

CENTER OF GRAVITY: IS THE CONCEPT STILL RELEVANT?

**A MONOGRAPH
BY
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Infantry**



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ABSTRACT

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This monograph addresses the usefulness of the concept of centers of gravity as a planning tool. The concept of center of gravity has been integral to the planning of military operations since its initial description by Clausewitz. It had been described in other ways before Clausewitz and has been interpreted in numerous ways by theorists since. Today, the concept is at the forefront of United States military doctrine. However, the concept of centers of gravity is also a source of great confusion to today's military planners.

The question of the usefulness of the concept of center of gravity is very relevant to today's military. The Army is currently writing new operational doctrine with centers of gravity as a key component. The military as a whole is continuing to strive towards jointness but service doctrine differs greatly regarding centers of gravity. There is an absence of common understanding among the professional officer corps on the subject. These factors make it clear that the subject is in need of clarification and evaluation in terms of its usefulness as a planning tool.

This monograph argues that the concept of centers of gravity is not useful in its current state. It is not commonly understood by military planners. It is also not clearly defined in joint and service doctrine. However, this monograph also demonstrates the immense value of the concept to military planners when it is clearly defined and commonly understood. Finally, the monograph provides a proposed solution that demonstrates the fact that, when clearly defined and commonly understood, the concept is a useful tool to military planners.

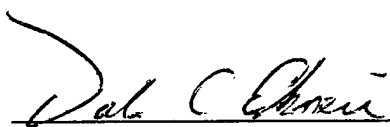
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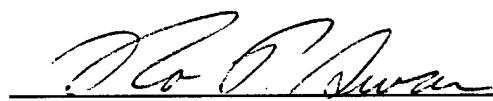
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Chapter One

Introduction

This monograph addresses the usefulness of the concept of centers of gravity as a planning tool. The concept of center of gravity has been integral to the planning of military operations since its initial description by Clausewitz. It had been described in other ways before Clausewitz and has been interpreted in numerous ways by theorists since. Today, the concept is at the forefront of United States military doctrine. However, the concept of centers of gravity is also a source of great confusion to today's military planners.

The question of the usefulness of the concept of center of gravity is very relevant as the military prepares for the next century. The Army is currently writing new operational doctrine with centers of gravity as a key component. The military as a whole is continuing to strive towards jointness but service doctrine differs greatly regarding centers of gravity. There is an absence of common understanding among the professional officer corps on the subject. These factors make it clear that the subject is in need of clarification and evaluation in terms of its usefulness as a planning tool.

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This paper answers the question of the usefulness of the concept of center of gravity as a planning tool using three approaches. The first is an analysis of the evolution of the concept. The purpose of this analysis is to demonstrate that whether or not the concept is commonly understood depends largely upon where in this evolution a person chooses to find their concept of centers of gravity. The second approach is a review of current Joint and service doctrine. This review evaluates the concept in terms of common definition and understanding and shows the lack of consensus in terms of definition and application. The third approach is an analysis of the value of the concept as a planning tool. The purpose of this analysis is to demonstrate that if center of gravity is clearly defined and commonly understood, it is useful at all levels of war and in all types of military operations. The monograph concludes with a proposed solution that addresses the shortcomings of the current concept and allows for full realization of its potential as a planning tool.

Chapter Two

Evolution of the Concept

The purpose of this chapter is to shed light on the confusion regarding centers of gravity. To understand the confusion surrounding the concept of the center of gravity, it is important to understand its evolution. The following is a brief discussion of the development of the concept from its introduction by Clausewitz, to the opinions of notable military theorists of today. This discussion is not intended as a comprehensive review. Instead, it is a sampling of key theorists and illustrations of the concept's application.

Clausewitz and the Center of Gravity

One has to look no further than the originator of the concept to begin to understand the problem. Carl von Clausewitz introduced the concept in his military classic On War. In fairness to the author, it is important to understand that he never completed the book and that it was published posthumously by his wife and has suffered from translation. The author also wrote based primarily on his observations of Napoleonic warfare. Despite these facts, On War has had an impact on the doctrine of all military services. Any discussion of the concept must start with Clausewitz.

The issues with Clausewitz's concept of center of gravity usually concern two main questions; Is the center of gravity always the enemy's military or can it sometimes be other things? And is there one center of gravity or can there be multiple centers of gravity?¹ Military theorists continue to hotly debate the answers to these questions.

The question of what things can constitute centers of gravity is not easily answered. Clausewitz seems to indicate that it is the military. As early as Chapter Two

of Book One of On War, Clausewitz states that “of all the possible aims in war, the destruction of the enemy’s armed forces always appears as the highest.”² It is important to note that Book One is the only book that Clausewitz felt was complete. In Book Six, Defense, Clausewitz goes on to say that “a center of gravity is always found where the mass is concentrated most densely.”³ and “the blow from which the broadest and most favorable repercussions can be expected will be aimed against that area where the greatest concentration of enemy troops can be found”.⁴ These points would seem to indicate that the center of gravity is the greatest concentration of the enemy mass.

Despite the apparent clarity of Book One and Book Six, proponents of centers of gravity that are other than the enemy are quick to point to Book Eight, War Plans. In this book, Clausewitz clearly contradicts himself. Here he states that other things can be centers of gravity. At one point he lists, in addition to the army, as possible centers of gravity; the capital, the army of an enemy’s protector, the community of interest, personalities of leaders and public opinion.⁵ Later in Book Eight, in a discussion of France, he states that the center of gravity is both the country’s armed forces and Paris.⁶ Clausewitz does state that the concentration of forces is only possible in small compact states and that only there will its defeat decide everything.⁷ If the issue is not confusing enough, Clausewitz, in the same Book Eight also says that regardless of the enemy’s main source of power, “the defeat and destruction of his fighting force remains the best way to begin”⁸.

The question of one versus multiple centers of gravity is not clearly answered in On War. Going back to Book Six, Clausewitz at first appears to indicate that there is only one. Evidence of this conclusion includes “Our position, then, is that a

theater of war, be it large or small, and the forces stationed there, no matter what their size, represent the sort of unity in which a single center of gravity can be identified.”⁹ In Book Eight, Clausewitz provides further support for those who argue for one center of gravity “one must keep the dominant characteristics of both belligerents in mind. Out of these characteristics a certain center of gravity develops, the hub of all power and movement, on which everything depends.”¹⁰ Clausewitz also states that it is sometimes possible to defeat one enemy, the center of gravity, and by doing so vanquish all of your enemies.¹¹

Typical of On War, there is ample evidence to support the opposing view. Proponents of multiple centers of gravity can also support their position from both Book Six and Book Eight. In Book Six, Clausewitz states “Thus these forces will present certain centers of gravity, which, by their movement and direction govern the rest.”;¹² and “It is therefore a major act of strategic judgment to distinguish these centers of gravity in the enemy’s forces.” In Book Eight, Clausewitz further indicates that there is more than one center of gravity when he states that “the first task, then, when planning for a war is to identify the enemy’s centers of gravity, and if possible trace them back to a single one.”¹³ and “The first principle is that the ultimate substance of enemy strength must be traced back to the fewest possible sources, and ideally to one alone.”¹⁴ Clausewitz offers a possible reconciliation of these contradictory statements when he seems to indicate later in Book Eight that even after defeating the force, the pursuit must be continued against the next source of strength, conceivably the new center of gravity.¹⁵

Students of military theory will never know the answer to these questions without being able to ask the author himself. A reader of On War must consider the time of the

writing and consider it in context. How a theorist determines the answer to these questions greatly influences his personal theory regarding centers of gravity. As we continue to trace the evolution of the concept we will see this point.

Jomini and the Decisive Point

To understand the evolution of the concept of centers of gravity, it is important to understand Jomini's concept of decisive points. Jomini, a contemporary of Clausewitz, developed the concept in his book The Summary of the Art of War. Jomini defined one great principle which underlies all military operations as the cumulative effect of the following maxims:

1. To throw by strategic movements the mass of an army, successively, upon the decisive points of a theater of war, and also upon the communications of the enemy as much as possible without compromising one's own.
2. To maneuver to engage fractions of the hostile army with the bulk of one's forces.
3. On the battlefield, to throw the mass of the forces upon the decisive point, or upon that portion of the hostile line which it is of the first importance to overthrow.
4. To so arrange that these masses shall not only be thrown upon the decisive point, but that they shall engage at the proper times and with ample energy.¹⁶

Jomini further explains his idea by stating that "there is in every battlefield a decisive point the possession of which, more than any other, helps to secure victory by enabling its holder to make a proper application of the principles of war."¹⁷ Jomini's concept and that of Clausewitz are compatible and support each other. Clausewitz emphasized mass and Jomini emphasized concentration at decisive points. Clausewitz

advocated the destruction of the enemy's mass while Jomini advocated massing ones forces at a decisive point in order to gain a decision.¹⁸

Liddell Hart and the Indirect Approach

A third concept that is critical to the evolution of centers of gravity is that of the indirect approach. This concept was developed by B.H. Liddell Hart, a British military theorist. He developed this theory following his observations of the senseless waste of human life that resulted from attrition warfare during World War One. In simple terms, the indirect approach is attacking enemy vulnerabilities as a means to defeating his strength. The indirect approach seeks to place the mass of ones force against an enemy weakness and by doing so gain a positional advantage.¹⁹

Hart's indirect approach builds on the concept of center of gravity and of the decisive point. The logical combination of these three concepts results in the placement of a friendly center of gravity, a strength, against an enemy vulnerability at a decisive point, in order to defeat his center of gravity. An example of this would be the defeat of an enemy artillery group, a center of gravity, by destroying vulnerabilities such as links to sensors, radars and logistics assets, rather than a direct attack against the artillery group itself.

