991 Gulf War in one quarter of the time. They advanced within 50 miles on Baghdad on Day 8, entered Baghdad International

Airport on Day 16, and were in the center of Baghdad on Day 20. That is, ground forces advanced to the Baghdad at the speed of average 80Km per day. (See Table3.3)

Table 3.3
Maneuver Speed of Ground Forces

	WW II	Korean War	Six-Day War	Gulf War	Iraq War
Speed	15 Km	18 Km	25 Km	40 Km	80 Km

(Speed: the average maneuver distance per day)

This quick maneuver was showed urban operation. In battle of Baghdad, the sheer speed of the V Corps and 1st MEF⁵ penetration into the regime's center of power in Baghdad enabled the Coalition to launch deep armored penetrations and raids into Baghdad. These "thunder runs" demoralized some of the defenders, further weakened the Iraqi regime's control over the city and the nation.

In conclusion, physical speed can be improved by employing the small-scaled troops to attack enemy rapidly and response quickly various situation. This rapid movement make adversary confused and paralyze the enemy system.

In the quick decision cycle, U.S forces could reduce the time from observation to action within one hour. Compare to WW II, one hour is too fast. Table 3.4 shows the

⁵ MEF: Middle East Forces

reduction of decision cycle. As already written, enemy is unable to control its components due to faster decision, which is called Strategic Paralysis (SP). This speed can be achieved through the development of C4ISR system and PGM.

Table 3.4
Change of Decision Cycle Time

	WW II	Gulf War	Iraq War
communication	radio / wireless	nearly real time	real time
judgment	a few times	a few minute	a few minute
decision	a few days	a few times	a few minutes
action	one week	one day	one hour

The rapid speed in both maneuver and decision cycle induces the paralysis of control among adversaries, which is the core of EBO. However, paralysis cannot be achieved by only speed.

3. 2 Jointness / Intelligence

Speed was decisive during OIF, but "speed" could never have been effective if it has not been supported by air dominance and overwhelming superiority in firepower backed by far great situational awareness and a common operating picture (COP). U.S

forces used coordination of air-land-naval operations and new technology to supplement the numerical inferiority.

Traditionally, ground forces advance only after air or ground firepower incapacitate adversaries. In the Gulf War, after firepower of air, navy and army was employed during 38 days, and ground forces advanced. But in the Iraq War, ground forces advanced only after 15 hours. That is, joint operation of air- land- navy was executed at the beginning of Iraq War, which shows the maximization of unification of fighting strength. Based close coordination, joint warfare and combined arms were executed effectively. Followings are examples how to execute joint operation.

CAS (Close Air Support) in battle of Baghdad showed the jointness of ground and air forces. In this battle, 3rd armor division made a full use of A-FAC to get effective air support. To get air dominance and support ground forces in low altitude, the air defense system of Iraq had to be neutralized before air force attack. Special Forces in the army played a decisive role in giving correct target list in **SEAD (Suppression of Enemy Air Defense)** fire. Also ground forces set up 30 ×30 Kill-Box outside of **FSCL (Fire Support Coordination Line)** to ensure aircraft activity. The rapid maneuver of ground forces has fatal problems: side threat and extended **LOC (Line**

of Communications). In the Gulf War the mission allocation of strike sorties flew roughly 55 percent of all sorties. In the Iraq War, the figures were evidently over 75 percent to ensure ground forces advance without side threat. To maintain sustainability in logistics, the United States deployed 120 C-130s and 7 C-17s full-time to the theater, plus large additional numbers of lighter transport aircraft. USCENTCOM reports that the United States flew 7,100 airlift sorties between G-Day and April 1, moved about 55,000 short tons, and deployed some 76,000 passengers between G-Day and April 9. During the full course of the war, the USAF flew 7,413 airlift sorties and Australia flew 263. Also there are different improvements in army-navy- air forces operations. In the Gulf War, Tomahawk cruise missile could be programmed in three days to launch after received report from special force, but in the Iraq War it needed only one hour. In addition, aircraft carriers were critical substitute for air base.

This joint operation can be executed by the intelligence system, called C4ISR (Command, Control, Communication, Computers, Intelligence, Surveillance, and Reconnaissance), which enables forces: 1) to judge accurate situational awareness; 2) to get intelligence on enemy and to co-own situation and intelligence more quickly among the allied forces at every level; 3) to communicate more rapidly among all

units. This improves the speed of decision, which allow adversary not to react effectively.

The United States had vastly improved every aspect of its intelligence, targeting, and command and control capabilities since the last Gulf War. Its combination of imagery, electronic intelligence, signals intelligence, and human intelligence was honed in Afghanistan, and improved communications and command and intelligence fusion at every level gave it near real-time day and night situational awareness.

In the aspect of ISR, various high-tech weapons were employed: JSTARS, UAVs. E-8C JSTARS is a joint development project of the U.S. Air Force and U.S. Army that provides an airborne, stand-off range, surveillance and target acquisition radar and command and control center, and play a role of sensor aircraft. The UAVs included larger systems like the Predator, Global Hawk, and the Pointer that the United States used in Afghanistan and Gulf War. In the Iraq War, the Coalition also made use of new tactical systems like the U.S. Army Hunter and Shadow, the Marine Corp's Dragon Eye, and the USAF Force Protection Surveillance System. In addition, some 80 dedicated Coalition aircraft flew more than 1,000 sorties on IS&R missions. They gathered some 42,000 battlefield images and provided 2,400 mission hours of

SIGINT coverage, 3,200 hours of full mission video, and 1,700 hours of moving target indicator coverage.

