Marine Corps University
Perspectives on Warfighting
Number Four
Second Edition

CENTERS OF GRAVITY & CRITICAL VULNERABILITIES:

Building on the Clausewitzian Foundation So That We Can All Speak the Same Language

by

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Editorial Policy
Perspectives on Warfighting

The Marine Corps University's *Perspectives on Warfighting* is a series of occasional papers, edited by the Marine Corps University, and normally funded (*) by the Marine Corps University Foundation, and published (*) by the Marine Corps Association.

Funding and publication are available to scholars whose proposals are accepted on the basis of their scholastic and experiential backgrounds as well as fulfillment of our editorial policy requirements. We require: (1) a focus on warfighting; (2) relevance to the combat mission of the Marine Corps; (3) a basis of combat history; and, (4) a high standard of scholarly research and writing.

The Marine Corps University's *Perspectives on Warfighting* are studies of the art of war. History is the basis for the study of war. It is through such study that we may deduce our tactics, operational art, and strategy for the future. Though the basis of the series *Perspectives on Warfighting* is history, they are not papers about history. They are papers about warfare. By study, discussion, and application, we shall learn to fight and win our nation's battles and wars.

(*) Second Edition
Funding and Printing

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Introduction

In line with the increased emphasis by the Chairman of the Joint Chiefs of Staff on the warfighting and ***employment*** aspects of campaign planning, combatant commanders are now required to specify in JSCP directed OPLANS how they intend to fight their forces. Additionally, the Chairman has directed that certain campaign plan elements be incorporated into the CINCs' deliberate plans. These elements include phasing of operations; ***strategic and operational centers of gravity, both friendly and enemy***; and, the commander's overall intent as well as intent by phase. Inclusion of these elements not only provides the National Command Authorities a basis to establish intertheater priorities, but more importantly, these elements provide a focus to the planners and warfighters responsible for coordinating multiple operations into a single campaign and then executing that campaign.

Effective preparation and execution of war plans require that Joint planners share and apply a common mature understanding of the **relationship** between centers of gravity and critical vulnerabilities. A solid grasp of this relationship is essential to the art of war. Despite the importance of these terms, current Joint and Service doctrinal manuals and publications still reflect divergent interpretations. Moreover, the base-line definition of centers of gravity proscribed in Joint Pub 3-0 is flawed to begin with, in that it is at odds with Clausewitz and the commonly understood meaning of the term. For example, according to the Joint Pub definition, neither Saddam Hussein nor the Republican Guard would be considered Iraqi centers of gravity during the recent Persian Gulf War.

This monograph by Dr. Joe Strange of the Marine Corps War College is a welcome step toward solving these challenges. Dr. Strange contends that we should retain the current concept of critical vulnerabilities, but should return to the original

Clausewitzian concept of centers of gravity, and that Joint Pub 3-0 should be revised accordingly. It also introduces two new conceptual terms, "critical capabilities" and "critical requirements". These latter terms bridge the gap and explain the relationship between centers of gravity and critical vulnerabilities, and provide Service and Joint planners a logical and useful aid in designing OPLANS to protect friendly sources of power while facilitating the defeat of the enemy's sources of strength.

Building upon the traditional Clausewitzian concept of centers of gravity, Dr. Strange clarifies the concept and relationship between centers of gravity and critical vulnerabilities. He does so without corrupting the genuine good sense and wisdom found in each of the current Joint and Service manuals regarding defeating the enemy at the strategic, operational, and tactical levels of war. His clear and compelling discussion of this critical concept merits serious consideration by those responsible for clarity of thought as well as unity of effort in the development and execution of "war" plans.

Second Edition

Foreword

Since its initial printing over a year ago, Dr. Strange's monograph on centers of gravity and critical vulnerabilities has stimulated the study and discussion of this important subject throughout the Marine Corps. Dr. Strange's analytical construct has been incorporated into the Marine Air-Ground Task Force Staff Training Program course provided to Marine Expeditionary Force headquarters staffs, and into draft Marine Corps doctrine. This fall it is being introduced into the curriculum of the Navy-Marine Corps Intelligence School. A significant portion of the work's recent demand also comes from professional military education activities outside the Marine Corps.

Readers at the tactical and operational levels will recognize the monograph's value as they identify an adversary's centers of gravity and critical vulnerabilities while seeking to apply their friendly centers of gravity against those vulnerabilities. The analytical construct supports and is supported by Marine Corps Doctrinal Publication 1, *Warfighting*, which captures how Marines think about conducting war.