The Germans and World War Two

The invasion of France in World War Two provides an illustration of how the Germans applied the concept of center of gravity. The German execution of Plan Yellow was one of the most decisive victories in military history. The Germans applied the concept of center of gravity to overwhelm the Allied forces. The plan called for an attack by three Army Groups; A, B and C. In its final version the strategic center

of gravity was Army Group A, under Rundstedt in the center. This Army Group consisted of 35 infantry divisions, seven Panzer divisions and three motorized divisions. This was the greatest concentration of combat power of the German attack. The operational center of gravity of Army group A was Panzer Gruppe Kleist, again the largest concentration of combat power. Within Panzer Gruppe Kleist, the XIX Panzer Corps, under Heinz Guderian, comprised the tactical center of gravity and was weighted accordingly with three panzer divisions.

The Allied plan called for the First Army Group to move into Belgium to counter the expected German attack in the north. The decisive point of the battle was the terrain vicinity of Sedan. Sedan was the decisive point because its seizure would place German forces to the flank and rear of the Allied center of gravity. Guderian dispersed his forces, moved rapidly through the Ardennes and massed at the decisive point, Sedan. Guderian combined the combat power of three panzer divisions, a reinforced infantry regiment, artillery and 1500 Stukas on a six kilometer front. This concentration defeated the French 55th Division at Sedan in three hours. Guderian then dispersed his forces and continued to exploit success and retain the initiative as he attacked towards the Channel.²⁰

Warden and the Enemy as a System

Another key evolution of the concept of center of gravity was the idea of the enemy as a system. One of the leading proponents of this theory is Colonel John Warden, an Air Force officer who helped shape the American air campaign used during the Persian Gulf War. Warden believes that, at the strategic level, enemies are systems composed of numerous subsystems.²¹ His approach advocates causing changes to one or more parts of the enemies system that force him to adopt our objectives or make it

physically impossible for him to resist.²²

Based on these beliefs, Warden developed a five ring model that can be applied to enemy states or entities. Starting from the outside in; the rings are the fielded military, the population, infrastructure, organic essentials and leadership. The leadership ring is the most critical. Warden professes that the enemy system can be attacked directly by attacking the inner ring, indirectly by attacking one or more of the outer rings or paralyzed by simultaneously attacking all of the rings.²³ The point that makes this idea the furthest evolution from Clausewitz's original concept is how Warden chooses to define centers of gravity. He states that "Every state and every military organization will have a unique set of centers of gravity-or vulnerabilities."²⁴ Using this definition the concept has evolved from always being the enemies largest concentration of force or greatest strength to being almost anything and being a vulnerability.

Contemporary Theorists

The evolution of the concept does not stop with Warden and the system theorists. The subject continues to be hotly debated in military journals and publications today. Contemporary authors present a wide range of views regarding centers of gravity. Dr. James Schneider and LTC Larry Izzo argue convincingly for a return to Clausewitz's classical definition.²⁵ The winning essay in the 1998 Colin L. Powell Joint Warfighting Essay Contest proposed that centers of gravity are a myth.²⁶ In addition to these opposing opinions, theorists can be found who advocate almost anything as a possible center of gravity. An example of this phenomenon is a recent paper advocating information centers of gravity.²⁷

The intent of this chapter is to explain the confusion regarding the concept of

center of gravity. In order to understand this confusion, one must understand the drastic evolution of the concept over time. The length and scope of this paper prevent a more detailed discussion. Theorists such as Giulio Douhet, Billy Mitchell, Julian Corbett, Alfred Thayer Mahan, J.F.C. Fuller, Mao Zedong, T.E. Lawrence and many others all contribute directly or indirectly to the debate and warrant further study.

However, the preceding discussion demonstrates the point that whether or not the concept of center of gravity is commonly understood depends largely on whose concept you are dealing with. In other words, the problem is not that people do not understand a particular concept. The essence of the confusion is that the term center of gravity means different things to different people depending on where they believe the concept is in its evolution. The term may evoke images of Clausewitz to one planner, Warden to another and the current joint concept to another.

Chapter Three

Doctrine

The preceding chapter demonstrated the fact that whether or not the concept of centers of gravity is commonly understood depends largely on how it is defined. The purpose of this chapter is to review how Joint doctrine defines and uses the concept. The doctrine of the four services is also examined to determine how well they correspond to joint doctrine and to each other.

Joint Doctrine

To be technically correct, it is important to acknowledge that joint doctrine takes precedence over service doctrine. Based on this fact, center of gravity is clearly defined. Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, defines Centers of Gravity as “Those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight”.²⁸

Acknowledging this fact, further examination of joint and service doctrine clearly shows that while this is technically correct, it is not true in reality due to inconsistencies between the services and joint doctrine.

While JP 1-02 provides a clear definition, further examination of Joint doctrine quickly confuses the issue. Joint Pub 1, Joint Warfare of the Armed Forces of the United States discusses the importance of the concept of center of gravity. According to JP 1 the concept of centers of gravity is “a key concept that integrates intelligence and operations” and “Finding and attacking enemy centers of gravity is a singularly important concept.”²⁹

So far the concept has been defined and its importance has been stressed. The problem with the definition arises when the issue of application is discussed.

Joint Pub 3-0, Doctrine for Joint Operations, defines centers of gravity as 'those characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength or will to fight.'³⁰ While the terms localities and location technically have different meanings, that fact is largely semantical, it does however demonstrate the lack of precision between joint publications. A larger issue is the next sentence in JP 3-0. The above definition is followed by the phrase "At the strategic level, centers of gravity might include a military force....."³¹ One interpretation of these statements is that they are mutually exclusive. If a center of gravity is a characteristic, capability or location that provides something to a military force, then it can not logically also be a military force in and of itself.³² However, another interpretation is that a military force may very well be the center of gravity of a larger military force. Regardless of which interpretation is correct, the doctrine is confusing.

The confusion is compounded when the publication goes on to say that "Where direct attack means attacking into an opponent's strength, JFCs should seek an indirect approach."³³ JP 3-0 calls centers of gravity the foundation of capability and directly quotes Clausewitz's hub of all power definition.³⁴ This seems to imply that the center of gravity is a strength. If this is the intent, the preceding quote is confusing because a direct attack against a center of gravity would, by definition, always mean attacking into an opponent's strength.

JP 3-0 also lists long sea and air LOCs from CONUS or supporting theaters as possible friendly centers of gravity.³⁵ This is another source of confusion. While long

LOCs are critical to friendly operations and of vital and importance, they are a vulnerability and not a strength.³⁶ This appears to be incompatible with the centers of gravity as a strength interpretation, and instead seems to imply that centers of gravity can also be sources of strength that are not strong in and of themselves.

These inconsistencies in definition and application are identified to demonstrate the confusion regarding centers of gravity in joint doctrine. The issues of whether a military force can be a center of gravity and whether centers of gravity are strengths, sources of strength or both are left to the interpretation of the reader. The problem is more clearly demonstrated by a review of the separate service positions on the concept.