As already written, improvements in C4I and the structure of the IS&R effort sharply reduced the time between the acquisition of targeting data and actual fire on the target. C4I plays a critical role in recognizing situation through many ways like COP (Common Operating Picture), TRITAC (Joint Tactical Communication System). In addition, improved C4ISR enhanced the capabilities of Joint Operations and close coordination, which resulted in securing the speed and informing the targets to attack with PGM.

3. 3 Precision

Precision weapon can strike the core of enemy without mass damage, which leads to loss the control of adversary. That is, strategic paralysis can be executed. The ability to use precision weapons throughout day and night and in virtually all weathers allowed the US land forces to exploit their speed, as well as reduced the need to take time to secure their flanks and rear areas. Finally, the use of air and missile strikes against Iraqi leadership and communications centers further disrupted an already weak and heavily politicized Iraqi command and control system, and ensured that Iraq

could not react in time to the speed of the US advance. Laser and GPS guidance system improved its precision.

As table 3.5 shows, the key precision weapons the Coalition used in its missile and air strikes included sea-launched 802 BGM-109 TLAM (Tomahawk) cruise missiles and air-launched 153 AGM-86 C/D CALCMs.

Table 3.5
Rounds of Precision Weapon used in the Iraq War

	BGM-109	AGM-86	BGU	EBGU-27	JDAM	AGM-98
rounds	802	153	8,618	98	6,542	48

They included 8,618 laser-guided bombs (GBU-10, GBU-12, GBU-16, GBU-24, GBU-27, and GBU-28). They fired 6,542 JDAM GPS-guided bombs (GBU-31, GBU-32, GBU-53, and GBU-37) and 408 AGM-88 HARM high-speed anti-radiation missiles.

These figures reflect the fact that the development of inexpensive strap-on kits for laser and GPS guided weapons made mass strikes far more affordable and cost effective, and enabled the United States to allow strike aircraft to operate outside of

the effective range of most current light air defense systems. The United States delivered 30 percent more laser-guided bombs than GPS-guided weapons, in part because laser illumination is more rapid and accurate in dynamic targeting.

In the aspect of air forces, precision of artillery was useful to joint operations. The flow of intelligence and targeting data to artillery units was better than in previous wars, and artillery was more maneuverable and quicker to react. It took eight minutes to set up the standard M109 155mm howitzer in the Gulf War. It took 30 seconds to set up the Army's Paladin 155mm howitzer in the Iraq War.

U.S. artillery forces used MLRS/ATACMS. Major General David H. Piraeus, commanding general of the 101st Airborne Division (Air Assault), stated that his division used 114 ATACMS and used them in conjunction with both attack helicopters and in forces whose combined arms elements made equally good use of anti-tank guided weapons as precision artillery. Also, U.S. artillery forces will have acquired considerably more lethality if the use of the SADARM proves to have been effective. The new M898 SADARM is the artillery's first fire-and-forget multi-sensor munitions. It can be fired from any 155mm howitzer and delivers two separate submunitions with one projectile. It is an indirect fire munitions intended primarily to

counter enemy artillery, and it is fired after counter-battery radar, such as the Q37 Fire finder, locates enemy artillery. It can also attack other armored vehicles and air defense systems.

In a word, EBO can be perfectly executed when four factors (speed, jointness, intelligence and precision) are provided at the same time. The core of EBO is to neutralize or incapacitate adversary's control on its system. It is possible to co-own and to disseminate intelligence on enemies through the latest C4ISR. The close joint operation in ground, sea and air forces keep the physical speed as well as psychological speed. In addition, the long range missile with precision reduces unnecessary expense and victims as well as can attack the core of adversary. Finally, the Iraq's leadership did lose its grip on nation system by the US forces. The U.S Forces could achieve four elements due to Continuous research, development, investment and analysis on the past war and battle. In contrast, the South Korea Forces lags behind the U.S in many respects.

Chapter 4 Directions for Applying EBO into the Korean Military Forces

The ROK Forces should develop and reinforce our military strength in weapon system, organization structure and operation art to deter war. Even though some people used to insist that such a big invest are ineffective in peace time, we should prepare for various threats and mission in an efficient way, which are neighbor countries' military threats and to execute coalition operations. That is a duty of nation and military personnel. To do so, we must set up directions to reinforce the capabilities for executing EBO.

4. 1 Necessity of EBO

Recently the balance of power has been complicate. The confrontation between the US – Japan - Australia and the China – Russia is stimulating an armament race. The ROK Military will get the full operational control after 2012. In addition, warfare aspect is being changed rapidly. In these cases there is no choice but to improve our military power in every level.

4.1.1 Military Threat in the Korean Peninsula

Economic cooperation and interdependence is increasing in Northeast Asia. Due to China's continued economic growth, Japan's economic recovery, and Russia's political

stability and economic growth, the strategic status of Northeast Asia is being enhanced. On the other hand, the structure of checks and rivalry is also deepening, while countries in the region are competing for more hegemony and influence in the region.

