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**Operational Art in a Multi-Medium
Environment**

**A Monograph
by**

**Major James K. Greer
Armor**



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**School of Advanced Military Studies
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This monograph examines the conduct of war at the operational level in a multi-medium environment to determine what functions must be successfully accomplished in order to win. The monograph is based on the fact that warfare is currently conducted in at least six mediums: land, sea, air, psychological, space, and electro-optical.

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The first portion of the monograph develops the multi-medium environment in which the operational art is conducted. It then uses the history of campaigns since 1940 to determine the attributes of warfare in the multi-medium environment. Those attributes are synergism, flexibility, precision, and elasticity. The separate theories of war that apply to each medium are then examined to find common functions that apply across all six mediums. The common functions of control, power projection, and power multiplication (CPM) are then combined to build a model for the application of operational art in a multi-medium environment.

The second portion of the monograph examines the model developed by analyzing it in comparison to the Army's existing model. The current model is the Blueprint of the Battlefield, contained in TRADOC Pamphlet 11-9, Blueprint of the Battlefield. Analysis of the two models indicates that the CPM model provides the operational planner or commander with a more effective framework for the design and execution of campaigns or major operations in a multi-medium environment.

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MONOGRAPH APPROVAL

Major James K. Greer

Title of Monograph: Operational Art in a Multi-Medium
Environment

Approved by:

Harold R. Winton Monograph Director
Harold R. Winton, Ph.D.

William H. Janes Director, School of
Colonel William H. Janes, MA, MMAS Advanced Military
Studies

Philip J. Brookes Director, Graduate
Philip J. Brookes, Ph.D. Degree Program

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Approved for	
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Dr. [unclear]	13
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Just [unclear]	
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Abstract

Operational Art in a Multi-Medium Environment by Major James K. Greer, USA, 40 pages.

This monograph examines the conduct of war at the operational level in a multi-medium environment to determine what functions must be successfully accomplished in order to win. The monograph is based on the fact that warfare is currently conducted in at least six mediums: land, sea, air, psychological, space, and electro-optical.

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TABLE OF CONTENTS

	Page
Section I. INTRODUCTION.....	1
II. OPERATIONAL ART BEFORE EXPANSION INTO THE MULTI-MEDIUM ENVIRONMENT.....	3
III. OPERATIONAL ART DURING THE EXPANSION OF WARFARE INTO THE MULTI-MEDIUM ENVIRONMENT....	7
IV. IMPACT OF EXPANSION INTO MULTI-MEDIUM WARFARE	12
V. CURRENT THEORIES.....	17
VI. DEVELOPING A MODEL.....	24
VII. PRESENTATION OF AN ALTERNATE MODEL.....	27
VIII. ANALYSIS OF THE MODELS.....	30
IX. CONCLUSION AND IMPLICATIONS.....	36
ENDNOTES.....	41
BIBLIOGRAPHY.....	44

I. INTRODUCTION

During the five thousand years of recorded history prior to the twentieth century, war was conducted either on land or at sea. Occasionally, battles were conducted at the juncture of these two mediums, such as the Greek defeat of the Persian amphibious invasion at Marathon in 490 B.C. or the British naval attack on the defenses of Copenhagen in 1802. Yet limitations in weapons and technology restricted the ability of armies to attack navies and vice versa.

However, during the twentieth century, the combination of tremendous leaps in technology and maturation of the theory and practice of warfare produced an expansion of warfare into the entire global environment. Specifically, the invention of the airplane rapidly led to the expansion of warfare into the air medium, so that by World War II airpower played a dominant role in strategy, operations, and tactics. Also, technological advances into the electro-optical medium led not only to advanced command, control, and communications and intelligence gathering, but also to electronic and directed-energy warfare as a means of applying combat power. During the middle of the twentieth century, Mao Tse-Tung, and later the People's Army of Viet Nam, refined a system of strategy, operations, and tactics in which the psychological medium was utilized as a means of applying combat power. Finally, since 1957 the expansion of man into space has led to that medium also being used for the conduct of war. Consequently, at this point in

history man conducts warfare in six mediums: land, sea, air, electro-optical, psychological, and space.

The purpose of this monograph is to examine the impact of the expansion of warfare into the multi-medium environment. Specifically, this monograph will focus at the operational level and attempt to identify and organize the functions required for the design and conduct of campaigns or major operations. As the British military theorist, Major General J.F.C. Fuller, said:

First and foremost we must get the present form of war out of our heads. What is this form? Battles waged by Cavalry, Infantry and Artillery. We must forget these arms, and no longer be chloroformed by their names, or organizations. We must cease to think in names and must learn to think in the terms of tactical functions.... For example, a carpenter has a bag of tools, but he does not think in terms of hammers, pliers, saws, etc., but in those of the functions of these tools. He thinks in terms of boring holes, sawing planks, hammering in nails, etc. He uses these tools according to their powers.¹

The identification and organization of operational functions in a multi-medium environment will be accomplished through a combination of analysis and synthesis. Analysis will be conducted of existing theories of warfare set within the history of the conduct of warfare since 1940. The analysis will identify the functions applicable to the conduct of warfare at the operational level in a multi-medium environment. Synthesis of the results of analysis will then yield an organization of the functions of operational art which can serve as a framework for campaign design and

execution. The organization of functions thus generated will be analyzed in comparison to the existing organization of components contained in the "Blueprint of the Battlefield for the Operational Level of War," (Blueprint) contained in TRADOC Pamphlet 11-9. Results of this analysis should assist in the development of US Army and joint doctrine for the practice of the operational art.

II. OPERATIONAL ART BEFORE EXPANSION INTO THE MULTI-MEDIUM ENVIRONMENT

In order to analyze the impact of the expansion of warfare into the six mediums, it is necessary to understand the functions pertinent to the conduct of operational art prior to that expansion. This section will identify those functions.

As previously mentioned, prior to the twentieth century war was conducted primarily on land or at sea. There were land campaigns or sea campaigns. While amphibious operations were conducted and coastal fortifications attempted to keep naval power offshore, armies and navies could not significantly project combat power against each other. For example, Lord Nelson's victory at Trafalgar in 1805 ensured British naval domination of the Atlantic and Mediterranean coasts of Europe. It also ensured British land forces of secure lines of communications from the Continent back to England. However, due to the limitations of technology, British naval combat power could not be projected against Napoleon's armies.

Similarly, Napoleon's land forces, despite control of almost the entire Continent, could not project combat power against the British Navy. For the most part, until the twentieth century land forces fought land forces and naval forces fought naval forces.

At the operational level, that of campaigns and major operations, the restriction of combat to a single medium led to specific methods of conducting warfare. The classic Napoleonic campaign leading to a decisive battle is the model of mature land warfare before its expansion into the multi-medium environment. The campaign consisted of three phases: maneuver to create the conditions for a decisive battle; the decisive battle; and exploitation, either military or political, of the results of the battle. The first phase consisted of movement from an army's camps to the vicinity of the battlefield and concluded with a concentration of forces for the battle. Napoleon employed three methods of conducting campaigns: strategic envelopment, central position, and strategic penetration. His preferred method was the strategic envelopment, in which a pinning force kept the enemy occupied while the main army maneuvered to the rear of the enemy to cut communications and force a battle on terms favorable to Napoleon.² Thus, at the operational level, the functions contained in the Napoleonic campaign were move, concentrate, fix, attack, and exploit.

By the time of the American Civil War, warfare was conducted differently. Technological advances of the

Industrial Age enabled a nation to field hundreds of thousands of troops. More importantly, and unlike Napoleon in Russia, these huge armies could be maintained in the field indefinitely and supported along increasingly long lines of operations. However, there were no fundamental changes in the functions necessary to the operational art. Examine Grant's final campaign of the war. The object of Grant's campaign was the destruction of Lee's army (the decisive battle). Grant, with three armies, attacked Lee's front to pin him against Richmond (Phase 1). He then conducted battles to fix Lee, while Sherman, also with three armies, maneuvered to Lee's rear (Phase 2). Finally outflanked, Lee was forced to abandon his defensive positions as Sherman advanced through North Carolina. Lee was pursued and destroyed (Phase 3).³ Grant's employment of his armies demonstrated the same functions used in the Napoleonic campaigns. The differences between the operations of this campaign and those of Napoleon were the size of the armies, the area of operations, and the duration in time. Those were differences in scope and complexity, rather than differences in the functions employed.