The Army and the Center of Gravity

The 1986 version of FM 100-5, Operations, was significant because it renewed interest in operational art. A key concept of this renewed interest was that of the center of gravity. The 1986 FM 100-5 describes the identification of the enemy's operational center of gravity as the essence of operational art.³⁷ It also lists center of gravity, along with lines of operation and culminating points, as the central concepts of campaigns and major operations.³⁸

The 1986 version viewed the modern enemy as a complex system made up of several components. The destruction or damage of the vital components of an enemy system unbalances his entire structure causing him to fail or be vulnerable to further damage. The center of gravity of an armed force refers to those vital components. The center of gravity is the enemy's source of strength or balance. Specifically it is "that characteristic, capability or locality from which the force derives its freedom of action, physical strength or will to fight."³⁹

This version of FM 100-5 advocates the existence of centers of gravity at all levels of war. Tactical centers of gravity, such as a key command post or a piece of key terrain, can exist. However, the concept is more useful at the operational level. Examples of operational centers of gravity are listed as the mass of the enemy force, a boundary between two major formations, a vital command and control center or a log base or line of communication. According to the 1986 version, operational centers of gravity may also be more abstract, such as the cohesion of allied forces or the mental and psychological balance of a key commander. At the strategic level, a center of gravity may be a key economic resource, locality, strategic transport capability or a vital part of the homeland. Strategic centers of gravity may also be wholly intangible things such as something of moral importance, popular support or political support.⁴⁰

The 1986 version of 100-5 was significant in that it raised the issue and acknowledged the importance of the center of gravity. The conceptual application of the concept was a valid application of Clausewitz's concept modernized to account for a more complex enemy and form of warfare. However, the singular wording of the definition seems to indicate only one center of gravity, at least at each level of war. Additionally, some of the examples of centers of gravity listed are actually weaknesses and others are extremely ambiguous.

The 1993 version of FM 100-5 continued to build on the concept of center of gravity. It defines center of gravity as "the hub of all power and movement upon which everything depends; that characteristic, capability or location from which enemy and friendly forces derive their freedom of action, physical strength, or the will to fight."⁴¹ This definition is significant in that it includes the Clausewitzian definition. It also modifies the

1986 definition slightly by adding friendly and enemy to the term force.⁴² This current version describes the concept of centers of gravity as a useful analytical tool that forces commanders to think about friendly and enemy sources of strength.⁴³ It states that "The essence of operational art lies in being able mass effects against the enemy's main source of strength - his center of gravity, which he seeks to protect."⁴⁴

The 1993 100-5 lists three types of potential centers of gravity. Traditional centers of gravity listed are the mass of the enemy army, the enemy's battle command structure, public opinion, national will and an alliance or coalition structure. Abstract centers of gravity include things such as will and alliances and concrete centers of gravity include strategic reserves, C2, industrial bases and LOCs.⁴⁵

A final point of confusion regarding Army doctrine and the center of gravity can be found in FM 101-5-1, Operational Terms and Graphics. This manual defines centers of gravity as "The hub of all power and movement, on which everything depends."⁴⁶ This definition is not the same as the 1993 FM 100-5 definition. The choice of the Clausewitzian definition in FM 101-5-1 clearly places the emphasis on a singular center of gravity and on the center of gravity as a strength. However, the 1993 FM 100-5 clearly describes centers of gravity as sources of strength and acknowledges the possibility of multiple centers of gravity.

The 1993 version, although it does not contain as detailed a discussion, places the same high importance on the concept of center of gravity. However, like the 1986 version, the definition maintains a singular connotation and the examples are ambiguous. These facts, as well as the disconnect between the service dictionary and its capstone manual's definition demonstrate the confusion regarding the concept.

The Navy and the Center of Gravity

Naval Doctrine Publication 1, Naval Warfare, defines center of gravity as “That characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength or will to fight.”⁴⁷ This definition is simply the Joint definition in a singular form. Navy doctrine states that there can be only one center of gravity. It is something the enemy must have to continue military operations. Another difference in Navy doctrine is that it clearly states that the center of gravity is a source of strength but not necessarily strong or a strength in itself.⁴⁸

Once the center of gravity is located, friendly strengths are focused against it. Opportunities to access or destroy a center of gravity are “critical vulnerabilities”⁴⁹ Naval Pub 1 uses the example of lines of communication to explain this concept. It explains that a lengthy enemy supply line could be his center of gravity. It is something the enemy must have, but not necessarily capable of defending. To be decisive, a blow to the enemy’s center of gravity must be against something that is both critical to his ability to fight and vulnerable to friendly attack.

The Navy concept of critical vulnerabilities is tied to the center of gravity. Critical vulnerabilities play a central role in maintaining or supporting the enemy center of gravity. They are transitory or time sensitive. Examples include an enemies dependence on raw materials, dependence on a single source of intelligence, electrical power facilities or fleet oilers supporting a task group. They can also be intangibles such as will and morale. The commander must quickly recognize enemy strengths and weaknesses and avoid the strength while attacking critical vulnerabilities in order to collapse the enemy center of gravity.⁵⁰

While the Navy concept of center of gravity appears by definition to be close to that of the Joint definition, closer examination reveals significant differences. The Navy concept of critical vulnerabilities is in keeping with the spirit if not the letter of Joint doctrine. However, the center of gravity as a weakness and the idea that there is only one are diametrically opposed to the Joint concepts.

The Air Force and Centers of Gravity

Of all the services, the Air Force most closely agrees with Joint doctrine on the subject of centers of gravity. Air Force Doctrine Document 1, Air Force Basic Doctrine, defines centers of gravity using the verbatim definition found in Joint Pub 1-02.⁵¹ Air Force Doctrine Document 2, Organization and Employment of Aerospace Power, cites the JP 1-02 definition and adds the statement; "They exist at the strategic, operational, and tactical levels of war."⁵²

Air Force doctrine states that a key theme of air and space power's maneuver advantage is the ability to strike directly at an adversary's strategic or operational center of gravity. Because of this advantage, the intent of most modern air and space operations is to quickly attain objectives through swift, parallel and decisive blows to the enemy's center of gravity at the operational and strategic level.⁵³

The concept of centers of gravity is an integral part of the Air Force's warfighting approach. Evidence of this fact is the definition of strategic attack, one of the Air and Space Power Functions, which states in part; "Strategic attack is defined as those operations intended to directly achieve strategic effects by striking at the enemy's center of gravity."⁵⁴

The Marine Corps and Critical Enemy Vulnerabilities

The Marine Corps is unique among the services in that it does not use the term centers of gravity. In its place FMFM 1, Warfighting, uses the term critical enemy vulnerabilities. FMFM 1 defines the term as follows:

“Sometimes known as the center of gravity. However, there is a danger in using this term. Introducing the term into the theory of war, Clausewitz wrote: “A center of gravity is always found where the mass is concentrated most densely. It presents the most effective target for a blow; furthermore, the heaviest blow is that struck by the center of gravity.” Clearly, Clausewitz was advocating a climactic test of strength against strength “by daring all to win all”. This approach is consistent with Clausewitz’ historical perspective. But we have since come to prefer pitting strength against weakness. Applying the term to modern warfare, we must make it clear that by the enemy’s center of gravity we do not mean a source of strength, but rather a critical vulnerability.”⁵⁵

The Marine Corps concept of critical enemy vulnerabilities is an interesting interpretation. On one hand, it seems to be based on Clausewitz’s original concept. On the other hand, it has transformed the concept from a strength to a vulnerability or weakness.

FMFM 1 states that some vulnerabilities are more critical to the enemy than others. The best way to defeat an enemy is to destroy the one thing that is most critical to him. Operations should focus on the one thing that if eliminated will do the most decisive damage to the enemies ability to resist. These statements seem to imply that destroying one thing will defeat an enemy.⁵⁶

FMFM 1 goes on to say that the concept applies to all levels of war. At the strategic level, they are often intangible things such as popular opinion or shaky alliances, but may also be an essential war resource or key city. At lower levels, they are more physical things such as an exposed flank, a gap, a chokepoint, a logistics dump or even the weak side of a tank. These statements seem to contradict the one most critical

vulnerability discussed above.⁵⁷ They imply that critical vulnerabilities should be attacked at all levels.

To their credit, the Marine Corps has analyzed theory and adapted it to modern warfare. They have developed a new term and clearly defined it. However, the idea that a critical enemy vulnerability is a weakness makes it a suitable equivalent to the Joint concept of center of gravity only if the joint center of gravity is interpreted as a source of strength and not a strength in and of itself.

From this review of Joint and service doctrine regarding the concept of centers of gravity, two points are clear. Beyond the technical supremacy of joint doctrine, the concept is not clearly defined. The following list demonstrates this point:

Joint - "Those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight".⁵⁸

Army - "The hub of all power and movement, upon which everything depends; that characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength, or the will to fight." ⁵⁹

Navy - "That characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength or will to fight." ⁶⁰

Air Force - "Those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight". ⁶¹

Marine Corps - Critical Enemy Vulnerabilities. ⁶²

The second point is that the concept is not commonly understood. Joint doctrine allows for multiple centers of gravity and is not clear as to whether they are strengths or sources of strength. The Army sees them as sources of strength but, at least by definition,

sees only one. To the Navy, there is only one center of gravity, but it is not necessarily a strength. The Navy also uses the concept in conjunction with the concept of critical vulnerabilities. The Air Force, perhaps because its doctrine has been recently updated, agrees with joint doctrine. The Marine Corps replaced the concept with the concept of critical enemy vulnerabilities, which are weaknesses not strengths. This wide range of opinions on the subject clearly demonstrates a lack of common understanding.