The United States and Japan declared to jointly respond to potential security threats rising in the region. While actively supporting the US policy of anti-terrorism and nonproliferation, Japan is showing moves to extend the activity sphere of its Self-Defense Forces to the world beyond the Indian Ocean and, at the same time, is pursuing "a normal military force of a normal state." In response to the strengthening of the bilateral alliance between the United States and Japan, China and Russia have been strengthening their strategic partnership. In conclusion, uncertainties stemming from traditional conflicts and rivalries are increasing with the remaining Cold War structure in Northeast Asia. Northeast Asia is the region where security situations are tenser than any other region.

North Korea's nuclear issue is not only the most serious threat but also challenges the security of Northeast Asia and the world. As North Korea conducted a nuclear test on October 9, 2006, the international community imposed sanctions on North Korea

and North Korea reacted strongly to such sanctions. Accordingly, instability is increasing in Northeast Asian security. On top of North Korea's nuclear issue, the Cross-Straits issue, diverging views on history between countries in the region, concerns about territorial claims add to regional frictions. China adopted a political resolution to strongly oppose independence of Taiwan in accordance with the "One-China Principle" at the 4th Plenary Session of the 10th National People's Congress on March 14, 2006 when she celebrated the first anniversary of enacting the "Anti-Secession Law." Tension across the Straits heightened because Taiwanese President Chen Shui-bian announced the intent to accomplish Taiwan's independence at any costs, one day before the National People's Congress resolution.

Japan's major politicians pay visits to the Yasukuni Shrine and some conservative groups beautify the past history of their invasion of Northeast Asia. This aroused concerns of neighboring countries because such behavior is detrimental to the improvement of peace in Northeast Asia. Moreover, there remain territorial disputes such as disputes over the Senkaku (Diaoyudao for the Chinese) Islands between China and Japan, and disputes over four Northern Islands between Japan and Russia. Since the sea surrounding the Senkaku Islands is known to preserve natural gas and oil reserves, China, Japan and Taiwan claim territorial rights one another. In relation to

the establishment of the Exclusive Economic Zone (EEZ), countries in the region adhere to their own positions in order to utilize the ocean space for economic benefits. Differences in their positions regarding the EEZ become factors for potential conflicts.

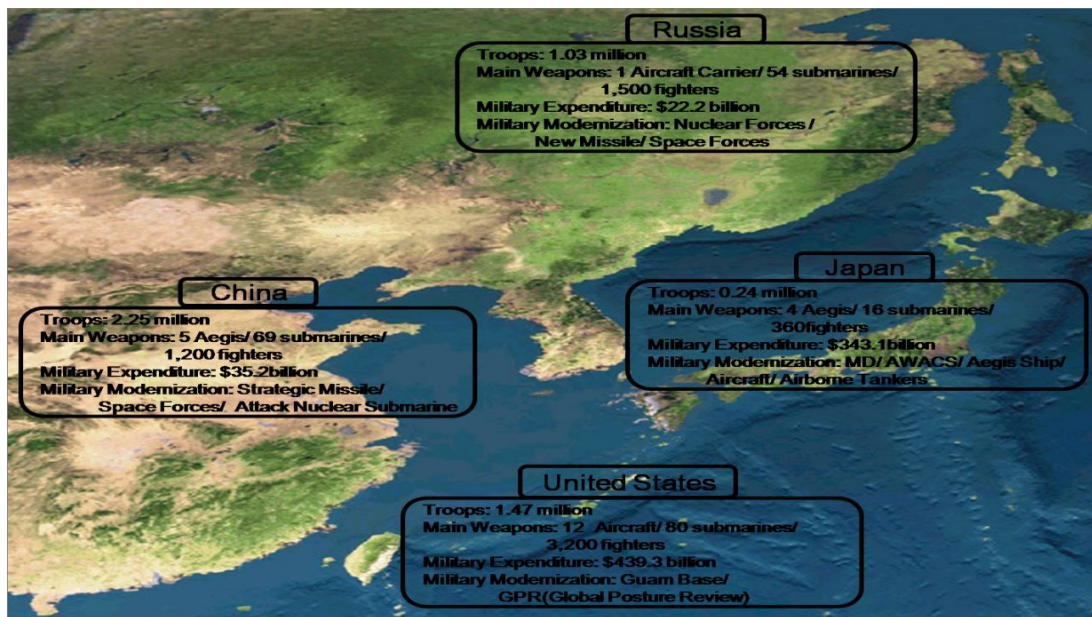


Figure 4.1 Military Forces of the Four Major Powers in North East

From the military point of view, the United States, Japan, China, and Russia had been competing with each other to maintain and expand their influence in this region, despite the lack of a multilateral security cooperative regime in place. Furthermore, most countries in the region are pursuing military transformation and technical innovation in order to modernize and enhance their military capabilities under the new security environment. Up-to-date military posture of the four major powers surrounding the Korean Peninsula is depicted in Figure 4.1. (Refer to Appendix A.