The monograph also offers a construct for analyzing decision making at the highest levels of national strategy. The ability to assess a strategic environment and understand why some decisions were correct while others led to disaster is a useful tool for the study of history. Through this study, winning and losing patterns emerge, patterns that today's decision makers can use to the benefit of their country and its security.

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President, Marine Corps University

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Clarification, Minor Changes and Elaboration to the First Edition

(#1)

Think:

NOUN
Center of Gravity

VERB
Critical Capability

NOUN (and verb)[1]
Critical Requirement

NOUN (and verb)[2]
Critical Vulnerability

[1] See immediately below (#2) and (#3).
[2] See immediately below (#2) and (#3).

(#2)

I propose the following

Minor *Modifications* of Definitions

for your consideration:

(Definitions on pages 43 and 64 ONLY have been changed accordingly.)

Centers of Gravity:

Primary sources of moral or physical strength, power and resistance. (Minor change)

Critical Capabilities:

Primary abilities which merits a Center of Gravity to be identified as such in the context of a given scenario, situation or mission. (Major minor change) (See discussion below.)

Critical Requirements:

Essential conditions, resources and means for a critical capability to be fully operative. (No change)

Critical Vulnerabilities:

Critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive results – *the smaller the resources and effort applied and the smaller the risk and cost, the better.* (Minor change) (See footnote 3, page 43.)

Discussion of Critical Capabilities (See also #3 below):

An enemy center of gravity (CG) has the moral or physical ability to prevent friendly mission accomplishment. The critical abilities or capabilities which we ascribe to a given CG answer the question: "Why are we afraid of or concerned about that particular entity?" Every answer to this question is **contextual** – that is, it is based on the context of a particular situation or mission. Therefore, I would suggest that we should step beyond the generic

"look, move, shoot and communicate" capabilities which are common to most military forces/units, and ask the $64,000-question: "Precisely what is it that a particular enemy force (moral or physical) can do to us to prevent us from accomplishing our mission in this particular situation/context? What particular capabilities are we especially concerned about?"

I thought about this recently while preparing for a class on "Centers of Gravity, Critical Vulnerabilities and the British-Canadian Raid on Dieppe in August 1942" conducted this month at the USMC Command and Control Systems School. I believe that we should zero in on those particularly 'attention-grabbing' or 'show-stopping' critical capabilities which, if allowed to be fully (or even partially) functional, will "eat the lunch" or "tear the heart out" of relevant friendly centers of gravity. I also suggest that we should describe said critical capabilities in language more specific than "move, shoot and communicate".

The table on the next page depicts the main critical capability and some supporting critical requirements for one of the German (tactical) centers of gravity capable of preventing the British and Canadians from achieving mission success in their raid on Dieppe on 19 August 1942. Your first thought about "**Generate & Direct Murderous Enfilade Fire on the Main Beach**" might be: 'That is nothing more than a mission statement for those defenders – that is their job, that is why they were put there.' BINGO! That is precisely why they were put there and why their commander(s) gave them the resources (bunkers, guns, etc.) to ensure that they would be able (have the capability) to do just that. (If it is just that easy to conceptualize and articulate an attention-grabbing, show-stopping critical capability, why make it more difficult?)

Copies of (just) this monograph can be obtained by contacting the author directly by phone (commercial 703-784-4082, DSN 278-4082). Or by letter: Marine Corps War College; ATTN: Dr. Joe Strange; 2076 South Street; MCCDC; Quantico, VA 22134-5067. Or by email: "strangejl@tecom.usmc.mil".

DIEPPE

19 August 1942

One of the German (Tactical) Centers of Gravity and its "attention-grabbing" or "show-stopping" Critical Capability

CENTER of GRAVITY	CRITICAL CAPABILITY	CRITICAL REQUIREMENTS
Dieppe Headlands **Defenders** manning strong defenses	**Generate & Direct Murderous Enfilade Fire on the Main Beach.** KILL, DISRUPT & DELAY the main Assault Forces. SHOOT	Sufficient Advance Warning. Assault troops stalled in Beach Kill Zones by Wire Obstacles. Observable fields of fire. Preregistered fields of fire. Plenty of ammunition.
		Survive & Stay focused. Lack of effective interference by enemy supporting forces: ✓ Air. ✓ Naval Gun Fire. ✓ Parachute Forces. ✓ Tanks Landed on the Main Beach. Protected fire positions. Steady troops. ✓ No Threats to their Rear from Flank Assault Forces.