Chapter Four

The Center of Gravity as a Planning Tool

Does the concept of centers of gravity serve a purpose in planning military operations? Chapter two demonstrated the lack of common understanding regarding the concept. Chapter three pointed out the lack of a clear definition of centers of gravity. Because of this, some assumptions must be made in order to determine the value of centers of gravity to the military planner.

For the purposes of the following analysis, the center of gravity is considered a strength. This assumption is necessary because of the confusion regarding the issue in joint doctrine. The second assumption is that modern enemies are complex systems. Complex systems are systems that are made up of a great number of independent agents interacting with each other in a great number of ways. They are self organizing and adaptive.⁶³ This view of the modern enemy allows for the final assumption, the existence of more than one center of gravity. Multiple centers of gravity are in keeping with the joint definition and at least parts of On War.

This chapter examines the value of centers of gravity as a planning tool across the full spectrum of military operations. The concept will be evaluated at the strategic, operational and tactical levels of war. Offensive, defensive, stability and support operations will be considered. The goal is to determine what use, if any, the concept of centers of gravity provides the military planner.

The definition of the strategic level of war is:

The level of war at which a nation, often as a member of a group of nations, determines national or multinational (alliance or coalition) strategic security objectives and

guidance, and develops and uses national resources to accomplish these objectives. Activities at this level establish national and multinational objectives, sequence initiatives, define limits and assess risks for the use of military and other instruments of national power, develop global plans or theater war plans to achieve these objectives, and provide military forces and other capabilities in accordance with strategic plans.⁶⁴

The concept of centers of gravity is a critical planning tool at this level of war. It allows planners to determine sources of strength across all instruments of national power, determine how to best defeat enemy aims while ensuring successful attainment of friendly aims and sets the stage for effective operational planning.

At the strategic level, commanders and planners begin by determining enemy aims and developing friendly aims if not received from the National Command Authority. Once aims are determined, the concept of centers of gravity allows for the determination of enemy strengths to include diplomatic, informational, military, and economic, that provide him with the ability to accomplish his aim or aims. Similarly, the concept applied to friendly forces will allow planners to determine elements of friendly national power essential to the achievement of US, alliance, or coalition aims.

Once the enemy and friendly strategic centers of gravity are determined, planners can then develop a campaign plan with the optimal chance of success. Using the concept of centers of gravity, planners can determine if the enemy is vulnerable to a direct attack. Because this is rarely the case, centers of gravity are evaluated to determine what things make them strong. In turn, these things can be evaluated based on their vulnerability to attack and objectives can be determined that are both achievable and tied to strategic aims. The same process applied to friendly centers of gravity allows planners to develop plans

that protect essential strengths against direct or indirect attack and allow for risk to be accepted.

Finally, the use of the concept of centers of gravity sets the stage for effective planning at the operational level. Because the strategic level is the dominant level of war, selection of centers of gravity at this level is critical to the selection of operational goals and centers of gravity. The strategic center or centers of gravity provide linkage between strategic aims and operational employment of forces.⁶⁵

The operational level of war is:

The level of war at which campaigns and major operations are planned, conducted and sustained to accomplish strategic objectives within theaters or areas of operations. Activities at this level link tactics and strategy by establishing operational objectives needed to accomplish the strategic objectives, sequencing events to achieve the operational objectives, initiating actions and applying resources to bring about and sustain these events. These activities imply a broader dimension of time or space than do tactics, they insure the logistic and administrative support of tactical forces, and provide the means by which tactical successes are exploited to achieve strategic objectives.⁶⁶

The concept of centers of gravity maintains its value to planners at the operational level of war. It is a key component of operational design, it is critical to the commanders ability to focus joint combat power, and it sets the conditions for success at the tactical level.

Operational art is the:

“employment of military forces to attain strategic and/or operational objectives through the design, organization, integration and conduct of strategies, campaigns, major operations and battles. Operational art translates the joint force commander’s strategy into operational design, and, ultimately, tactical action, by integrating the key activities at all levels of war.”⁶⁷

The essence of operational art is to concentrate, in some way, friendly resources against the enemy's main source or sources of strength (center(s) of gravity) in order to achieve an advantage that will set the conditions for the achievement of friendly aims or goals.⁶⁸

Commanders and planners at the operational level face the challenge of focusing joint combat power against the enemy. The concept of centers of gravity provides the point of focus for the application of that combat power. By identifying operational centers of gravity and their associated vulnerabilities, planners can develop ways to defeat, destroy and neutralize them. This can be done directly, if sufficient combat power can be generated, or indirectly if resources are limited.

The concept of centers of gravity, when properly applied at the operational level, facilitates the effective use of combat power at the tactical level. Tactical objectives that relate directly to the operational goals and operational centers of gravity of the enemy, provide the greatest opportunity for success. History is replete with examples of tactical successes having limited effect at the strategic level. This can be prevented by ensuring a clear linkage between tactical objectives and operational goals. This is accomplished through correct identification of the centers of gravity at the operational level.

The tactical level of war is defined as:

The level of war at which battles and engagements are planned and executed to accomplish military objectives assigned to tactical units or task forces. Activities at this level focus on the ordered arrangement and maneuver of combat elements in relation to each other and to the enemy to achieve combat objectives.⁶⁹

The value of the concept of centers of gravity at the tactical level depends largely on the size of the friendly force and the complexity of the enemy. Whether or not the time

required for a detailed center of gravity analysis is worth the result must be determined by the tactical unit commander.

Decisive points for tactical operations can often be determined by means other than center of gravity analysis. Commanders apply judgment and experience to determine where to focus combat power. Detailed intelligence preparation of the battlefield is another effective means for determining the best way to defeat an enemy. At the tactical level, when the decisive point is discernible and the mission is clearly defined, center of gravity analysis is often an unwise use of valuable planning time.

However, tactical level missions are not always clear and often involve complex enemies and situations. In these situations, the concept of centers of gravity retains its high value to military planners. Modern tactical operations are often extremely complex both in terms of the mission and the enemy. Tactical commanders, especially at the higher levels, are often confronted with unconventional tasks. They may also be asked to defeat an unconventional or unknown enemy. They may be required to conduct operations other than war in which they face multiple forces or no enemy at all. In situations such as these, center of gravity analysis is critical to effective planning.

The preceding discussion demonstrates the value of the concept of centers of gravity to planners at all levels of war. The second portion of this chapter assesses the value of the concept in all types of military operations.

Offensive operations are:

Combat operations designed primarily to destroy the enemy. Offensive operations may be undertaken to secure key or decisive terrain, to deprive the enemy of resources or decisive terrain, to deceive or divert the enemy, to develop intelligence, and to hold the enemy in position. Forms of offensive operations include movement to contact, attack,

exploitation and pursuit. The offensive is undertaken to seize, retain and exploit the initiative.⁷⁰

The concept of centers of gravity is an extremely valuable tool for planners of offensive operations. It allows them to focus combat power, select the optimal method of attack and leverage technological advantages.

Regardless of the level, offensive operations require commanders and planners to focus combat power against the enemy. The concept of centers of gravity facilitates this process. By identifying enemy strengths and their associated vulnerabilities, planners can select objectives for offensive operations. Objectives that are linked to the enemy's strengths provide the greatest effect. Objectives that are vulnerable to friendly attack provide the greatest opportunity for success.

A detailed analysis of the enemy centers of gravity also allows planners to select the optimal method of attack. If the enemy center of gravity is vulnerable to attack and the friendly force is available and the risks acceptable, planners may attack the center of gravity directly. The concept of centers of gravity becomes more valuable when, as usually occurs, this is not the case. When the enemy center of gravity is well protected, or friendly combat power is limited, an indirect approach may be required. A successful indirect attack requires a detailed analysis of centers of gravity and their associated requirements in order to select objectives. Enemy forces can be defeated indirectly only when objectives are clearly linked to correctly identified centers of gravity. Finally, if planners and commanders choose to shock an enemy force, they must understand enemy strengths and how they are supported and maintained. This can only be accomplished through a detailed analysis of centers of gravity.

Still another advantage of centers of gravity to planners is that of leveraging technology. Conventional offensive operations are costly in terms of men and material. U.S. forces possess significant technological advantages over almost all potential adversaries. Based on these facts, loss of life and material costs can often be reduced by maximizing use of technological advantages. This can best be accomplished by determining where to employ these technologies in order to achieve the greatest effects. This can be accomplished by identifying centers of gravity and their supporting requirements and evaluating them in terms of vulnerability to technologies. Often a costly attack against an enemy strength can be averted by applying technology to a vulnerability to achieve the same end result.