Military Capabilities of Neighboring Countries)

South Korea has some 680,000 troops backed up by 29,500 US troops confronting North Korea's 1.1 million-strong communist army since the Korean War. So we have to consider North Korean military threat. North Korea is striving to stabilize the regime, and making efforts to maintain the regime by reorganizing the party-government apparatus and by setting up a new economic development strategy. After the nuclear test, North Korea sought to cement internal unity and promote national pride by holding a military-civilian ceremony to celebrate its successful nuclear test. The North Korean military seeks to develop missiles by making test launches of new surface-to-surface missiles and ground-to-sea missiles. At the same time, the military seeks to strengthen core combat capabilities such as the Cheonma tanks and the long-range artillery munitions through test-firing those munitions. (Refer to Appendix B. Comparison of Military Capabilities between ROK and DPRK)

The core of its military strategy is to execute a surprise attack at an early stage, to grasp the military initiative combined with a warfare strategy including regular and irregular warfare, and to expand the initial victory by concentrating firepower and mechanized and self-propelled maneuver units. To do so, major combat capabilities are deployed to the south of the Pyongyang-Wonsan line. The North Korean army

consists of a total of 19 corps level units, in which there are nine frontal and rear corps, four mechanized corps, one tank corps, one artillery corps, the Pyongyang Defense Command, Border Guard Command, Missile Guidance Bureau, and Light-infantry Instruction Bureau. Major combat units comprise more than 170 divisions and brigades including 75 infantry divisions (including instruction divisions), 30 artillery brigades, 10 tank brigades, 20 mechanized brigades, 25 special warfare brigades, and 10 other brigades. Additionally, it is expected that North Korean special warfare units comprising around 120,000 troops including those of frontline special warfare units will infiltrate into the entire area of the South and will plunge the rear areas of the South into chaos.

The North Korean Navy consists of two fleet Commands in the East Sea and the West Sea respectively, twelve squadrons, and two maritime sniper brigades under the central control of the Navy Command. North Korea holds 60 submarines including Romeo-class and Sango (Shark)-class submarines and over 10 Yugo-class submersibles. These can perform missions of laying mines, attacking surface ships, and supporting operations by special warfare units. Support ships include landing vessels such as landing ships, high-speed landing craft, and landing craft air cushioned (LCAC), as well as minesweepers. The North Korean Air Force comprises

four air divisions, two tactical transportation brigades, two sniper brigades, five surface-to-air missile brigades, and three radar regiments under the central control of the Air Force Command.

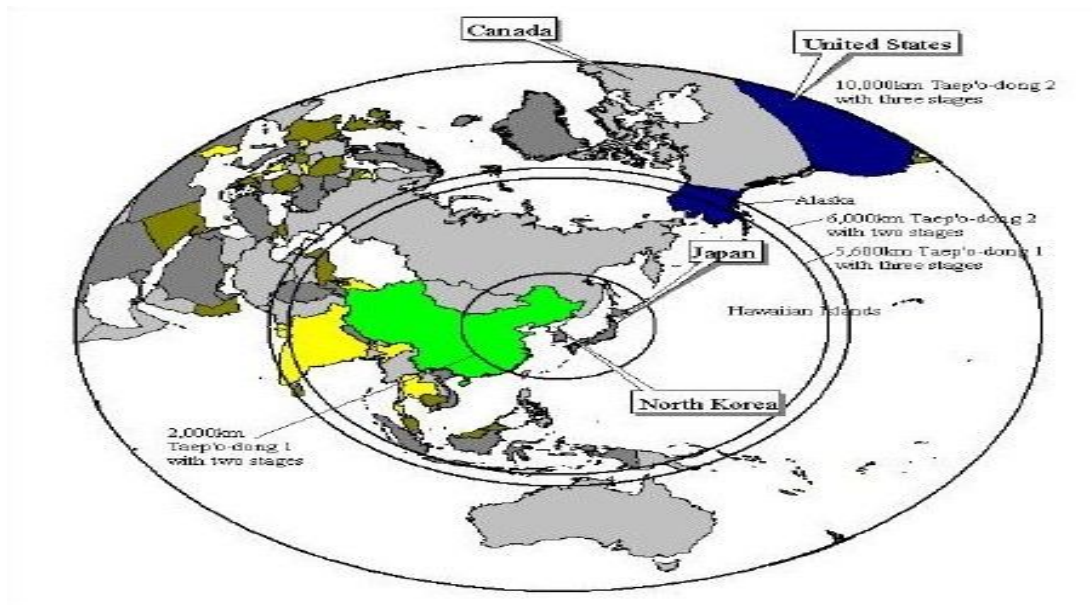


Figure 4.2 Potential North Korean Long-Range Missile Capabilities

Pyongyang is developing a long-range Taepodong-II missile. In July 2006, the North Korea tested and launched Taepodong-II type, Scud, and Rodong missiles, thereby raising tension on the Korean Peninsula and in Northeast Asia. As figure 4.2 depicts, the range of the Taepodong-II is expected to go beyond 6,700 km and the range will be able to be extended if the weight of the delivery body is reduced or three-stage rockets are loaded additionally. In addition, in December 1961, North Korea launched its chemical weapons development programs including research and construction of production facilities in compliance with Kim Il-sung's "Declaration of

Chemicalization." It is assessed that Pyongyang has been producing poison gas and biological weapons since the 1980s. It is believed that approximately 2,500 to 5,000 tons of a variety of agents including nerve agents remains stored in a number of facilities scattered around the country and that North Korea is able to produce biological weapons such as the bacteria of anthrax, small pox, and cholera.

4.1.2 Efficient Execution of Coalition Operations

The South Korea took over military operational control over its own forces in peacetime in 1996. Even though the United States had hoped to effect the wartime command transition as early as 2009, on February 13 2007, US Defense Secretary Robert Gates and South Korean Defense Minister Kim Jang Soo decided to amend the current South Korean-US Combined Forces Command on April 17, 2012. After 4 months, General BB Bell, commander of US troops in Seoul, and South Korean Joint Chiefs of Staff chairman Kim Kwan-Jin agreed to detailed time-lines to follow up their defense chiefs' accord. After April 17, 2012, the South Korean military will have full operational control of the country in time of war as well as peacetime, and US forces in Korea will move to a supporting role.