Similarly, the classic naval campaigns conducted prior to the expansion of warfare into the multi-medium environment consisted of campaigns of maneuver designed to bring about a single decisive battle. The British Admiral Lord Nelson's campaign of 1805 is a classic example. At the beginning of 1805, Napoleon's victorious armies stood poised along the English Channel coast in preparation for a cross-channel

invasion of England. However, as long as the English fleet controlled the Channel, the invasion could not be conducted. Accordingly, the French naval campaign plan was to lure the British fleet to the West Indies and then return to the Channel and seize control long enough to cross the Grand Arme'e. Nelson's campaign plan was simply to bring the French fleet to battle as quickly as possible and then destroy it. The French fleet, combined with that of Spain, sailed on 7 April 1805. Nelson's fleet chased the enemy to the West Indies and back, finally bringing the French to battle off Trafalgar on 21 October 1805. Realizing that this was to be the decisive battle, Nelson's tactics were simply to mass as much of his combat power as possible against a few of the enemy and then repeat the process to destroy the French fleet. Nelson's success in the 1805 campaign ensured that Napoleon's plans to invade England would never be realized.⁴ Analysis of Nelson's campaigns reveal that the functions utilized to achieve victory at sea at the operational level were movement, concentration, and application of combat power.

The impact of technological advances on the conduct of naval warfare during the nineteenth and early twentieth centuries was significant. However, as in land warfare, there was little maturation in operational methods of warfighting coincident to the increase in technological capability. An example of this failure to improve naval operational art is the Russo-Japanese naval campaign that culminated in the Battle of Tsushima Straits. In 1904 Russia and Japan began a

war for control of the eastern Asian mainland. Early successes by the Japanese and the length of Russian lines of communications across Asia led to the deployment of the main Russian fleet from the Baltic around Africa and Asia to meet the Japanese. The purpose of this naval campaign was to defeat the Japanese fleet in a decisive battle and secure control of the Sea of Japan. The Russian fleet arrived off the Tsushima Straits on 27 May 1905 where the decisive battle of the war took place.⁵ Conceptually, the battle was the same as Trafalgar. The Japanese won because they were able to concentrate a greater portion of their combat power against a portion of the Russian fleet. Also, as at Trafalgar, there was no capability to project combat power, at the operational level, between land and sea forces. Analysis of the Japanese and Russian naval campaigns of this war reveal the same functions as those of Nelson: movement, concentration, and application of combat power.

III. OPERATIONAL ART DURING THE EXPANSION OF WARFARE INTO THE MULTI-MEDIUM ENVIRONMENT

This section will describe the expansion of warfare into the air, psychological, electro-optical, and space mediums. This description will provide the basis for the analysis of the impact of that expansion, which will be the purpose of the section. Beginning on 7 December, 1941, the Japanese conducted a campaign that was significantly different from those that preceded it. For the first time, airpower was fully integrated

into a campaign that employed air, land, and sea elements as a unified whole. The strategic goal of the Japanese campaign in the Pacific was to secure strategic resources, specifically oil, from Indonesia and Southeast Asia. In order to accomplish the objective, the Japanese felt they had to secure an area known as the Southeast Asian Greater Co-Prosperity Sphere.⁶ To accomplish the objective required the seizure of considerable territory and the elimination of United States power in the western Pacific. With the theater of war being the area of the Pacific and Eastern Indian Oceans, three theaters of operations were utilized to destroy US naval power at Pearl Harbor, seize the Philippines, and seize Malaya. The Pearl Harbor campaign was entirely naval; the other two campaigns combined air, land, and sea forces.

From an operational point of view, one of the most significant aspects of the campaign was the application of combat power from one medium to another to secure an operational advantage. Specifically, on the 7th of December, 1941, Japanese naval air not only destroyed the Pacific Fleet, but also eliminated land-based medium bombers and fighters that could have later been employed in the defense of the Philippines. On 8 December, 1941, land-based bombers, belonging to the Army, were utilized by the Japanese to sink the British battleships Repulse and Prince of Wales in support of amphibious operations in Malaya. During the campaign in the Philippines, both carrier- and land-based aircraft were used to attack the US Army. Additionally, leapfrogging amphibious

forces along the coast of Luzon provided opportunities for operational maneuver unavailable in the dense jungles of the islands.⁷ The Japanese campaign of 1941-1942 provided the first dramatic examples of the operational effects of utilizing the air medium in conjunction with land and sea forces and of applying combat power from one medium to another.

A second, though not as dramatic, example of the air, land, and sea campaign, was the German invasion of Norway in April, 1941. The strategic goal of this campaign was to occupy Norway in order to outflank the United Kingdom, secure iron ore deposits, and deny Norway to Allied forces. Operational maneuver was conducted by sealifting troops into six invasion sites and conducting airborne operations into two more locations. As in the Pacific, land-based aircraft sank British warships, ensuring the isolation of Norway and allowing completion of the German campaign.⁸ Additionally, German air cover protected ground operations from the Royal Air Force. In both these examples, the combined effects of the use of land, air, and sea operations and the application of combat power between mediums led to success over nations unprepared for multi-medium operations.

During the middle of the twentieth century warfare also expanded into the psychological medium. The Viet Nam War contains many examples of operational art utilizing the psychological medium of war. The Long An campaign of 1969 conducted by the B2 theater is an excellent example. The

communist forces had divided South Vietnam into four theaters of operations, the southernmost of which was the B2 theater. Following the Tet Offensive of 1968, the communists determined that within the B2 theater it was necessary to isolate Saigon from the Mekong Delta. This object was to be accomplished by the 320th Regiment. The subsequent campaign consisted not only of engagements with US and RVN forces, but also included proselytizing and organizing the masses, proselytizing enemy (US and RVN) troops, eliminating spies, killing tyrants, and guiding guerilla troops. Throughout the campaign, the 320th Regiment conducted party and political work, guided the spiritual and material lives of the masses, and supplied villages with food.⁹

Since World War II, the operational impact of using the electro-optical medium has expanded rapidly. An excellent example of this expansion is the June 1982 Israeli campaign into Lebanon called "Peace for Galilee." The government of Israel declared that the purpose of the campaign was to ensure that the area north of the Lebanese border would be demilitarized from all hostile elements to a distance which would place Israeli towns and villages out of range of PLO weapons. The military condition to be obtained was to destroy the PLO military infrastructure and clear the area north of Israel for a distance of 40-45 kilometers. It was determined that the decisive point along the line of operations was the Beirut-Damascus road. Establishing a presence along this road would sever the PLO from its support base, Syria.¹⁰

Operationally, the problem was that Syrian forces blocked any possibility of achieving the 40 kilometer objective line. To push the Syrians out of Lebanon, it was clear to the Israeli command that air support was essential. However, the space over the battlefield was covered by surface-to-air (SAM) batteries in an integrated air defense system supported by warning, detection, and fire control radars, as well as an elaborate command and control system.¹¹

To start the operation, unmanned drones were launched over the Syrian air defenses, forcing the Syrians to fire SAMs against fake targets and protecting the real Israeli aircraft following behind. It is also reported that the Israelis used ground-launched anti-radiation missiles with radar homing warheads, as well as American made Standard anti-radiation missiles. Ground launched missiles carrying chaff were fired at Syrian radar sites to mask Israeli air activity and were supplemented by active electronic jamming. In coordination with these attacks, a commando raid was conducted to infiltrate and destroy the main air defense command post in Lebanon. Its success forced each air defense site to operate independently.¹² The success of this operation to gain control of the electro-optical medium resulted in complete freedom of operations for the Israeli Air Force over Lebanon. Additionally, while Syrian air defense command and control had been destroyed on the ground, the Israelis were able to maintain their command and control over the battlefield by employing E2C command aircraft to guide and mass fighters at

decisive locations.¹³ The Syrian's only recourse was to attempt to defeat the Israelis through air-to-air combat. The Syrians lost 86 planes, while the Israelis lost none.¹⁴

No campaign has yet been conducted in space. However, the current military uses of space, combined with space weapons and platform research being conducted throughout the world, indicate that the extension of combat operations into the space medium may take place in the near future. Currently, the space medium is used as an operational combat multiplier, providing critical intelligence and command and control capabilities. Current research in space weapons includes anti-satellite (ASAT) weapons (both missile and directed energy). An example is the current F-15 ASAT program, which fires a missile into space from a high-altitude F-15 to attack a designated satellite.¹⁵ Missile systems which defend against both ICBM and shorter range ballistic missiles are currently being tested and developed.¹⁶ The threat of nuclear weapons launched from space has been recognized for over thirty years.¹⁷ Clearly, it is unlikely that space will remain a safe haven.