Defensive operations are:

Operations conducted with the immediate purpose of causing an enemy attack to fail. Defensive operations also may achieve one or more of the following: gain time; concentrate forces elsewhere; wear down enemy forces as a prelude to offensive operations; and retain tactical, strategic or political objectives.⁷¹

The concept of centers of gravity is of equal value to planners of defensive operations. The concept provides the same advantages regarding focusing combat power and leveraging technology as discussed for offensive operations. Additionally, identifying centers of gravity is essential for defeating stronger enemies, as is usually the case in defensive operations, and protecting friendly assets and capabilities.

The concept allows planners to develop plans to defeat stronger opponents by achieving superiority at critical points. This superiority, while not achievable against the total enemy force, can be achieved against enemy vulnerabilities and against critical

requirements of the enemy force. These requirements and vulnerabilities are determined using the concept of centers of gravity.

Analysis of friendly centers of gravity provides commanders conducting defensive operations a distinct advantage. When fighting a larger enemy, allocation of combat power for force protection is always a challenge. Commanders can use the concept of centers of gravity applied to their own force to determine what things must be protected and where they can accept risk. This technique allows for the maximum amount of combat power to be employed against the enemy.

Stability operations involve:

The application of military power to influence the political and civil environment, to facilitate diplomacy, and to interrupt specified illegal activities. They include both developmental and coercive actions. Developmental actions enhance a government's willingness and ability to care for its people. Coercive actions apply carefully prescribed limited force and the threat of force to achieve objectives. The purposes of stability activities are to: deter or thwart aggression; reassure allies, friendly governments, and agencies; encourage a weak or faltering government; stabilize a restless area; maintain or restore order; and enforce agreements and policies.⁷²

Commanders and planners must modify their approach in two significant ways in order for the concept of centers of gravity to retain its value during stability operations. First, they must adapt the concept to consider all parties involved, and second, they must consider the effects they want to achieve against each entity's center of gravity. With these two modifications the concept remains a valuable tool.

Stability operations are more complex than conventional problems. One major reason for this fact is that there are usually more than two parties involved. A stability operation may involve the separation of two or more factions, the protection of innocent civilians, dealing with NGOs and PVOs, and possibly other forces such as guerrillas or

national police. In cases such as these, the concept of centers of gravity must be applied to all parties. Additionally, commanders and planners must carefully analyze their own force to determine strengths and vulnerabilities that may be different from conventional operations.

The second adaptation required for centers of gravity to remain a valuable planning tool involves desired effects. In a conventional operation, planners develop ways to destroy, defeat or neutralize enemy centers of gravity. In a stability operation, the desired effects may vary greatly for different entities. The center of gravity of a belligerent faction may require destruction or at least neutralization. However, another faction's center of gravity may require strengthening. Still another entity's center of gravity may need to be protected.

In stability operations, the goal is to create a stable environment. Commanders and planners can use the concept of centers of gravity to aid in this process. They must evaluate all parties and carefully consider the effects they want to achieve against each entity's center of gravity in order to balance them. With these modifications, the concept retains its value as a planning tool.

Support operations involve:

Providing essential supplies and services to assist designated groups. They relieve suffering and help civil authorities respond to crises. They include humanitarian assistance and environmental assistance. Humanitarian assistance focuses on the well being of supported peoples. Environmental assistance focuses on the condition of natural environments. The purposes of support activities are to save lives, reduce suffering, recover essential infrastructure, improve quality of life and restore situations to normal.⁷³

The concept of centers of gravity has value to planners of support operations. However, like stability operations, the application requires modification. Commanders

and planners must be willing to accept more ambiguous centers of gravity and desired effects.

Stability operations involve friendly forces, supported forces and an enemy or enemies of some type. The concept allows planners to identify friendly strengths and requirements and protect them. Commanders may identify a positive relationship with the supported community as a center of gravity and take measures to reduce incidents that would damage that relationship.

Supported forces also have a center of gravity. It is usually more ambiguous such as a common culture or a sense of community or even their health. In support operations, planners must develop ways to rebuild the supported entities center of gravity. Therefore, they eliminate things that oppose and restore things that support the center of gravity.

Support operations, by definition preclude a conventional enemy. However, in an abstract sense, things such as hunger or some natural or man-made disaster constitute the enemy in support operations. The concept of centers of gravity is a valuable tool for planners to determine the best way to defeat these "enemies."

The concept of centers of gravity provides planners at all levels of war with a valuable tool. At the strategic level it allows planners to evaluate all elements of national power, defeat enemy aims, protect friendly aims and set the stage for effective operational planning. At the operational level, the concept is a key component of operational design, aids in the focusing of joint combat power and sets the conditions for tactical success. The concept of centers of gravity is also a valuable tool at the tactical level, especially at higher levels and in more complex missions.

The center of gravity concept is also a valuable planning tool in all types of military operations. In offensive operations, the concept allows planners to focus combat power, select the appropriate method of attack and leverage technological advantages. In defensive operations, it allows for focusing combat power, leveraging technologies and also provides an essential tool for planning the defeat of a larger force and protecting critical friendly assets and capabilities. The concept retains its value in stability operations when applied to all entities involved and when desired effects are carefully determined. In support operations, centers of gravity are more ambiguous, but the concept is still valuable when planners use it to evaluate friendly forces, supported groups and "enemies."

Chapter 5

A Proposed Solution

The dilemma regarding the concept of centers of gravity requires resolution. Chapters Two and Three demonstrated the lack of common understanding of the concept and the lack of agreement between joint and service definitions and uses of the concept. Chapter Four, however, showed the immense value of the concept to commanders and planners at all levels of war and in all types of operations if it is commonly understood and clearly defined.

Resolving the problems concerning understanding and definition would allow for full realization of the benefits of the concept. A possible solution to this problem is to develop new terminology, clearly articulate a simple concept for its use, and ensure its compatibility with all four services warfighting doctrine. The following discussion is one way to do so.

The issue with multiple definitions can be resolved in one of two ways. Forcing the services to adopt the joint definition would technically eliminate the problem. However, a better solution would be to clearly define new terms for centers of gravity and their requirements. This would be less directive and would require learning something new versus redefining an existing term which would surely create confusion. This approach would also eliminate the problem of centers of gravity meaning different things to different people. The terms Sources of Power and Vital Components are offered as examples:

Sources of Power - Real or potential strengths that provide a friendly, enemy or neutral entity a means of accomplishing its aim. They exist at all levels of war and apply to all military operations.

Vital Components - Characteristics, capabilities, elements of combat power or locations that are required to support, maintain or establish a source of power. May be strong or weak, well protected or vulnerable.

The term center of gravity should be retained as a theoretical and historical term. It should be studied as required to understand its evolution and to facilitate the application of the new concept. The term Source of Power is intended to replace the term center of Gravity in joint and all service doctrine. However, the term vital components is not intended to replace the terms decisive points, critical requirements, vulnerabilities or any other term.

Once the new terms have been defined, a concept for their application must be clearly and simply articulated. This will allow for universal understanding of the concept. The following is a proposed application of the concept of sources of power and their vital components.

All entities in a military operation have aims or objectives. They have sources of power, or strengths, that provide them the means to accomplish these aims or objectives. These sources of power are supported, maintained or established by vital components. Vital components may be strengths or weaknesses and may be vulnerable or well protected.

Commanders and planners determine the aims or objectives for friendly, enemy and neutral entities involved in a military operation. Based on these aims or objectives, they

identify real or potential sources of power and their associated vital components. Sources of power are prioritized based on their level of value. The goal should be to reduce them to the smallest possible number, ideally to only one. Vital components are further evaluated to determine their degree of vulnerability and their degree of value to their given source of power.

Planners develop plans that accomplish their aims and prevent the enemy from accomplishing his. To do this they must protect friendly sources of power and their vital components. They use the concept of sources of power to allocate resources to force protection, identify and accept risk and determine the appropriate asset to attack an enemy vital component or source of power.

Planners use the concept in offensive and defensive operations to defeat, destroy or neutralize enemy sources of power. They can do this directly by attacking the enemy source of power, or indirectly by attacking one or more vital components required by the source of power. They can also attempt to defeat the enemy through shock by simultaneously attacking multiple vital components and sources of power.

The concept retains its value in stability and support operations. Planners in stability operations use the concept to protect friendly sources of power and to balance the sources of power of belligerent parties to create a stable environment. In support operations, the concept is used to protect friendly sources of power and to restore sources of power of the supported entity. The difference in stability and support operations is one of desired effects in relation to the source of power or vital component.

Additionally, friendly sources of power and vital components may will also be different and vulnerable to different things in these types of operations.

Finally, proper use of the concept of sources of power and vital components ensures linkage with the higher level and facilitates effective operations at the next lower level. For example, effective use of this concept at the operational level will ensure operational goals and objectives are clearly linked to strategic sources of power. Additionally, the concept will ensure that objectives selected for tactical level forces directly support operational goals.