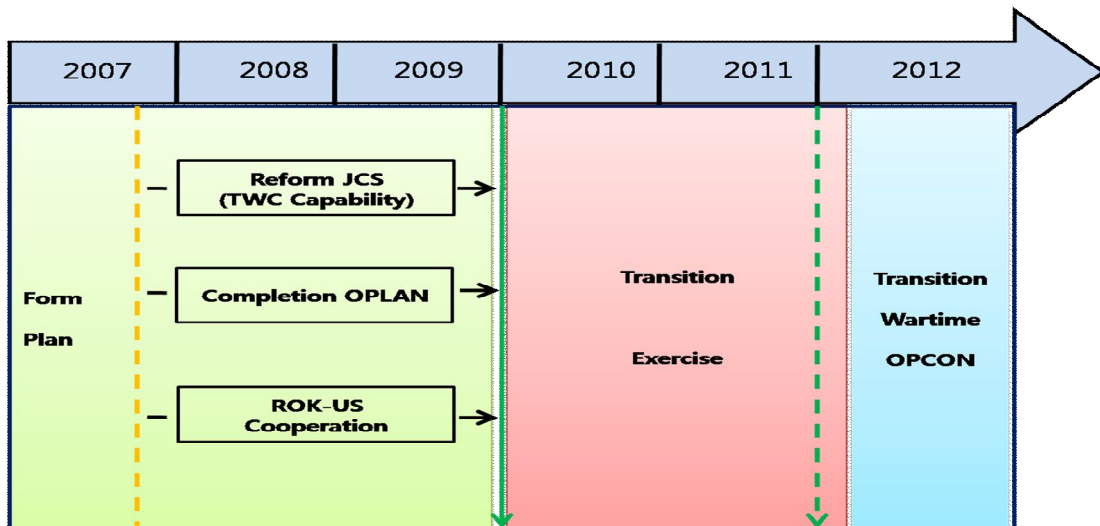


Figure 4.3 Time Plan for Transition of Wartime Operational Control

As figure 4.3 shows, South Korea should have “initial operational capability (**IOC**)” by late 2009 and full capability (**FOC**) by the end of 2011 to enable the transfer at 10 a.m. on April 17, 2012 under the time frame. South Korea is trying to build up its military strength against North Korea, and to replace the current US-led joint operation plan to comply with the change at a slower pace until 2012.

In case a war breaks out in Korea or ROK executes any military operation with US, South Korea will face the new US military strategy and operation art and weapons. EBO is essential in US Military strategy. As already known, EBO is linked to many state-of-the art weapons system, C4ISR and strike on the core of adversary called node. To enhance efficiency of coalition operation, ROK should try: 1) to understand

the concept of EBO; 2) apply it to Korean military; 3) to make the best use of the new technology of US.

4.1.3 Preparation for the Future Warfare

The US has the initiative in military affairs, weapon system, military strategy etc. As US develops its military technology and strategy, other states are trying to catch up US. That is, the united States Forces shows the aspect of future warfare and how to execute future war.

Commanders of planners can see every battle situation at real time. Battle situation including land, sky, sea, space and internet can be shown by only one screen. They can recognize the COG of enemy to be able to control adversary. In this case past forces intended to destruct all troops, facilities to achieve objectives, which are called attrition or annihilation. However, in future warfare the COG should be attacked by PGM to achieve the desired effect without mass destruction. This PGM and stealth weapon like F-117 nighthawk is modified to be able to cover a longer distance.

As figure 4.4 shows the capability of missiles, each states has intention of developing a long-range missile with more close precision, which is capable of supporting a variety of regional contingencies. In addition, network plays core role in executing operation. So every state is trying to develop weapon which can interfere an opponent's network system and protect from adversary's interference. Also as the China showed recently in Asia, the initiative of space has good or bad influence on each state's security