The best book on the Dieppe raid remains Dieppe – The Shame and the Glory by Terence Robertson.

(#3)

Based on (#2)
I would recommend making a sharper distinction between Critical Capabilities and Critical Requirements within the context of specific situations and missions.

If we were to focus on just those 'attention-grabbing' or 'show-stopping' critical capabilities as discussed in (#2), then what about those generic capabilities under the broad umbrella of "see, move, shoot and communicate" which do not make the cut? My suggestion is that the latter be listed instead under the critical requirements column. For example, regarding the table on the previous page, you will note that just below the dotted line under CRs is listed "Survive and Stay Focused". That is a *condition* for the CG to remain effective, for it to be able to perform effectively its "attention-grabbing," "show-stopping" critical capability of raking the main assault beach with murderous enfilade fire.

Another example relates to a Canadian center of gravity for the Dieppe raid – the assault battalions of the 2nd Canadian Infantry Division. The 2nd Division did not possess the organic intelligence assets and staff capable of "looking" across the English Channel and collecting and interpreting the data available on the German garrison and defences. That intelligence mission was accomplished at a higher echelon of command, i.e., it was done for them (more or less) by somebody else. Nevertheless, adequate intelligence and the professional interpretation thereof (by whomever) was a critical requirement for mission accomplishment. Also, the 2nd Division could not transport itself across the English Channel; some other military organization/command provided the necessary assault ships and landing craft. "Look" and "move" (across the Channel) are verbs, but they did not reflect capabilities inherent within the 2nd Division.

But even if a reinforced, super division did have the assets to do those things by itself, do "look" and "move" (across the Channel) qualify as "attention-grabbing," "show-stopping," "eat-your-lunch" and "rip-your-heart-out" critical capabilities in the context of the Dieppe raid and mission – in the eyes of the German commander at Dieppe? If you believe they do (or did), then fine; get on with the CG-CC-CR-CV analysis. But if you believe they do (or did) not so qualify, those verbs still have to be performed effectively; in which case we can move them right on over into the CR column.

Finally, "look/examine" and "move" in this context are *"preconditions"* which must pertain before the 2nd Division's assault battalions (which they called regiments) can bring their own "attention-grabbing" critical capability into play. And **that critical capability was** "overwhelm enemy coastal defenders by the application of superior combat power via small arms fire and cold steel (the knife) in hand-to-hand combat" – by direct assault and maneuver from the sea where possible and necessary, and by expeditious maneuver from landing beaches to inland defenses and forces where necessary.

And that leads to (#4).

(#4)

Do not overlook "Conditions" as candidates for Critical Requirements.

The two infantry battalions (regiments) assaulting the main beach at Dieppe at 0520 relied heavily on supporting units also accomplishing their missions. Successful mission accomplishment by some minimum combination of these other units was considered to be a *condition* critical to the ability of the two battalions assaulting the main beach (just 30 minutes after the flank landings a mile or so distant!) to accomplish their mission:

CENTER OF GRAVITY	CONDITIONS CONSIDERED TO BE CRITICAL REQUIREMENTS
Two Battalions **Assaulting the Main Dieppe Beach**	Mission accomplishment of Bn landing at **Blue Beach (to the east)** **Mission accomplishment of Bn landing at Green Beach (to the west)** **Mission accomplishment of two Squadrons of Hurricane Close Support aircraft** strafing the Dieppe Sea Front defenses.
CRITICAL CAPABILITY	
Overwhelm enemy defenders by superior combat power via small arms fire and **cold steel in hand-to-hand combat.**	Ability of supporting Destroyers to keep down fire from the East and West Headlands defenses (overlooking the main beach) until flanking assault Bns overrun them from the rear. Ability of combat engineers to clear lanes through the barbed wire obstacles. Timely landing of supporting Tanks. Ability of those tanks to get off the beach.

A lot of disparate things – all important for mission accomplishment – fall under the category of "conditions" or "preconditions". List under the CR column everything you can think of. **The longer the list, the greater the number of potential candidates for critical vulnerabilities.**

(#5)

Centers of Gravity offer physical and moral resistance. Therefore, *Harvey* is the gang's center of gravity.