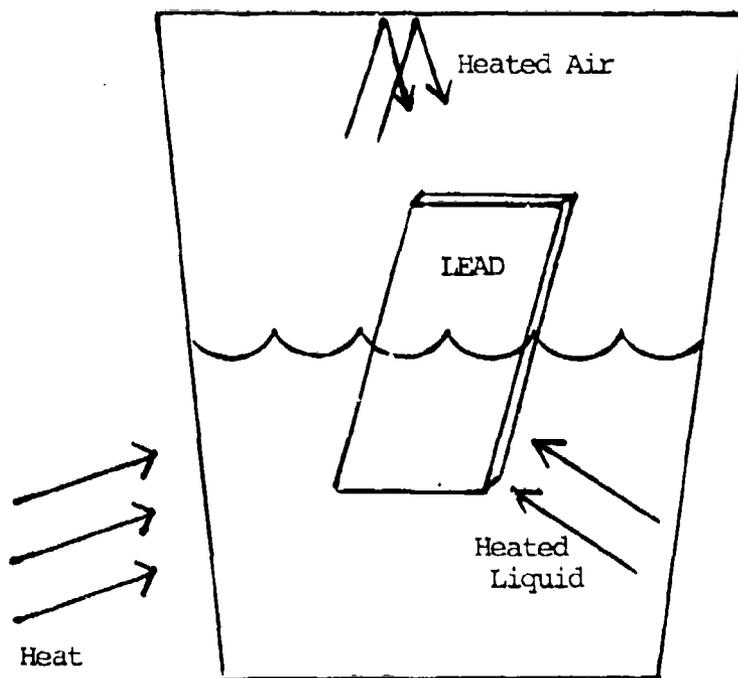
IV. IMPACT OF EXPANSION INTO MULTI-MEDIUM WARFARE

The next question to be addressed is, "What have been the effects of the expansion of warfare into the six mediums on the conduct of the operational art." The answer to this question has two parts. First, the new mediums offer the operational commander the ability to practice his art with

newly-found capabilities in the areas of synergism, flexibility, precision, and elasticity in time and space. These gains, however, are offset by the increased complexity of operational art, especially in the areas of intelligence; logistics; and command, control, and communications. These seven effects will be addressed below.

A. Synergism. Synergism is the concept that two or more discrete actions have a combined effect that is greater than the sum of the effects of the actions taken separately. This concept can be illustrated using the metaphor of the crucible and lead used to describe the domains of battle.¹⁸ Consider a piece of lead (representing a combat unit) placed in a crucible (representing battle) and having heat applied (representing combat power applied against the unit) (Figure 1). The rate at which the lead melts is analogous to the rate at which the unit is destroyed. The heat is transferred to the lead through the solid medium of the crucible (land warfare). After a time, that portion of the lead which has already melted is hotter than the remaining solid. It transmits a portion of its heat to the remaining solid, further increasing the rate of transformation to a complete liquid (sea warfare). If the crucible is covered, the temperature of the trapped air will be raised, in turn transferring some heat to the lead (air warfare). Therefore, the synergistic effect of transferring heat through multiple mediums is to accelerate the transformation of the solid to a liquid beyond that of simply adding more heat. Certainly any army, cut off in

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Note: Heat represents destructive force

Figure 1

theater by the destruction of its supporting fleet in port, having lost its air support to preemptive air attack, attacked amphibiously in the rear, and by land to its front is likely to be defeated far more quickly than one simply attacked by superior land forces. This is an example of the synergistic effect to be achieved through simultaneous and sequential operations in diverse mediums for a single purpose.

B. Flexibility. From the viewpoint of the "art" portion of operational art, the expansion of warfare offers the operational artist greatly expanded possibilities. These possibilities are provided by the various combinations of ways to apply combat power among the mediums. The flexibility thus achieved means that the operational artist can pick and choose how and when he will apply combat power in order to achieve a certain effect. For example, let us assume that the denial of the use of a certain enemy airfield is critical to the success of the friendly campaign. The operational commander can send SOF forces via ground infiltration to use direct action to attack the airfield. He can also employ conventional ground forces in a major operation to seize the airfield. Air forces can strike the airfield with bombs or missiles to render it useless. Sea-launched aircraft or cruise missiles can achieve the same effect. Air assault or airborne forces may combine the use of several mediums to accomplish the task. The point is that the operational artist gains flexibility through greatly expanded combinations of ways to achieve a desired effect. The caveat is that each method has both strengths and

weaknesses including certainty that the effect will be achieved, lead time required for a decision, cost, and requirement for the resource at another time or place.

C. Precision. Current technology, combined with the expansion of warfare, gives the operational artist precision in the application of combat power not previously available in the design and conduct of campaigns. For example, the Libyan Raid of 1985, a major operation, achieved operational effects by demonstrating an ability to originate an operation in England and strike targets in Libya only hours later with errors measured in minutes and meters. The negative side of increased precision is a necessity for near real-time intelligence and fusion capabilities that allow combat power to be focused to achieve the effect desired by the operational commander.

D. Elasticity in time and space. Attempting to describe the German blitzkrieg, F.O. Miksche introduced the concept of "elastic concentration in time." The concept states that increased mobility allows a force to select a time and place at which concentration is desired. The force can initially be dispersed and located anywhere such that elements can subsequently move to arrive at the point of concentration at the correct time. Elastic concentration decreases the capability of the enemy to identify the point of concentration in time and space and concentrate his forces correctly.¹⁹ The expansion of warfare into the multi-medium environment enables

the operational commander to employ elasticity in time and space not only within a medium, but also among mediums.

E. Intelligence. The multi-medium environment of modern warfare places an increased burden on intelligence systems. First, a force must be able to extend its collection effort into each of the mediums. Second, it must have a fusion capability which enables it to create a coherent picture of enemy status and intentions not only within each medium, but also as a unified whole. Third, as mentioned earlier, increased operational capabilities require increased precision on the part of the intelligence system. Finally, the Clausewitzian concept of the "fog" of war will be increased in effect by the complexity of the multi-medium theater of operations. The operational artist will encounter more "fog" of war during his decision making process.

F. Command, Control, and Communications. The process of identifying or creating operational level commanders and staff officers who can grasp the requirements for and possibilities of each medium, and who also possess the ability to combine actions within each of the mediums into a unified, coherent campaign, is going to be both difficult and critical. Determining a method of controlling and synchronizing actions within the diverse mediums will be as difficult and as critical. Finally, although the strictly scientific aspects of communicating between the mediums are certainly achievable, creating a common framework and language for the communication

of ideas among the practitioners of operations within the various mediums will be a long and difficult process.

G. Logistics. Logistics operations supporting a campaign conducted in several mediums will be extraordinarily difficult. First, in terms of variety of requirements, replacing a single satellite in space may be more difficult, and costly, than feeding a division in Europe. Second, the concept of a logistics base may no longer be applicable when a significant portion of the combat power applied in theater originates out of theater and leaves the theater as soon as the task is accomplished. An example was the Libyan Air Raid of 1985, in which the major attack force of F-111 fighter/bombers was stationed in England, moved to the theater of operations, applied combat power, and returned to base in a matter of hours. Third, the operational artist may not be able to achieve the flexibility, precision, and synergistic effect he desires due to logistical limitations within a specific medium. Finally, the concept of lines of communications will have to be extended in some manner to address each of the mediums utilized.

V. CURRENT THEORIES

This paper seeks to determine the functions of operational art. In order to determine what those functions are, it is necessary to examine the theories of war in each of the mediums. The brief examinations of theory that follow are

focused on identifying the functions that must be performed within each medium.

A. Land. In the opening quotation of this paper the British military theorist J.F.C. Fuller stated the requirement for identifying the functions that military forces must perform in war. In his book, The Foundations of the Science of War, Fuller develops the principles of war and their relationship to the functions that must be performed. Fuller develops nine principles, which he groups into three functions. The first three principles are, Direction, Determination, and Mobility. He groups these principles together under a broader principle of Control. The second three principles are, Concentration, Surprise, and Offensive Action. Fuller further groups these three principles under the broad principle of Pressure. Finally, Fuller presents the three principles of Distribution, Endurance, and Security. These principles are grouped under the broad principle of Resistance.²⁰ Having developed the principles of Control, Pressure, and Resistance, Fuller uses the principles as a basis for the development of functions. The three functions which correspond respectively to Control, Pressure, and Resistance are Move, Hit, and Guard.²¹ These are the functions that, according to Fuller, land forces must perform to succeed on the battlefield.

B. Sea. The Soviet naval theorist, Admiral Sergie Gorshkov describes the primary functions of the navy as "fleet

vs fleet" and "fleet vs shore." In describing the operations of "fleet vs fleet," he says:

Among the operations of fleet against fleet one may include the battles and operations to destroy the ships of the enemy at sea and in the bases, and the struggle for oceanic and sea communications. A vivid example of this is provided by the campaigns, sea operations, and battles of World War I, in the course of which fleets acted little against the shore.²²

Gorshkov continues by describing the function of "fleet vs shore":

Traditional were the staging of sea landings of various size and the delivery of the strikes of ships armament on targets located on the shore. The new modes of operations of a fleet against the shore consist in delivering a strike of carrier aviation on ground targets and groupings of troops, and in the destruction by nuclear missile strikes from submarines of land targets.²³

Lastly, Gorshkov includes in naval tasks the requirements of shipment of military forces and materials, oceanic survey, energy production from the ocean, and actions during peace to include shows of force and port visits.²⁴ Thus, Gorshkov's functions of sea warfare are "fleet vs fleet," "fleet vs shore," and sea support.