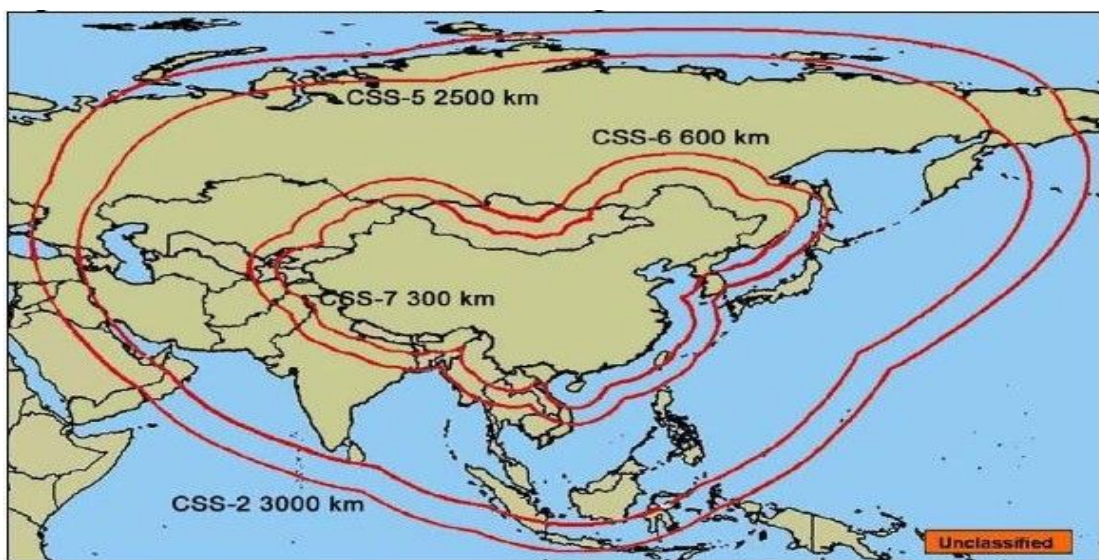


Figure 4.4 Short, Medium and Intermediate Range Ballistic Missiles in China

In conclusion, neighboring countries has its own benefits: 1) China has big territory and continuing economic growth, and consists of around 1.2 billion people; 2) Japan has building powerful military strength based on economic power and high-tech industry; 3) Russia has big territory as well as abundant natural resources, and hold

strong military strength. Even though South Korea cannot catch up their innate merits, South Korea should prepare urgent and potential threat. In addition, ROK has to strengthen ROK-US alliance to use of US advanced military system. In this aspect ROK military forces should endeavor to apply and understand EBO.

4. 2 Directions for Application

The ROK Forces is trying to apply EBO. There are some problems. It needs big expense and flexible thinking. In addition we have no enough data and clear directions. Based on the analysis on the Iraq War, four elements (speed, jointness, intelligence and precision) are the directions to execute EBO.

4.2.1 The Pursuit of Speed

Having to deal with North Korea's massive conventional forces, South Korea forces have maintained a quantity-centric force structure. Due to this manpower-oriented force structure and army-oriented management, actual combat capability has been insufficient despite its huge force size, and the unbalance among the military services has been brought about.

In case of Army, It has maintained a loose structure with a large of troops and outdated weapons. There is 10 corps, 47 divisions and about 540,000 troops, which are made up of primarily foot soldiers with light weapons, but mechanized forces are insufficient. It has multi-level command structure from the squad to army or JCS and MND. Even though combat-oriented management is emphasized, most of field units are operated under the principle of troop's management. Finally, ROK Army has faced some problems, big structure without speed. In addition, South Korea forces have stressed the readiness posture to react North Korea forces' action, which is passive system and makes ROK Army more loosen.

According to the Defense Reform 2020, to upgrade existing warfare capabilities and remove multi-level command structure, 10 corps will be reduce by four to six, and 47 divisions will also be reduced to 20. The shortage will be replaced by state-of-the art weapon system, reinforced maneuverability and fire- power. As it was witnessed during the Iraq War, rapid maneuver and decision is very decisive to control enemy. To achieve speedy maneuver, ROK Army has to acquire more mechanized forces with tanks, infantry fighting vehicles and other armored vehicles. Also ROK forces should build capabilities like US air assault division to attack targets and deploy troops by helicopters. But we must consider the characteristics of Korean peninsula,

which is made of 70% of mountain areas. As US forces has been suffered from it's a guerilla actions in Afghanistan made of mostly rugged mountains and in the Vietnam War, it is desirable to use or strength special forces to clean up guerilla.

By removing multi-level command structure, ROK forces can improve it's the speed of decision making. First of all, the continuous development of C4ISR can play a critical role in enhancing decision cycle. This is needed to provide commanders with better information for decision making in order to exercise faster and more effective command and control in both joint and combined operations. To prepare the future warfare, JCS has run **CPAS (Command Post Automation System)** from July 1999, and Navy does **KNTDS (Korea Navy Tactical Data System)**, and Air forces does **MCRC (Master Control and Reporting Center)**. ROK forces have plans to build the integrated and jointed C4I system through enlargement of CPAS in three stages until 2015. In these stages, South Korea forces needs to apply the advanced US C4ISR system. Especially, we have to focus on developing ability to visualize battlefield and grasp it in three dimension, and co-owner as well as spread information in real-time among all military services and its components like COP in US C4ISR system.

4.2.2 The Pursuit of Jointness / Intelligence

South Korea Forces is trying to balance among the military services. As the Defense Reform 2020 shows establishing JCS-centric operational execution system, each service feels the need of cooperation to achieve more effectively goal through the lesson from the Iraq War.

The Air Force is the pivotal force in modern and future warfare. The incapacitation of enemy air defense and airfield is important to secure air superiority. That's why, the Air forces needs its own precision strikes as well as Special Forces' guide and missile launched in sea and land, and artillery's fire-power. According to the Defense Reform 2020, the Air Force pursues the capability to secure operational capability over the entire Korean peninsula in order to retaliate on enemy attack as well as to ensure air superiority and proper conditions as much as possible for ground and naval operations in wartime. So we can consider two aspects: weapon system and employment of troops.

In weapon system, it is no wonder that we must develop and acquire precision weapons, which is guided by laser or GPS. This will be treated in next in detail. In use of troops, it is more advisable to improve and expand special force and its capabilities.

Also general units have to upgrade their ability to use air strikes through training GFAC and development of communication technology between land and air force. As in Baghdad Operation US land forces used the CAS effectively, we should have ability to make the best use of air force power. That is one of ways to attack the COG of enemy with rapid speed.