(See below, Chapter 3)

The concept of centers of gravity is greatly simplified when one considers for that distinction only candidates/entities that offer moral or physical resistance to a given course of action. Therefore, both the Army armor officer (for the wrong reason) and the SAMS graduate correctly identified Harvey as the gang's center of gravity. Harvey is neither a characteristic nor a capability; nor is he a locality. Harvey is a man – a moral and a physical force. True, Harvey possesses physical characteristics which give him an impressive capability (to knock somebody's teeth in – or out); and it is this capability which underlies his moral position within the gang. The reference to Clausewitz by the SAMS graduate is a bit imprecise in that Clausewitz clearly allowed for multiple centers of gravity and advised that they should be traced back to a single center of gravity **IF POSSIBLE**. (See below, Chapter 2, page 11.)

The Army infantry officer is clearly wrong. Harvey's "testicles" is a critical vulnerability if there ever was one. The definition given by that officer for a center of gravity applies instead to critical requirements and critical vulnerabilities. The Air Force officer initially appeared to realize that Harvey was the gang's CG, but then he jumped the rails when he advised how to attack Harvey's "four centers of gravity" – which are instead some of Harvey's critical requirements (eyes, ears, knees and an in-tact skull housing his brain). The Marine officer (as per FMFM 1 at that time) simply ignored the concept of center of gravity and spoke instead of seeking a critical vulnerability. The Navy officer's remarks were not directly germane to the CG-CV concept.

(#6)
"Strong-willed people."

The "will of the people" can be strong, weak, or in between. The "will of the people" can therefore be either a CG or a CV, or neither. Even if popular will is not exceptionally strong, it may be strong enough – in which case it can be viewed as a critical requirement. Consider, for example, the statement: "As long as popular support for our course of action remains at the 50% level, we can stay the course; but if it falls much below that level we are in deep trouble." The speaker is thinking of the 50% level as a minimum critical requirement, not as a source of great strength.

(#7)
It is what the Capital *contains*.

When Clausewitz wrote "Capital" (see below, Chapter 2, page 7), he was referring to "the center of administration" and also the hub of a nation's "social, professional and political activity." If the government (the leaders and bureaucrats) and the social and professional elites are able to flee the capital (before an enemy captures it) and function effectively elsewhere, then it is they – not the city – which is the true center of gravity. The phrase "function effectively elsewhere" is the key; a judgment reserved for the people of that country, not the enemy. Why hang one's hat on capturing the enemy's capital, if by that point it is likely to have lost all meaningful value and significance in anyone's eyes other than those of the captor? Just a thought.

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Marine Corps University
September 1997

Chapter 1

The Problem and The Solution
–
A Brief Summary Introduction

The Problem quite simply is the considerable confusion regarding concepts and definitions of "centers of gravity" (CGs) and "critical vulnerabilities" (CVs) which exists in the current array of Joint and Service doctrinal manuals/publications. This is a self-inflicted wound on the DOD community writ large. To begin with, the current Joint/Service definition is a remarkably curious and confusing oddity. By stipulating that centers of gravity are **not** moral or physical forces themselves, but only the "characteristics, capabilities, or locations" which contribute to their effectiveness,[1] the definition is at odds with both Clausewitz and the commonly understood meaning of the term. This means that Saddam Hussein and the Republican Guard; Ho Chi Minh and the North Vietnamese Regular Army; Emperor Hirohito, Admiral Isoroku Yamamoto, and the Imperial Japanese Navy; and General Robert E. Lee and the Army of Northern Virginia were **not** moral and physical centers of gravity. This would be news to Generals Norman Schwarzkopf, Colin Powell, William Westmoreland, Douglas MacArthur, and Ulysses S. Grant, and to the authors of a few hundred classics on modern military history. This alone is reason enough to modify the current Joint/Service definition.

This confusion is further exacerbated by FMFM 1 Warfighting, which has turned the Clausewitzian definition of

[1] Joint Pub 3-0, Doctrine for Joint Operations, 1 February 1995, p III-20; and Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, 23 March 1994, p 63.

centers of gravity inside-out: "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." [1] So, CGs are not sources of strength but are **instead** critical weaknesses? FMFM 1 is not alone. Naval Doctrine Publication 1 - Naval Warfare explains that while a center of gravity is a source of strength it is "not necessarily strong or a strength in itself." It states for example that "a lengthy resupply line supporting forces engaged at a distance from the home front could be an enemy's center of gravity." [2] (Far more often than not in military history long supply lines have been major weaknesses contributing to failure and defeat.) So, CGs are sources of strength which **may also be** critical weaknesses?