C. Air. Current concepts regarding the application of air power spring from the theories developed by Giulio Douhet and Billy Mitchell. Based on their observations of air operations during the World War I, both men came to similar conclusions. First, air forces had a unique capability to deliver combat power against other forces. In Mitchell's words:

The air covers the whole world, aircraft are able to go anywhere on the planet. They are not dependent on the water as a means of sustentation, nor on the land, to keep them up. Mountains, deserts, oceans, rivers, and forests offer no obstacles.... Aircraft possess the most powerful weapons ever devised by man. They carry not only guns and cannon, but heavy missiles that utilize the force of gravity for their propulsion and which can cause more damage than any other weapon.25

The stark reality of the capability of air power to attack the planet's surface led to Douhet's major contribution to the theory of air power:

There is no practical way to prevent the enemy from attacking us with his air force except to destroy his air power before he has a chance to strike at us...so that the surface of the earth should be defended from aerial attack, not by scattering guns and planes over its whole extent, but by preventing the enemy from flying. In other words, by conquering the command of the air.26

Thus, the two dominant functions of air power are to secure control of the air environment and to project combat power from the air environment to other mediums. A third dominant function is air power's demonstrated capability, both in peace and war, to transfer combat power from one location to another, i.e., airborne, airmobile, air transport, or logistics operations.

D. Psychological. The most completely developed, and historically proven, theory of warfare in the psychological medium is that of dau tranh. The earlier example of the operations of the 320th Regiment in 1969 demonstrated the applicability of dau tranh theory to the operational art. The

basic objective of dau tranh is to put armed conflict into the context of political dissidence. Dau tranh is divided into two parts which strive to achieve a synergistic effect. Armed dau tranh, as the more visible part, is physical in nature and resembles Mao's three-stage guerilla war. Political dau tranh, as the second part of the overall strategy, is non-violent or semi-violent in nature and seeks a decision through psychological efforts. Political dau tranh is in turn divided into three programs. The first program, dich van, or action among the enemy, seeks to transfer the struggle to the people controlled by the enemy. In the Viet Nam War, dich van was manifested by actions in South Viet Nam and the United States designed to create an idealized image of revolutionary conflict and the communists among the Americans and South Vietnamese. The effect achieved was to limit the combat power that would actually be applied to the theater, not to affect how it would be applied within the theater.²⁷ The second program of dau tranh was binh van. Binh van was aimed at the enemy military forces and civil servants, with the purpose of weakening or destroying military forces and governmental structure through non-military means. Oriented at the individual soldier, but on a grand scale, the fomenting of dissension and desertion was intended to have the operational effect of limiting the amount and manner in which combat power was applied within the theater.²⁸ The last program was dan van, or action among the people. Essentially administrative and motivational in nature, dan van sought to maintain control

over the portion of the population already psychologically committed to the communist struggle.²⁹

E. Electro-Optical. The rapid expansion of warfare into the electro-optical spectrum has led to the development of theories of application based primarily on technical capabilities as they have developed. The most clearly defined areas of employment center around command and control and intelligence gathering capabilities. This "combat multiplier" function is known as Electronic Support Measures (ESM) and has been practiced since the Civil War. The second function which was developed dealt with Electronic Counter Measures (ECM), i.e. those capabilities required to prevent the enemy from using his ESM, such as jamming, radar suppression, deception, and electronic signature homing weapons. Similarly, for protection a set of Electronic Counter Counter Measures (ECCM) has developed to oppose ECM. About this function, the Soviet military theoritician, V.G. Reznichenko says:

This means that a unique form of electronic battle will be conducted...the commander must take timely steps to successfully suppress the enemy's electronic equipment and protect his own... the success of the operations of the troops in general will depend in many ways on the outcome of this battle.³⁰

Recent increases in technological capabilities within the electronic spectrum have created one more function necessary to the successful conduct of future operations. That function is the application of directed energy weapons against forces operating in a different medium. Directed Energy Weapons (DEW) in the form of lasers, radio frequency weapons (high powered

microwaves), and particle beams represent weapons of potentially operationally significant range and striking power. For example, a directed energy weapon positioned in the Soviet Union could attack our overhead satellite intelligence collection capabilities, blinding our forces to critical information within a theater of operations.

F. Space. Currently, there is no universally recognized, much less accepted or practiced, theory for operations in space warfare. There is, as yet, no Fuller, Douhet, Gorshkov, or Mao who has done for the space environment what these theorists have done for the other mediums. However, it is possible to use a proposed strategy for military operations in space as a means of identifying the functions pertinent to combat operations in the space medium. Major Robert H. Chisholm, USAF, has published a manuscript titled, On Space Warfare: Military Strategy for Space Operations, in which he outlines a comprehensive approach to the application of combat power using the space medium. He identifies four functions in the application of space power: protection of the nation's population and assets; control of space in conflict situations; destruction of the enemy's warmaking capability; and support of terrestrial-based forces.³¹ While current capabilities do not exist to perform the functions he has identified, it is clear that research and development efforts are targeted at each of these functions. Thus, as a working theory for the application of space power, Major Chisholm's writings fill a critical void in military thought.

VI. DEVELOPING A MODEL

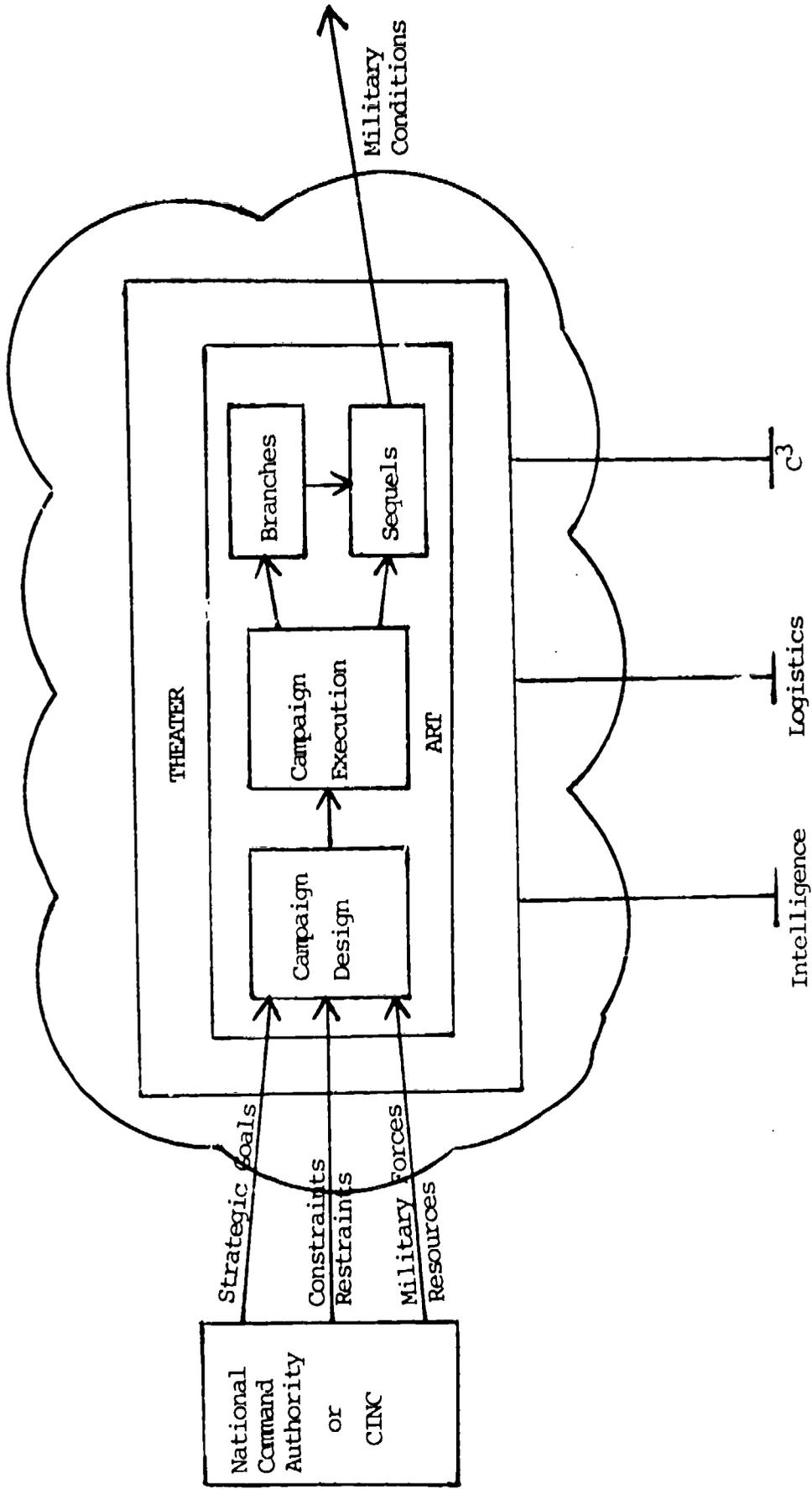
Having examined the historical and theoretical development of the conduct of warfare in the various mediums, it is necessary to identify an organization of the functions necessary to success in the practice of operational art. However, before that task can be accomplished, it is first necessary to examine the context in which the operational art is practiced. Figure 2 is a representation of the world environment within which the operational commander works. The world environment consists of military, economic, political, social, and geographic relationships among various countries. Although during war the military relationship is the most critical, the conduct of operations within the theater is affected by the relationships in the other areas as well. The military leadership of the country, or a theater commander-in-chief, provides the operational commander with: strategic goals for his theater, constraints, restraints, military forces, and other resources. Additionally, any theater campaign is going to rest on a national intelligence; logistics; and command, control, and communications structure. The cloud around the theater represents the interaction of the theater with all of the above. However, within the theater, it is the responsibility of the operational commander to design and execute campaigns and major operations leading to the military conditions required to accomplish the strategic goals within the theater. To be relevant, any organization of the