The third part of the solution to this problem is ensuring compatibility with all service warfighting doctrine. This will greatly increase compliance as well as build consensus. The concept of sources of power and vital components accomplishes this goal. The Army could select decisive points from the vital components of a source or sources of power. Navy doctrine could maintain its single center of gravity doctrine by selecting a single source of power instead. The Navy could then select critical vulnerabilities from that source of power's vital components. The Air Force would simply need to replace the term center of gravity with sources of power and accept the existence of vital components. Marine Corps doctrine could be modified by accepting the term sources of power and selecting critical enemy vulnerabilities from vital components. These minor modifications to service terminology would not effect any services' warfighting doctrine.

The dilemma concerning the concept of centers of gravity requires resolution. The concept is of immense value to military planners. The concept should not be abandoned due to lack of common understanding or clear definition. The concept of sources of power and vital components is an example of a solution to this problem. It does so by defining new terms, providing a simple concept for application and requiring no major changes to the way the services fight.

The following examples demonstrate the application of the concept of sources of power and their vital components:

Example 1 - Company team deliberate attack against platoon size defense.

The aim of the company team is to destroy an enemy platoon in a prepared defense. The friendly source of power, or that strength that provides the means of accomplishing the aim, is the assault platoon. The friendly vital components that are required by the assault platoon are the Support Platoon, Breach Platoon, and Company Mortars. The enemy platoon's aim is to block a key intersection. The enemy source of power in this example is the key terrain that affords him the ability to defend the intersection. The vital components that are required to establish that key terrain as the source of power are AT weapons, obstacles and observation. In this example, the company team commander could conduct a successful attack by suppressing enemy AT weapons, using smoke to negate the enemy advantage of observation and breach his obstacles. Simultaneously, he would protect his source of power, the assault platoon, until the critical point in the fight. Having weakened the enemy source of power and protected his own, he has set the conditions for a successful attack and the destruction of the enemy platoon.

Example 2 - Division defense against enemy corps.

The division's aim in this example is to block penetration by an MRR or larger force of a designated no penetration line. The friendly source of power is the main effort brigade. The vital components required by the main effort brigade are the supporting effort brigade, division fires, the reserve, C2, CAS, LOG support, and the obstacle plan. The enemy aim is to seize key terrain in the rear of the division. The enemy source of

power is his second echelon divisions. Vital components required to establish these divisions as the source of power include the first echelon divisions, the CRAG and CAG, engineer assets, and fuel assets. In order to design an effective defense, the division commander must synchronize the effects of his own vital components to realize the maximum combat power of his source of power, the main effort brigade. Simultaneously, he must eliminate or attrit the enemy's vital components, thereby weakening the enemy source of power, and enabling it to be defeated by his main effort brigade.

Example 3 - JTF conducting stability operation

This example demonstrates the concept as it is applied in a stability operation involving a JTF and two belligerents. The friendly aim is to create a stable environment to allow implementation of a peace agreement. The JTF sources of power in this example are maintaining neutrality and the existence of a credible coercive force. The vital components required by these sources of power are impartiality, the coalition, Civil Affairs assets, US public support, and the ability to conduct punitive air strikes. Because the source of power of maintaining neutrality is less concrete than previous examples, the vital components that support it are also more ambiguous. Belligerent Alpha has the aim of autonomy. Belligerent Alpha has two sources of power to accomplish this aim. One is its guerrilla forces and the other is international support for its cause in relation to belligerent Bravo. Belligerent Alpha needs the following vital components to sustain its sources of power; safe havens, the support of the local population, a supply of arms and ammunition, and the perception of non aggression by the international community. Belligerent Bravo's aim is to retain control of the disputed region. Its sources of power are its national identity and its leader. These sources of power are supported by vital components that

include; the military, the national police, its air defense systems, and the support of key allies.

In this example, the goal of the JTF is to balance the sources of power of the belligerents to create stability. To do this, the commander must protect his own sources of power and vital components while strengthening, weakening or eliminating those of the two belligerents to ensure that one side does not gain a real or perceived advantage.

Example 4 - Brigade conducting support operation (CONUS).

The aim of the brigade conducting this hypothetical support operation in the continental United States is to eliminate suffering. The brigade's source of power is its positive relationship with the supported community. The vital components required to sustain this source of power are CA assets, military police, water purification assets, the ability to distribute food, and the ability to maintain order. The supported group, the community, also has an aim. In this case it is a return to their normal lifestyle. The source of power that will enable the realization of the aim is the sense of community. Prior to the disaster, this source of power was generated by the following vital components; schools, churches, local police, sanitation, water sources, and hospitals. The brigade in this example must protect its source of power and vital components and rebuild the supported group's in order to be successful.

Illustrations of the Sources of Power and Vital Component concept are provided at Appendix A.

Chapter Six

Conclusion

The concept of centers of gravity is not commonly understood nor is it clearly defined. However, the concept has enormous value to planners when these problems are rectified. Therefore, every effort should be made to realize the benefits of the concept by correcting the sources of confusion surrounding the concept. This could be accomplished, as demonstrated in Chapter Four, by simply providing a clear understanding of which concept is being used and then clearly defining it.

The concept of centers of gravity suffers greatly from lack of common understanding. This is due to the fact that the concept has evolved greatly from its origination with Clausewitz to its current state in joint doctrine. The confusion results, not from the inability to understand a given application of the concept, but rather from the fact that there are multiple valid concepts in existence. While the term center of gravity evokes images of Clausewitz to one person, it is just as likely to draw another planner to Warden and still another towards current joint doctrine.

The confusion surrounding centers of gravity is compounded by joint and service doctrine. While joint doctrine clearly defines center of gravity, it does not clearly explain its application. Service doctrine does not mirror joint doctrine regarding the concept. Additionally, the individual service applications vary greatly. While the Air Force corresponds almost exactly with the joint concept of centers of gravity, the Marine Corps uses an entirely different concept.

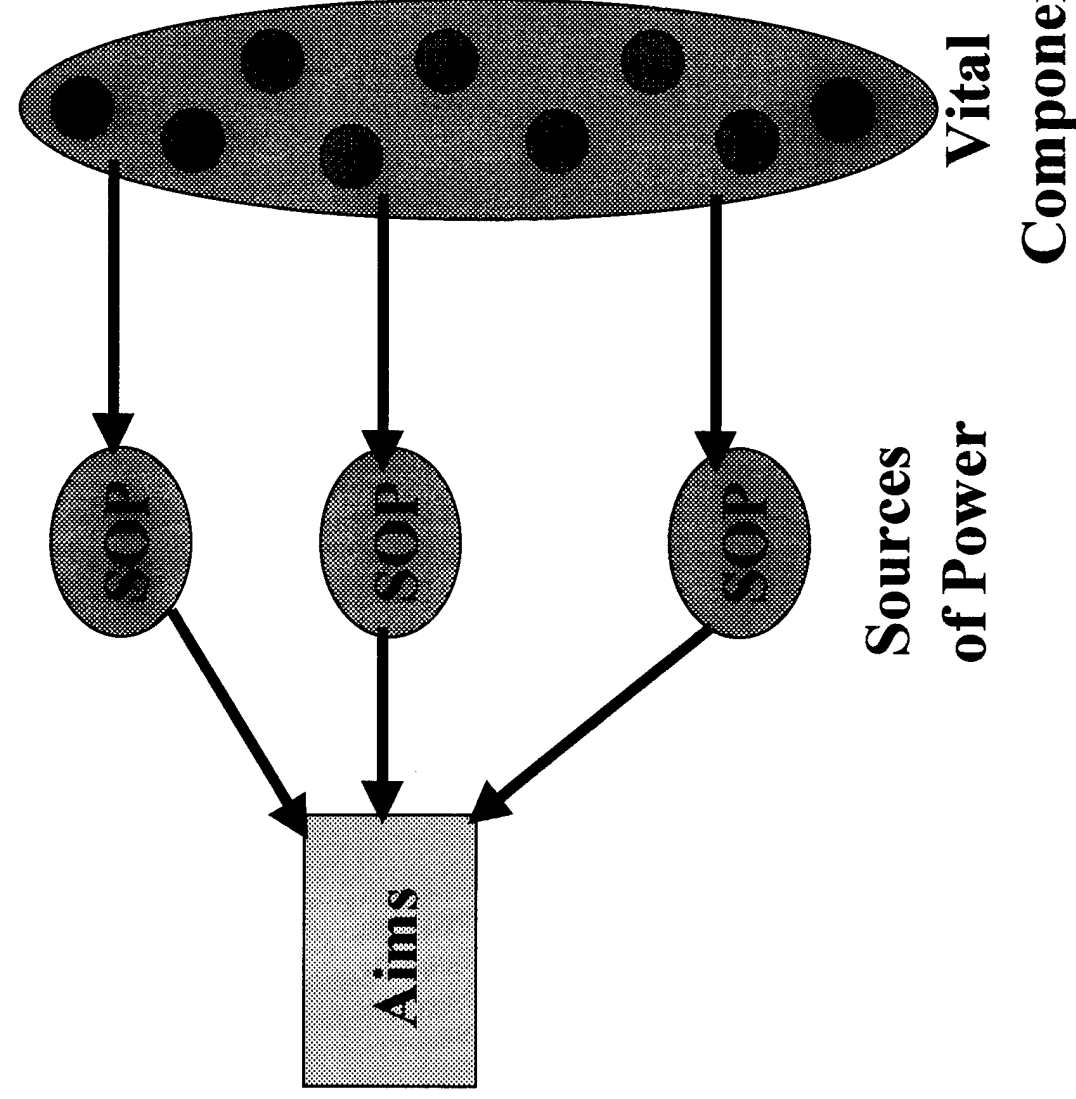
Despite these problems, the concept of centers of gravity should not be abandoned. It has the potential to provide military planners with a valuable tool. It is relevant at all levels of war and in all types of military operations. If the concept is clearly defined and its application is clearly articulated and understood, military planners will realize the full potential of centers of gravity as a planning tool.