These are but three examples of the confusion on this fundamentally important concept which the array of current Joint and Service doctrine has generated – a confusion which cannot help but inhibit precision of thought and clarity of communication at all levels of war throughout the DOD community.

The Solution is simple. We should as a minimum return to the Clausewitzian meaning of centers of gravity as moral and physical sources of strength, while simultaneously retaining the concept of "critical vulnerabilities" as critical weaknesses as explained in USMC FMFM 1, Warfighting, without of course the infamous footnote 28.[3] Beyond that, we should also incorporate into Joint/Service doctrine two new conceptual terms – "critical capabilities" (CCs) and "critical requirements" (CRs) – which bridge the gap and explain the relationship between centers of gravity and critical vulnerabilities. Chapter 4 offers the following definitions and fully explains the CG-CC-CR-CV concept:

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[1] FMFM 1 Warfighting (Washington DC: Dept of the Navy, HQUSMC, 6 March 1989), footnote 28, p 85 (referring to page 36 in the text).

[2] Naval Doctrine Publication 1 - Naval Warfare, 28 March 1994, p 72.

[3] FMFM 1 Warfighting (Washington, DC: Dept of the Navy, HQUSMC, 6 March 1989) – footnote 28 on p 85 refers to pages 35-36 in the text. (See below chapter 3 page 37, and chapter 5 pages 130 and 136.)

Centers of Gravity:

Primary sources of moral or physical strength, power and resistance.

Critical Capabilities:

Primary abilities which merits a Center of Gravity to be identified as such in the context of a given scenario, situation or mission.

Critical Requirements:

Essential conditions, resources and means for a critical capability to be fully operative.

Critical Vulnerabilities:

Critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive results – the smaller the resources and effort applied and the smaller the risk and cost, the better.

When we reinvent the definition of centers of gravity, what are we to do with the thousand or so books on military history written during the 20th Century – books which fill our military libraries and support a great deal of our Professional Military Education curricula? We can't rewrite even one single page dealing with strategy, operations and centers of gravity so as to make it harmonize with the latest doctrinal notion. **What we can do, however, is build on the traditional concept of centers of gravity, instead of destroying it.** The CG-CC-CR-CV concept does just that. Chapter 5 suggests how our current Joint/Service manuals/publications could be revised accordingly.

Best of all, the CG-CC-CR-CV concept does not challenge any existing Joint or Service warfighting philosophy, whether it be 'maneuver warfare' or anything else. It requires only a few simple but important changes in vocabulary and definitions. And as we continue to formulate strategy and conduct operations consistent

with the sound warfighting advice found in **all** of the current Joint and Service doctrine manuals and publications, when it comes to centers of gravity and critical vulnerabilities it asks only **that all of us speak the same language regardless of Service and regardless of level of war.**

Chapter 2

What Did Clausewitz mean by "Center(s) of Gravity"?

Popularity and Validity of Clausewitz' On War

Despite premature[1] epitaphs by Martin Van Creveld, John Keegan and others, the popularity and perceived relevance of On War and the Clausewitzian theory of war remains huge within the American DOD/National Security community – among academics and practitioners alike. The Clausewitzian theory of the dynamics of war remains valid in spite of dizzying technological and political changes of the late 20th Century. While the "character" or "form" of war has changed from age to age and war to war, the "nature" of war remains immutable. On War is about the nature of war; it is about timeless concepts such as the "political purpose of war," "opposing dynamic wills," "the fog and friction of war," and "centers of gravity".

On the following page we will begin our analysis of the Clausewitzian concept of centers of gravity by reviewing what Clausewitz said in his own words.

[1] and mistaken

Passages on *Strategic* "Centers of Gravity" from On War [1]

The Armed Forces, the Country, and Will

"Later ... we shall investigate in greater detail what is meant by *disarming* a country. But we should at once distinguish between three things, three broad objectives, which between them cover everything: the *armed forces*, the *country*, and the *enemy's will*.

"The fighting forces must be *destroyed*: that is they must be put ***in such a condition that they can no longer carry on the fight***. ...

"The country must be occupied; otherwise the enemy could raise fresh military forces. [In another passage, Clausewitz defined 'Country' as a country's 'physical features and population' – 'the source of all armed forces proper'. See On War, p 79.]