WORLD ENVIRONMENT

SOCIAL

MILITARY

POLITICAL



GEOGRAPHICAL

ECONOMIC

Figure 2

functions of operational art must address this last requirement for the commander.

The above examination of theory identified the functions applicable within each medium. Also, an overall pattern emerged in which similar functions occurred across all of the mediums. First, the functions of guard, fleet vs fleet, command of the air, radio electronic combat, dan van, and space control all seek to secure the use of the medium for the friendly forces and deny its use to the enemy, i.e. control of the medium. Second, hit, fleet vs shore. bombardment, directed energy, dich van, and destruction from space all seek to project combat power from one medium to another, i.e. power projection. Finally, move, sea support, aerial combat power transfer, ESM, ban van, and support of terrestrial forces all seek to multiply the combat power available, i.e. power multiplication (Figure 3).

Having identified the three main functions of control, power projection, and power multiplication, it is necessary to arrange them in some manner that is meaningful for the operational artist. The key here is not merely to identify the functions, but to determine the relationships among the functions. In applying resources to the performance of these functions, it must be remembered that resources, once allocated to the theater, represent a zero-sum game. Any resources applied to the performance of the control function are thus not available for the power projection or power multiplication functions. Additionally, it is often difficult

FUNCTIONS OF OPERATIONAL ART IN A MULTI-MEDIUM ENVIRONMENT

ENVIRONMENT	CONTROL	POWER PROJECTION	POWER MULTIPLICATION
Land	Guard	Hit	Move
Sea	Fleet vs Fleet	Fleet vs Shore	Sea Support
Air	Command of the Air	Bombardment	Aerial Combat Power Transfer
Psychological	Dan Van	Dich Van	Ban Van
Space	Space Control	Destruction from Space	Support of Terrestrial Forces
Electro-Optical	Radio-Electronic Combat	Directed Energy	Electronic Support Measures

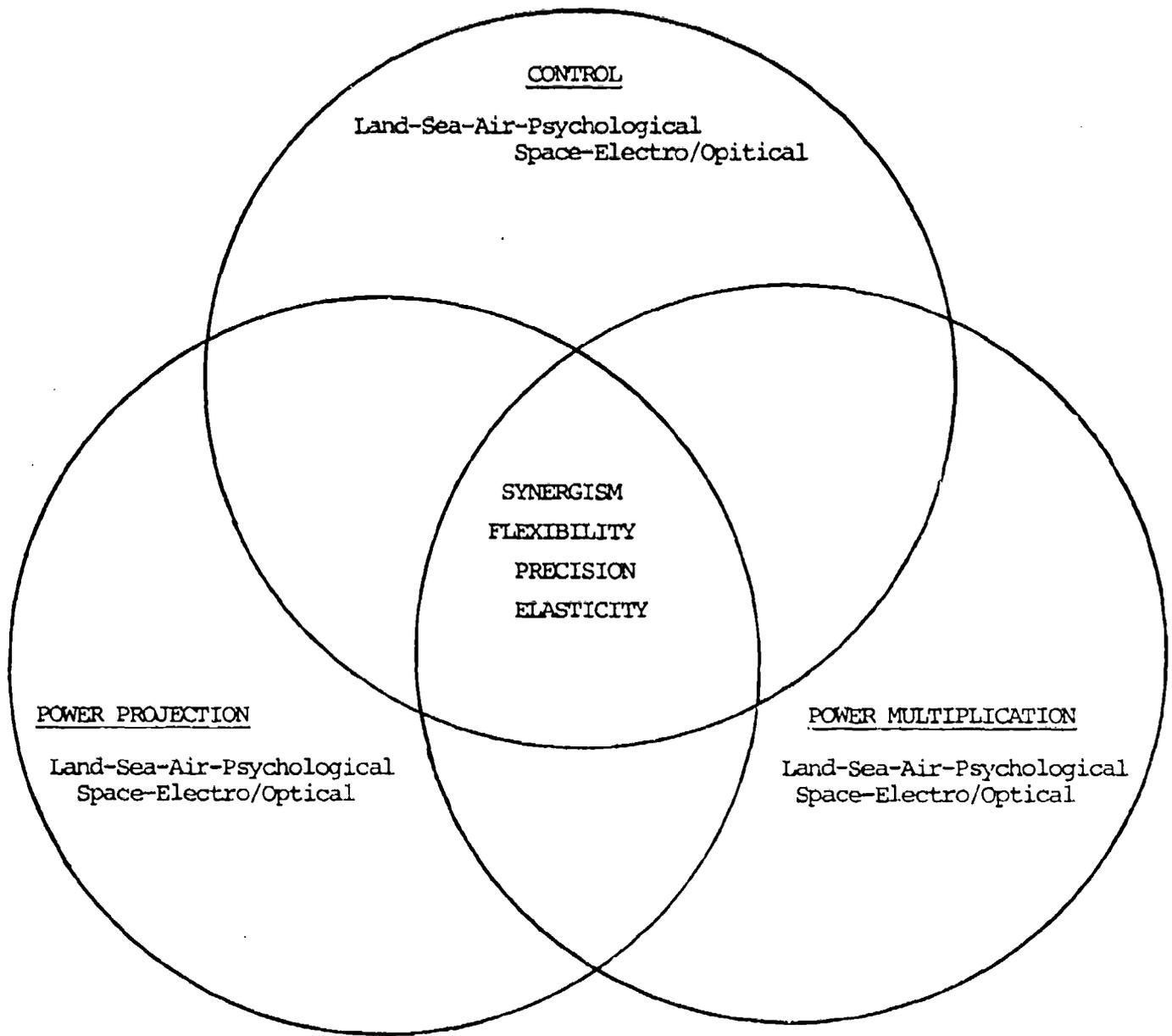
Figure 3

or impossible to transfer resources among mediums due to their inherent uniqueness.

A second key consideration is the dominance of any one function over the others. Douhet and Mahan would state that control is dominant over all others, and it often appears that the dominance of control extends to all mediums. However, it must be remembered that each campaign or operation is unique and that the emphasis of the operational artist must shift during execution to optimize the result. For example, during deployment the focus of main effort would probably be with the power multiplication function in order to move assets to the proper location.

The final major consideration evolves from the attributes of operations in the multi-medium environment. Synergism, flexibility, precision, and elasticity are achieved through the correct arrangement of the functions in terms of time, space, and resources. Thus, campaign design and execution (the essence of operational art) consists of making optimal use of the arrangement of the functions within and among the mediums to produce the desired military conditions in the theater and within the context of the world environment.

Figure 4 depicts the control, power projection, power multiplication (CPM) model in the form of a venn diagram. The intersection of the circles represents the optimum arrangement of functions, while each function circle depicts the requirement to function in all mediums simultaneously. The attributes listed within the intersection call attention to



CONTROL - POWER PROJECTION - POWER MULTIPLICATION MODEL
(CPM)

Figure 4

the power that can be generated when operations in a multi-medium environment are conducted as a unified whole.