This must be done at the joint level and done so in a manner that builds consensus across the services. The concept of sources of power and their vital components is intended to demonstrate one possible solution to this dilemma. The ideal solution for this problem will only be resolved by a determined effort involving the entire joint warfighting community.

Appendix A

Sources of Power and Vital Components

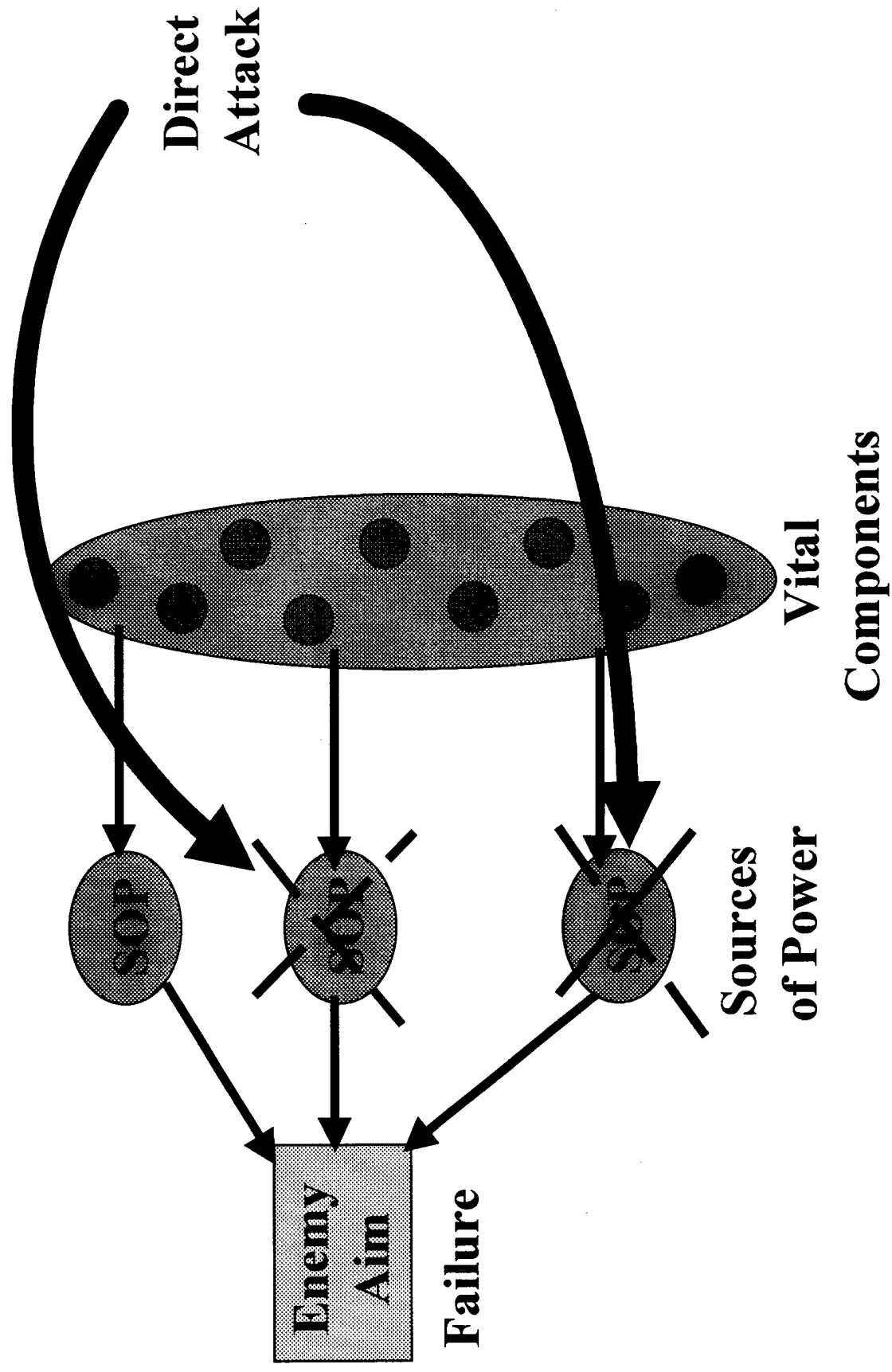
Sources of Power and Vital Components



Sources of Power - Real or potential strengths that provide a friendly, enemy, or neutral entity a means of accomplishing its aim.

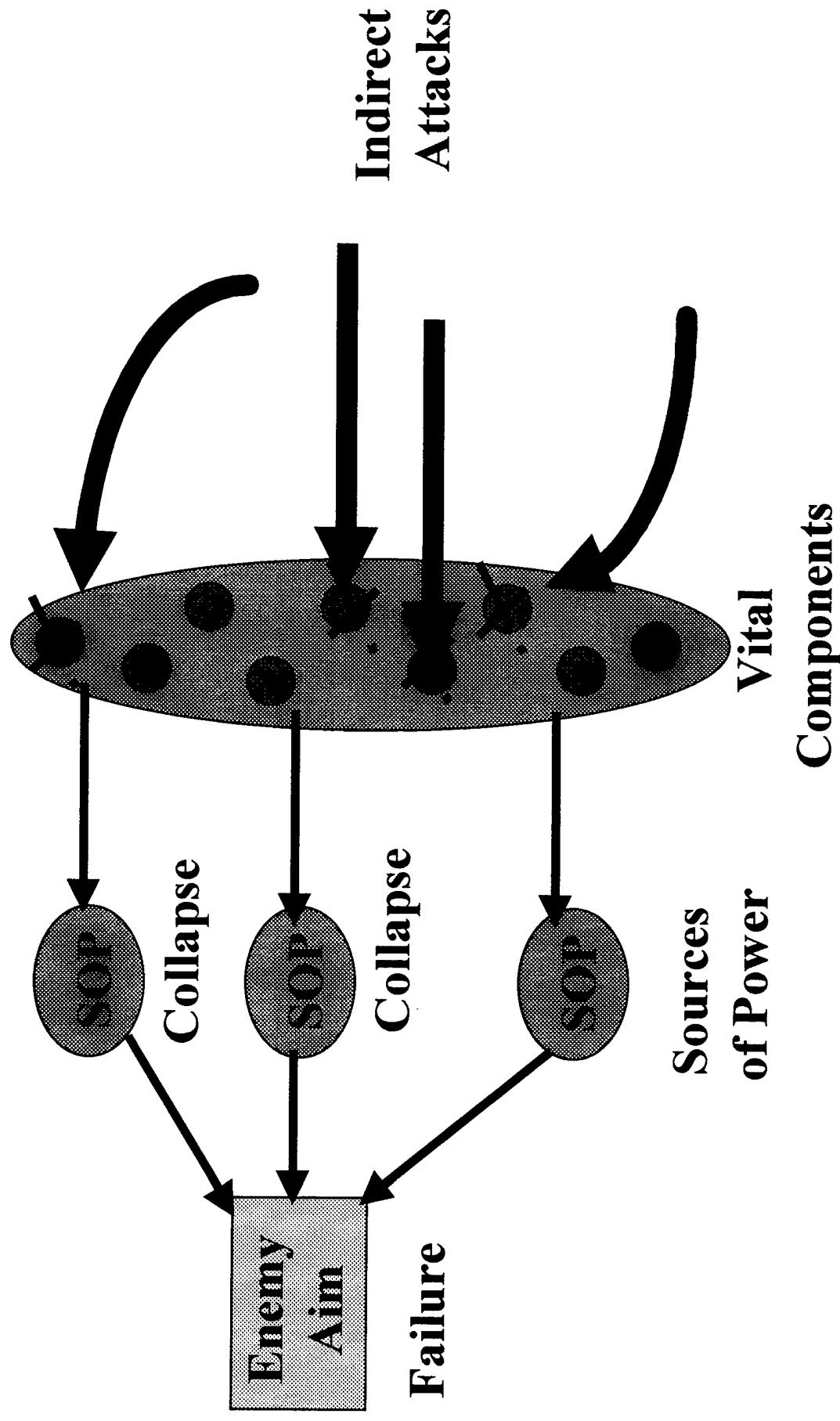
Vital Components - Characteristics, capabilities, elements of combat power or locations that are required to support, maintain, or establish a source of power.