However, before attack we have to know well of adversary through various means. That is, intelligence on adversary must be preceded. Intelligence is related to above-mentioned C4ISR. The capability to get better and faster information on enemy depends on the technology. As US Forces used JSTAR, AWACS and satellite, we have to secure such capability through buying or developing that kind of weapons as soon as possible. ROK have UAV companies, and plan to equip ISR system through buying Global Hawk, and is developing reconnaissance satellite called Arirang-3 with black-and-white 80 cm resolution. However, we are shortage of organization and human resources to deal with those technologies. Also we need to recognize quickly the COG of enemy though knowledge of adversary.

4.2.3 The Pursuit of Precision

As already mentioned, precision is need to reduce cost and casualties. Based on exact knowledge on enemy, we need capabilities to strike the core of enemy, which can lead to strategic paralysis. Those capabilities are PGM like BGM-109 TLAM (Tomahawk) cruise missiles, AGM-86 C/D CALCMs and JDAM which are laser-guided or GPS-guided bombs with long distance.

In 2006 South Korea Forces established the GMC (Guided Missile Command) to prepare North Korean ballistic missile and long range gun as well as potential threat among neighboring countries. ROK Army has K3 Hyun-Mu Missile, which can cover above 180 Km, and can employ ATACMS system with M270 IPDS. If we have a long-range missile with more close precision, we can deter any aggressions. Even though it can be arms race in the North East, we should consider this problem to prepare the situation after unification.

Chapter 5. Conclusion

U.S forces showed the future warfare in Iraq War, and proved that Attrition or annihilation mass destruction and serial or sequential warfare are a past concept. In the Iraq War, U.S forces can get the knowledge on enemy from the satellite based on new technology, and spread and co-owner its knowledge in real time, and strike required objectives not all of enemy, execute non-military operation, and control land, air, sea, space and internet.

US Forces escaped the past operation concept which is attrition or serial warfare. US has developed ancient win by default and named it EBO. Based on cutting-edge technology, US forces need do not have to attack all of enemy. In contrast to, they just do strike objectives that can lead to loss of control. As Secretary Rumsfeld mentioned, EBO can be executed through speed, jointness, intelligence and precision. To make well use of EBO, those four elements should be preceded. US Forces have trying to have capabilities to carry out EBO, and showed their abilities in the Iraq War.

South Korea has lived in the arms race. China, Russia, Japan and North Korea have strengthened their military power. In the short view, ROK should have capabilities to be able to deter North Korean threat and to retaliate for its attack. After April 2012, when ROK forces will have full operational control of the country in time of war as

well as peacetime, ROK forces feel need to understand EBO concept and system for better coalition operation between ROK and US. In the long view, South Korea has to consider neighbor military strength. ROK may face situation like sandwich in the future. Military alliance of China and Russia has stimulated alliance of US and Japan. That's why; South Korea should build capabilities to defend through its own power. That is, ROK have enough military power to be able to deter neighbor threat. South Korea forces should establish system to get and analyze enemies which may be China, Japan etc. Based on accurate knowledge, we should be able to attack the COG of adversary, which can deter aggression. In the worst case, South Korea can execute military operation in various regions. In that case ROK must secure air superiority through close joint operation and coordination among military services. In addition, rapid decision and maneuver can lead to quick win with minimum blood. Even though the Defense Reform 2020 contains those contents, South Korea forces should consider EBO in terms of speed, jointness, intelligence and precision to build mighty military strength.

To improve the speed of units ROK Forces should get out of current manpower-oriented and think the military strength as the capabilities not the number of troops.

So the air assault unit is needed to upgrade response and maneuver. In addition, current special forces is more professionalized to obtain accurate information, and to guide various fire power, and to strike COG of enemy. In the aspects of decision cycle we need the system to co-own information at the same time, and to spread it at real time, and to visualize it. The current army-oriented structure and operation should be removed for improving joint operations. First of all commander should consider ways to acquire air superiority at the beginning of war. After that, Air forces should cooperate with the ground Forces to protect side threat and extended LOC. C4I system and ISR assets must be expanded and improved. Even though those equipments are very expensive, KOR Forces should invest to secure high-tech C4ISR System. The capabilities to more quickly identify enemies' actions and COG is essential to decide faster. Therefore we should develop and purchase the ISR assets. Based on the accurate information and rapid decision we can take actions faster than enemy. Also KOR forces should develop stealth and precision weapon to execute strategic paralysis and parallel or simultaneous attack.

APPENDICES

A. Military Capabilities of Neighboring Countries

B. Comparison of Military Capabilities between ROK and DPRK

[Appendix A] Military Capabilities of Neighboring Countries

☐ **Total**

	US	Russia	China	Japan
Total Troops	1,473,960	1,037,000	2,255,000	240,812

□ **Army**

	US	Russia	China	Japan
Troops	502,000	395,000	1,600,000	149,571
Division (Reserve)	10(8)	36(15)	59	10
Tanks	7,620	22,950	8,580	950
Light tanks	6,719	150	1,000	-
Reconnaissance tanks	96	2,000	-	90
Armored vehicles	14,900	24,990	45,000	950
Towed artillery	1,547	12,785	14,000	480
Self-propelled artillery	2,037	6,010	1,200	290
MLRS	830	4,350	2,400	110
Mortars	2,066	6,100	100	2,000
Anti-tank guided weapons	Dragon: 19,000 Javelin: 950	Various types of AT series but quantity unknown	7,200	850
Surface-to-air missiles	1,281	2,460	284	800
Helicopters	4,597	1,700	364	495
Aircraft	298	-	4+	15