VII. PRESENTATION OF AN ALTERNATE MODEL

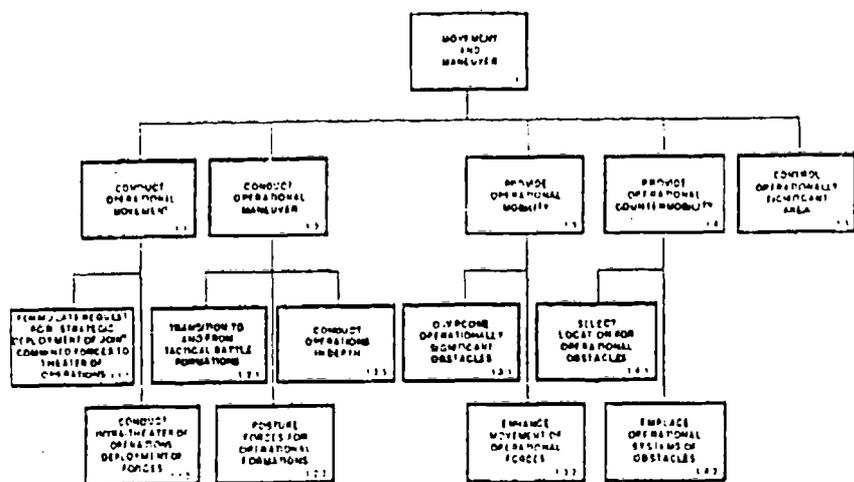
Thus far, the effort of this monograph has been to produce a model for the organization of the functions applicable to the conduct of operational art in a multi-medium environment. However, the model must be validated before acceptance and incorporation into theory or practice. The remainder of this monograph will focus on examining the validity of the model. This will be accomplished by presenting a current doctrinal model and analyzing both models against criteria important to the operational artist. The U.S. Army's current doctrinal organization of the functions applicable to the operational art is contained in TRADOC Pamphlet 11-9, Blueprint of the Battlefield (Blueprint) (Figure 5). The Blueprint serves as a common reference system for field commanders, combat developers, analysts, trainers, and planners for analyzing and integrating the actions the Army performs in, and in support of, combat operations. The Blueprint is intended to apply to military operations across the full spectrum of conflict, including high-, mid-, and low-intensity warfare. However, it does not apply to military actions short of war. The Blueprint for each level of war is organized by operating systems. Operating systems are the major functions performed at each level of war, for successfully executing operations. At the operational level,

BLUEPRINT OF THE BATTLEFIELD

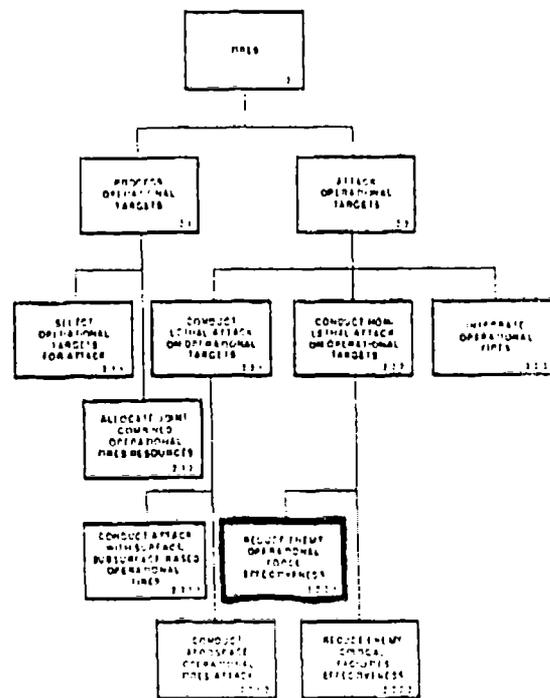
OPERATIONAL LEVEL OF WAR

(TRADOC Pam 11-9)

1. MOVEMENT AND MANEUVER



2. FIRES



3. PROTECTION

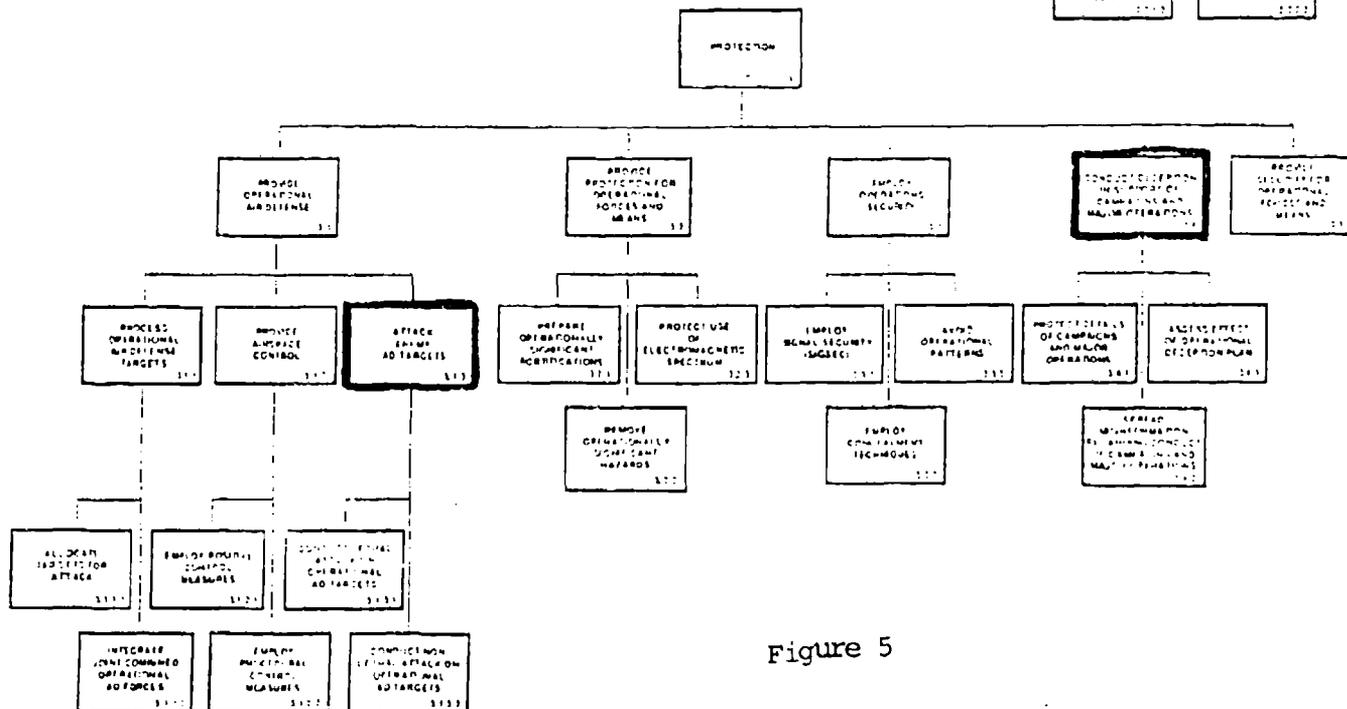
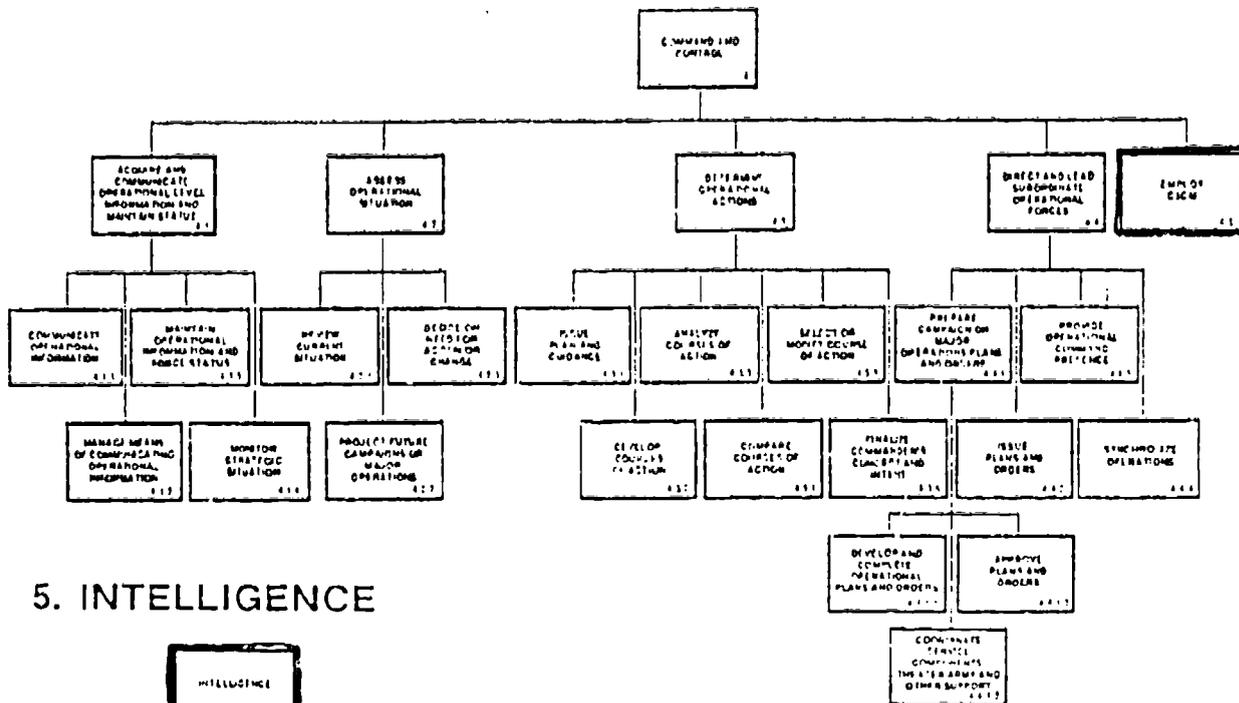
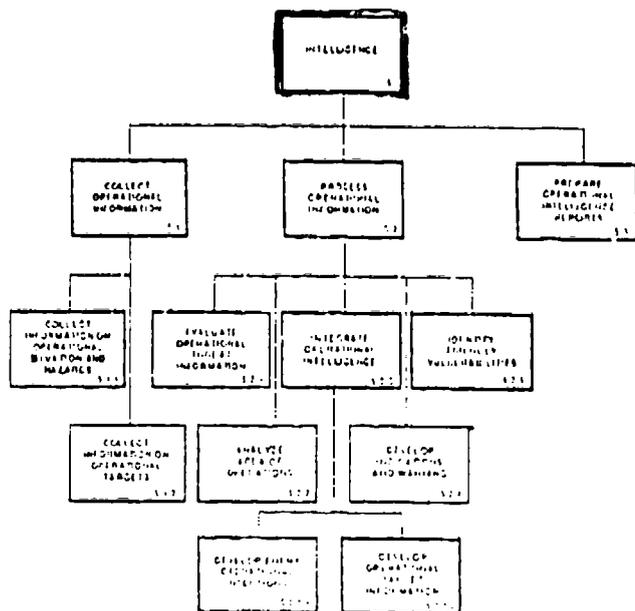