Direct Attack Against Sources of Power

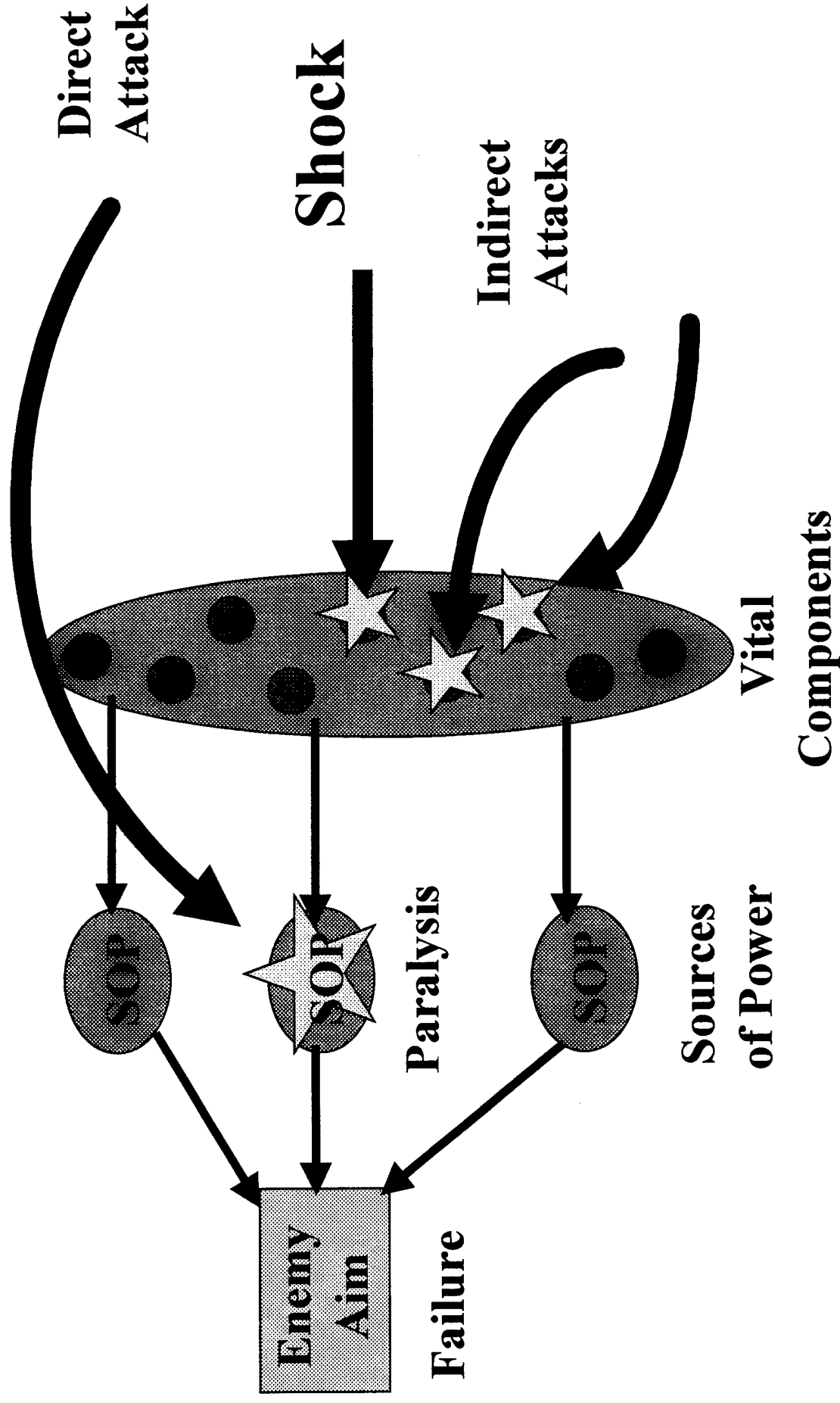


Indirect Attack Against Sources of Power

By Attacking Vital Components



Shocking Sources of Power and Vital Components



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- ¹ Joe Strange, Centers of Gravity and Critical Vulnerabilities. (Quantico, VA: Marine Corps University, 1996), 14.
- ² Carl von Clausewitz, On War. (Edited and translated by Michael Howard and Peter Paret. Princeton, New Jersey: Princeton University Press, 1976), 99.
- ³ Ibid., 485.
- ⁴ Ibid.
- ⁵ Ibid., 596.
- ⁶ Ibid., 633.
- ⁷ Ibid., 485.
- ⁸ Ibid., 596.
- ⁹ Ibid., 487.
- ¹⁰ Ibid., 595-6.
- ¹¹ Ibid., 597.
- ¹² Ibid., 486.
- ¹³ Ibid., 619.
- ¹⁴ Ibid., 617.
- ¹⁵ Ibid., 625.
- ¹⁶ Antoine Henri Jomini, The Art of War. (Edited by J.D. Hittle in Roots of Strategy, Book 2. Harrisburg, PA: Stackpole Books, 1987), 461.
- ¹⁷ Ibid., 489.
- ¹⁸ James J. Schneider and Lawrence L. Izzo. "Clausewitz's Elusive Center of Gravity." (*Parameters* XVIII, no. 3, September 1987) : 51.
- ¹⁹ B.H. Liddell Hart, Strategy. (2d ed., New York: Penguin, 1991), 334-337.
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- ²¹ COL. John A. Warden, "The Enemy As A System," (*Airpower Journal*, Spring 1995) : 42.
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- ²⁷ Wayne M. Hall, "Reflections on 21st Century Information Operations," (Unpublished Paper, 2 January 1999) : 9.
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- ³¹ Ibid.
- ³² Strange, 95.
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- ³⁴ Ibid., III-20.
- ³⁵ Ibid., III-21.
- ³⁶ Strange, 100-101.
- ³⁷ Department of the Army. Field Manual 100-5: Operations. (Washington, DC: Headquarters, Department of the Army, May 1986), 10.
- ³⁸ Ibid., 179.
- ³⁹ Ibid.
- ⁴⁰ Ibid., 179-180.

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- ⁴¹ Department of the Army. Field Manual 100-5: Operations. (Washington, DC: Headquarters, Department of the Army, June 1993), G-1.
- ⁴² Ibid., 6-7.
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- ⁴⁴ Ibid.
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- ⁵⁰ Ibid., 37.
- ⁵¹ United States Air Force. Air Force Doctrine Document 1, Air Force Basic Doctrine. (Washington, DC: United States Government Printing Office, September, 1997), 79.
- ⁵² United States Air Force. Air Force Doctrine Document 2, Organization and Employment of Aerospace Power. (Washington, DC: United States Government Printing Office, September, 1998), 126.
- ⁵³ AFDD 1, 25.
- ⁵⁴ Ibid., 51.
- ⁵⁵ United States Marine Corps. FMFM 1, Warfighting. (Washington, DC: United States Government Printing Office, 20 June 1997), footnote 28, 85.
- ⁵⁶ Ibid., 35.
- ⁵⁷ Ibid., 36.
- ⁵⁸ JP 1-02, 72.
- ⁵⁹ FM 100-5, 1993, G-1.
- ⁶⁰ NDP 1, 72.
- ⁶¹ AFDD 1, 79.
- ⁶² FMFM1, 47.
- ⁶³ M. Mitchell Waldrop, Complexity: The Emerging Science on the Edge of Order and Chaos. (New York: Simon and Schuster, 1993), 11.
- ⁶⁴ JP 1-02, 428.
- ⁶⁵ William W. Mendel and Lamar Tooke, "Operational Logic: Selecting the Center of Gravity." (*Military Review* 73, no. 6, June 1993) : 3.
- ⁶⁶ JP 1-02, 326.
- ⁶⁷ Ibid., 325.
- ⁶⁸ William W. Mendel, "The Campaign Planning Process," (U.S. Army War College, 1988) : 8.
- ⁶⁹ JP 1-02, 443.
- ⁷⁰ FM 101-5-1, 1-113.
- ⁷¹ Ibid., 1-48.
- ⁷² This definition was taken from a draft of FM 100-5 provided for review and later disapproved. At the time of this writing, this definition is planned for inclusion in the final FM 100-5.
- ⁷³ Same as above.

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