□ **Navy**

	US	Russia	China	Japan
Troops	376,750	142,000	255,000	44,928

Submarines(strategic)	80(16)	54(13)	69(1)	16
Aircraft carriers	12	1	-	-
Cruisers	27	6	-	-
Destroyers	49	15	21	45
Frigates	30	19	42	9
Corvettes	21	88	331	7
Mine sweepers	26	60	39	31
Landing vessels	40	21	56	8
Landing craft	200	80	50	-
Support vessels	35	435	163	-
Cargo vessels	26	-	?	27
Reserve transportation	127	-	?	8
fighters	752	266	200	-
Helicopters	608	120	51	107(P-3C 96)
Marine divisions	3	1	2	-

□ **Air Forces**

	US	Russia	China	Japan
Troops	379,000	170,000	400,000	46,313
Long-range bombers	205	116	222	-
Reconnaissance aircraft	261	160	54	27
Command aircraft	30	20	-	-
Fighters	3,200	1,500	1,200	360
Transport aircraft	1,025	354	296	42
Tankers	659	20	10	-
Training aircraft	1,516	980	493	170
Helicopters	196	848	80	-
Civilian reserve aircraft	927	1,500	?	-

[Appendix B] Comparison of Military Capabilities between ROK and DPRK

Classification	R O K	DPRK
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Troops (peace time)	Total			680,000	1,170,000
	Army			541,000	1,000,000
	Navy			68,000	60,000
	Air force			85,000	110,000
Principal Forces Capabilities	Army	Units	Corps	12	19
			Divisions	50	69
			Maneuver Brigade	19	3,700
		Equipment	Tanks	2,300	2,100
			Armored vehicles	2,500	8,500
			Field artillery	5,100	4,800
			MLRS	200	80
			Surface-to-surface guided weapon	20	420
		Navy	Surface ships	warships	120
	Landing vessels			10	30
	Mine warfare ships			10	30
	Support vessels			20	30
	Submarines		10	60	
	Air Forces	Fighters		500	820
		Special aircrafts		80	30
		Support aircrafts		190	510
	Helicopters			680	310
	Reserve Forces (troops)				3,040,000

BIBLIOGRAPHY

Hhi Rack Park. (2005). *War, military strategy and military*. Seoul: Bub Mun Sa

Jin hang Kim. (2006, Aug). *How to define strategy*. Seoul: Yang Se Gak.

Tae Am Ohm, Ggoo Yeol Lee, Ji yong Yoo, Gi Young Jung. (2007). *2006-2007 North East military strength*. Seoul: KIDA Press.

Tae Gue Kim. (2004). The concept of EBO and direction for applying to Korea Military. *Journal of Joint Chief of Staff*, No 22, 215-232.

Keung Chul Shin. (2004, June). *A study on directions to prepare new military operation based on Iraq war*. Unpublished master thesis. Dong Guk University, Seoul.

Keung Hhi Cho. (2005). *A Plan for application of EBO into Korean Military Forces*. Unpublished master thesis. Korea National Defense University, Seoul.

The Ministry of National Defense. (2006, December). *Defense White Paper 2006*. Seoul.

The Ministry of National Defense. (2005, December). *The Defense Reform 2020*. Seoul.

Joint Chief of Staff. (2002). *Field Manual 3-0 「Joint Operation」*. Washington, D.C.

David S. Fadok. (1994, June). *John Boyd and John Warden: Air Power's Quest for Strategic Paralysis*. Alabama: Air University.

TNO-report. (2003, August). *Literature survey on effects-based operations. A Ph.D. Study on measuring military effects and effectiveness*. Delft, Netherlands: Netherlands Organizations for Applied scientific research (TNO).

Allen W. Batschelet. (2002, April). *Effect-based operations: A New operational model*. Pennsylvania: U.S Army War College.

Jeramy Biggie. (2003, November). *Operational net assessment*. Washington, D.C : United States Joint Forces Command.

H.A. FOSTER. (2002, February). *Organizing for effect: Assessing the institutional machinery needed to effectively conduct effects-based operations*. Quantico, Virginia: United States Marine Corps Command and Staff College.

David. A. Deptula. (2001). *Effects-based operations: change in the nature of warfare*. Virginia: Aerospace Education Foundation.

Anthony H. Cordesman. (2003, July 21). *The Lessons of the Iraq War: Main Report*. Washington, DC: Center for Strategic and International Studies.

Correll, John T. (2001, July). Rumsfeld's Review: The Closed-Door Approach Led to Problems, and They Are Not Over Yet. *Air Force Magazine*, Vol 84, No 7.

Rumsfeld, Donald H. (2002, January 31). *Secretary Rumsfeld Speaks on '21st Century Transformation' of U.S. Armed Forces (transcript of remarks and question and answer period)*. Washington, D.C: National Defense University.

Edward A. Smith. (2002). *Effects Based Operations: Applying Network Centric warfare in Peace, Crisis, and War*, Washington, D.C: CCRP.

Andrew Feickert. (2004, March 5). Missile Survey: Ballistic and Cruise Missiles of Foreign Countries. *CRS Report*, Washington, D.C: Library of Congress.