Figure 5

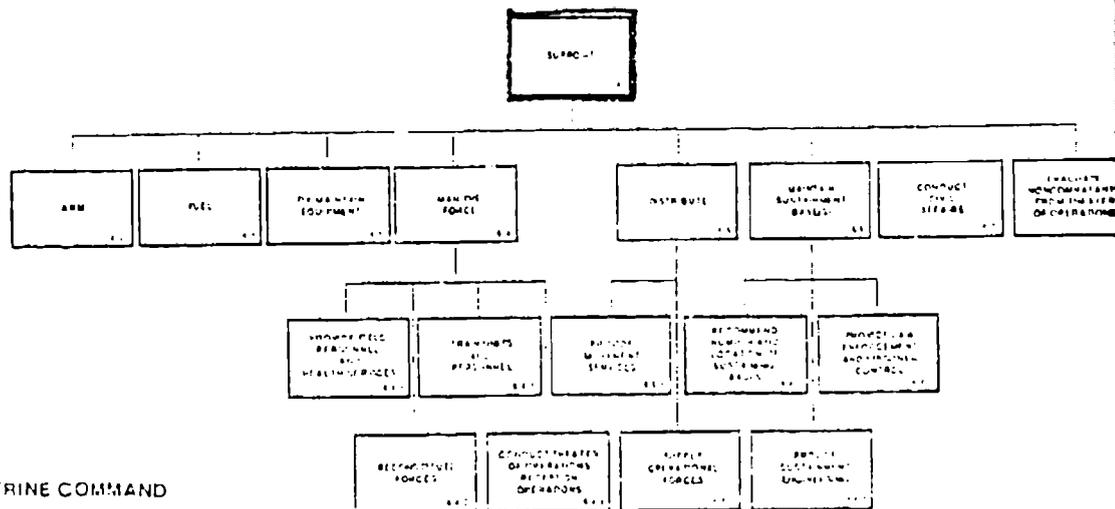
4. COMMAND AND CONTROL



5. INTELLIGENCE



6. SUPPORT



U.S. ARMY TRAINING AND DOCTRINE COMMAND
ATDO-P

THE U.S. ARMY RESEARCH INSTITUTE
USARI/PERI-SM

Figure 5 (cont)

these functions are called Operational Operating Systems (OOS).³² The OOS are Movement and Maneuver, Fires, Protection, Command and Control, Intelligence, and Support. The following paragraphs will describe each OOS.

Operational Movement and Maneuver is the disposition of forces to create a decisive impact on the conduct of the campaign or major operation by either securing the operational advantages of position before the battle is joined or exploiting tactical success to achieve operational or strategic results. It also includes delaying, channeling, or stopping movement by enemy formations, and controlling terrain, sea, and air for positional advantage.³³

Operational Fires is the application of firepower to achieve a decisive impact on the conduct of a campaign or major operation. They are a separate component of the operational scheme and the coequal of operational movement and maneuver, but maneuver and fires must be integrated. Fires at the operational level are designed to achieve a single operationally significant objective. Operational Fires focus largely on one of the following: facilitation of maneuver to operational depths, isolation of the battlefield, or destruction of critical functions and facilities.³⁴

Operational Protection is the conservation of the fighting force so that it can be applied at the decisive time and place. It includes actions taken to counter the enemy's firepower and maneuver by making soldiers, systems, and operational formations difficult to locate, strike, and

destruction. Operational Protection includes providing operational air defense, safeguarding operational forces, employing operations security, conducting deception, and providing security all for operational effect.³⁵

Operational Command and Control is the exercise of authority and direction by the properly designated commander over assigned operational forces in the accomplishment of the mission. Command and control functions are performed through an arrangement of personnel, equipment, facilities, and procedures employed by a commander in planning, directing, coordinating, and controlling forces and operations. At the operational level command and control is often a joint and/or combined activity.³⁶

Operational Intelligence is that intelligence which is required for the planning and conduct of campaigns and major operations. At the operational level, the joint and combined intelligence system concentrates on the collection, identification, location, and analysis of strategic and operational centers of gravity which, if successfully attacked, will achieve the assigned strategic aim. Intelligence at the operational level must probe the mind of the enemy commander. Also, political, economic, and technological factors could materially affect decisions at the operational level.³⁷

Operational Support consists of logistics and support activities required to sustain the force during campaigns and major operations. This sustainment function is almost always a

joint effort. The functions of Operational Support are arm, fuel, fix, man the force, and distribute stocks and services by using joint and combined transportation means.³⁸

VIII. ANALYSIS OF THE MODELS

The two models presented above will be analyzed against the following criteria:

- Applicability in a multi-medium environment.
- Applicability across the spectrum of conflict.
- Contribution to the development of joint doctrine.
- Service compatibility.
- Relevance to the identification of end states.
- Relevance to the identification of resources required for a campaign or major operation.

The first consideration to examine is the applicability of each model to the design and conduct of campaigns or major operations in a multi-medium environment. That is, does the model serve to unify operations conducted in discrete mediums into a coherent campaign. Since the CPM model was developed from the concept of a multi-medium environment, the entire orientation of that model is on facilitating multi-medium operations. Specifically, there is an acceptance that there are trade-offs with respect to resources, time, space, and effort among the mediums. These trade-offs must be made with the overall campaign objective in mind. Similarly, the attributes of synergism, flexibility, precision, and elasticity serve to guide the development of campaign courses

of action, branches, and sequels within the context of the multi-medium environment.

In contrast, the functional approach of the Blueprint is discrete in nature. The model makes no attempt to link the disparate functions together to form a unified whole. Consequently, the operational artist trying to link together operations in different mediums to accomplish a single purpose has no conceptual framework to guide his thought or actions. For example, to attack enemy airfields successfully for the purpose of securing air superiority may require SOF direct action and special reconnaissance; naval conventional cruise missile and air attacks; air force fighter bomber attacks; space platform surveillance; psychological warfare directed against enemy troops and civilian workers; as well as jamming, chaff, and anti-radiation missiles to control the electro-optical environment. The Blueprint makes no provision for the integration of these efforts into a major operation to achieve an operational effect such as air superiority.

The next consideration is the applicability of the models to combat across the spectrum of conflict. That is, what capability does the model give the operational artist to plan and execute operations across the entire spectrum of conflict from actions short of war to strategic nuclear conflict. The CPM model provides the operational commander with a framework for designing and executing campaigns across the entire spectrum of conflict. For example, counter-guerrilla operations are essentially a struggle for control of the

people and country. With its inclusion of the psychological medium, the CPM model addresses requirements other than actual combat. Additionally, use of the air, space, and electro-optical mediums emphasizing power multiplication provides a framework for supporting the friendly nation without employing U.S. combat forces. The CPM model also provides the capability for escalation throughout the entire spectrum of conflict.

The Blueprint addresses primarily mid- to high- intensity conflict. TRADOC Pamphlet 11-9 specifically states, "it does not apply to military actions short of war, although many activities related to military actions short of war are contained in the Blueprint."³⁹ The effect of the combat orientation of the Blueprint is to cause the theater CINC or other operational commander to look elsewhere for a model when dealing with operations short of war.

Contribution to the development of joint doctrine is a key consideration for any operational model. There is a realization within the military establishment that all future campaigns and operations will be joint in nature. Currently, the JCS is conducting a major effort to produce joint doctrine and a family of joint manuals to support the doctrine. Each of the proposed models supports the development of that doctrine. The CPM model provides a place for each service within its concept of unified multi-medium operations. The Blueprint provides for all service participation by structuring the sub-functions so that they can be performed by multiple services within the overall function. The important point is that any

model of the functions of the operational art must provide for joint operations and can have no single service bias.

Another consideration is service compatibility. That is, how compatible is each model with the doctrine, theory, culture, and methods of operation of the various services? The CPM model accounts for the theories of conflict which each of the services utilizes today. The offensive spirit of Fuller is present throughout AirLand Battle doctrine. While the patron saint of the Navy is Mahan, its maritime strategy, organization, and combat operations are pure Gorshkov. The U.S. Navy's doctrine, contained in its maritime strategy states, "Major navies exist for two purposes: to contest the use of the sea, and to attack targets ashore."⁴⁰ That statement is consistent with the functions contained in the CPM model. The Air Force still considers the theories of Douhet and Mitchell to be the bedrock of their doctrine. Among the functions identified in AFM 1-1, Basic Aerospace Doctrine, are gain control of the aerospace environment, attack the enemy's warfighting potential, and exploit the psychological impact of aerospace power.⁴¹ These functions fit well into the CPM model. Consequently, the CPM model should be relatively palatable to the three major services.

Doctrinal and warfighting relationships between the Army and Air Force have solidified since the creation of AirLand Battle doctrine. Consequently, as organized, the Blueprint supports Air Force and Army theory, doctrine, and operations. However, the U.S. Navy has no similar doctrine. Instead, there

is a maritime strategy to guide the application of sea power within a theater. Also, within the framework of the maritime strategy, naval operations are conducted functionally, i.e., anti-submarine, anti-surface, mine counter-measure, strike, anti-air, amphibious, and logistics support. It is much easier to group these functions into the CPM model than it is to attempt to take the functions apart in order to align them with the six functions in the Blueprint. Adoption of the Blueprint organization of functions would force the Navy to alter its organization, training, and employment.

Military campaigns and operations are conducted for the purpose of creating the military conditions necessary to achieve the strategic goal within a theater.⁴² A key consideration for the use of any operational model is the degree to which the model assists in identifying required military conditions and in structuring a campaign to produce those conditions. For example, for the Japanese to succeed in their campaign of 1941-1942, they had to secure military control of the area contained within the Southeast Asian Greater Co-Prosperity Sphere. This was accomplished by power projection for the purpose of destroying the U.S. and British naval capabilities as well as the U.S. medium bomber capability on the Philippines. That effort was followed by power multiplication for the purpose of concentrating overwhelming combat power against the U.S. and British forces on the Philippines and in Malaysia respectively. Thus, the CPM

model can assist in describing end states and in the structuring of a campaign.

Applying the Blueprint to this example makes it more difficult to describe the military conditions that need to be produced. For example, "utilize maneuver and fires to defeat allied forces and protect Japanese holdings within the Southeast Asian Greater Co-Prosperity Sphere" is cumbersome. However, the Blueprint does support campaign design such as, "move to the Hawaiian Island area and utilize operational fires to defeat the Pacific Fleet."

The final consideration is the degree to which each model contributes to the identification of resources required for a campaign or major operation. The CPM model assists due to the requirement to consider the entire campaign as a unified whole within the multi-medium environment of the theater. Thus, within the CPM model resources must be balanced between the requirement to exercise some control, power projection, and power multiplication within each medium, and the necessity of focusing the effort of the campaign toward the goal. The best arrangement of functions throughout the campaign, the intersection of the three circles in the model, can not be determined without analyzing the application of resources. However, the CPM model, as stated, does not explicitly address the impact of logistics resource management. This deficiency inhibits the operational planner's integration of logistics support into campaign design.

In contrast, as previously mentioned, the functions contained in the Blueprint are discrete. The Blueprint places no requirement on the operational artist to trade-off resources among functions. Also, within the support function, the sub-functions are organized as systems, with no requirement or provision for the management of resources when designing or executing campaigns. Thus, conceptually, the Blueprint provides no basis for the identification of resources required for a campaign, instead focusing on the application of available resources.

IX. CONCLUSION AND IMPLICATIONS

Based on the above analysis, one may conclude that the CPM model provides the operational artist with the more effective organization of the functions of operational art. The Blueprint inadequately addresses the multi-medium environment, operations across the spectrum of conflict, the identification of end states, and the identification of resources for a campaign or major operation. From a practical standpoint, the Navy is unlikely to accept the Blueprint based on naval maritime strategy, theory, heritage, organization, and operations. In contrast, the CPM model addresses the major concerns of the operational artist in a framework that assists in the design and execution of major campaigns and operations.

The implications of this monograph are both service specific and joint in nature. For the U.S. Army, the doctrinal implications are that single service operations are almost

always tactical in nature. Theater CINCs and JTF Commanders are operational artists. Therefore, they must be guided by JCS doctrine for operational art. The correct location for basic operational doctrine is not in FM 100-5, but in the JCS family of publications. The next edition of FM 100-5 must be altered, not to attempt to provide doctrine for the practice of the operational art, but to describe how army operations fit within the overall context of operational art in a multi-medium, joint environment. Finally, the Blueprint should be set aside in favor of a model, adopted by JCS and all services, which addresses operational art in a multi-medium environment. That model must include the functions of control, power projection, and power multiplication.

A more focused implication for the Army deals with the instruction currently conducted at the School of Advanced Military Studies, in the Advanced Military Studies Course (AMSC). Within AMSC, students must be exposed to the tactics applicable to combat in all mediums. Currently, the tactics instruction in AMSP, to include tactical wargames, focuses almost entirely on land combat. Since tactical events are the building blocks of campaigns, multi-medium campaigns can not be designed and executed correctly unless operational planners and commanders understand how combat is conducted at the tactical level in each medium. For example, the FAST STICK simulation would provide an opportunity for students to work through the tactical application of airpower. Additionally, during the courses on the historical and contemporary practice

of operational art, emphasis must be placed on campaigns that are multi-medium, vice those in which a single medium is or was dominant.

There are also some significant joint implications of the results of this monograph. First, the entire approach of the U.S. military establishment toward the operational art must be joint in nature. Any doctrinal or educational discussion of operational art must be entirely joint to produce the best possible product. That means that for the Department of Defense to have only service oriented courses in the operational art may be counter-productive. This is because the operational art will be viewed through a lens of service bias, not maliciously, but with adverse affects. In place of the Army's School of Advanced Military Studies and, soon other similar service schools, there should be a single joint school to study the operational art. This school should be in addition to the new three-month joint education course at the Armed Forces Staff College. Services should supplement that course with instruction in their Staff College and Senior Service level courses to insure their officers can execute service specific doctrine within the framework of multi-medium campaigns. Second, the development of operational doctrine must be joint in nature. For example, the JCS Pub 1 definition of the operational art is almost verbatim the U.S. Army FM 100-5 definition, while the Navy's maritime strategy makes no provision for the operational art.

Finally, for the long term, the Department of Defense should consider reorganizing into six services: Army, Navy, Air Force, Special Operations (dealing in the psychological medium and including SOF, PSYOPS, and Civil Affairs), Space Forces, and Electro-Optical Warfare. Such an organization better reflects the current realities of the conduct of warfare. While it may at first seem expensive, this reorganization could probably be conducted within the current activities of the restructuring of the services due to budgetary and changing threat considerations. That restructuring will probably continue for at least a decade, offering an opportunity for a gradual, but beneficial reorganization. There are some indications that necessity is already forcing this reorganization upon the armed forces. Special Operations have been combined from separate service functions into a single unified command, with its own budget and programming authority. While the services still provide resources, conduct training, and manage personnel, these functions are rapidly joining doctrine development and operational planning as functions performed by the Special Operations Command. That command may soon be, in everything but name, a service.

In summary, it is evident that warfare has expanded into a complex, global, multi-medium environment. In order to win at the operational level, the United States Armed Forces must be prepared to perform the functions of control, power projection, and power multiplication, within the context of a

campaign or major environment, to accomplish strategic goals within a theater of war or theater of operations.

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