"Yet both these things may be done and the war, that is the animosity and the reciprocal effects of hostile elements, cannot be considered to have ended so long as the enemy's *will* has not been broken: in other words, so long as the enemy government and its allies have not been driven to ask for peace, or the population made to submit." [2]

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[1] Carl von Clausewitz, On War (Howard-Paret paper edition, Princeton Univ. Press, 1976). Hereinafter cited as On War.

[2] On War, p 90. (Emphasis in the original.)

Moral Factors and Will

"...[T]he moral elements are the most important in war. They constitute the spirit that permeates war as a whole, and at an early stage they establish a close affinity with the will that moves and leads the whole mass of force, practically merging with it, since the will is itself a moral quality....

"The spirit and other moral qualities of an army, a general or a government, the temper of the population of the theater of war, the moral effects of victory or defeat – all these vary greatly....

"History provides the strongest proof of the importance of moral factors and their often incredible effect: ..." [1]

The Army, the Capital, and Allies

"Basing our comments on general experience, the acts we consider most important for the defeat of the enemy are the following:

1. Destruction of his army, if it is at all significant. [See also On War, p 624.]

2. Seizure of his capital, if it is not only the center of administration but also that of social, professional, and political activity.

3. Delivery of an effective blow against his principal ally if that ally is more powerful than he." [2]

---

[1] On War, pp 184-185.

[2] On War, p 596.

"Mass" as a Center of Gravity

In chapter twenty-seven of Book six in On War, Clausewitz discussed the concept of "a center of gravity" in a section dealing with "general reasons for dividing one's forces" while on the defensive.[1] Clausewitz reminded his readers that in principle as much of the national army as possible should be concentrated for the purpose of fighting and winning a single decisive battle. But he quickly added that the practical application of this principle requires 'ideal' circumstances which do not often exist.

> "Only in the case of small and compact states is such a concentration of force possible and probable that its defeat will decide everything. If the area involved is very large and the frontier long, or if one is surrounded on all sides by a powerful alliance of enemies, such a concentration is a practicable impossibility. A division of forces then becomes inevitable, and with it, several theaters of operation."

The importance of a military victory in any particular theater of operations in such a scenario, Clausewitz continued, will depend on the "scale" of that victory, which depends in large part on the size of the defeated force and the degree of its defeat (i.e., pushed back and retreating in good order, or severely mauled with remnants being routed by an aggressive pursuit).

> "For this reason, 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; the larger the force with which the blow is struck, the surer its effect will be. This rather obvious sequence leads us to an analogy that will illustrate it more clearly – that is, the nature and effect of a center of gravity.

[1] On War, pp 485-486. "The last book [Book Eight 'War Plans,' pp 577-637] will describe how this idea of a center of gravity in the enemy's force operates throughout the plan of war. In effect, that is where the matter properly belongs; we have merely drawn on it here in order not to leave a gap in the present argument" ... regarding "reasons for dividing one's forces" while on the defensive (p 486).

"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. The same holds true in war. The fighting forces of each belligerent – whether a single state or an alliance of states – have a certain unity and therefore some cohesion. Where there is cohesion, the analogy of the center of gravity can be applied. Thus these [Allied] forces will possess certain centers of gravity, which, by their movement and direction, govern the rest [of the Allied forces not part of these concentrations]; and those centers of gravity will be found wherever the forces are most concentrated....

"It is therefore a major act of strategic judgment to distinguish these centers of gravity in the enemy's forces and to identify their spheres of effectiveness. One will constantly be called upon to estimate the effect that an advance or a retreat by part of the forces on either side will have upon the rest." [1]

A Word of Caution Regarding "Mass" Since Clausewitz' Day

Thirty years after the death of Clausewitz, during the American Civil War, Union and Confederate divisions were being moved great distances by railroad relatively quickly – one of the more notable examples being the movement of Longstreet's corps in September 1863 from Virginia almost directly into the battle of Chickamauga in northern Georgia. When General Grant became general in chief of all Union armies early in 1864, from a strategic perspective he could have viewed the two principal 'masses' of

[1] On War, pp 485-486. Emphasis added regarding (S).

Confederate troops in the armies of Northern Virginia and Tennessee as two separate entities, or as a single strategic entity. Likewise, Allied strategists early in 1944 had the option of viewing the two principal 'masses' of German divisions concentrated in Russia and in France as two separate entities, or as a single strategic entity. As we have progressed through the 20th Century, technological advancements enhancing strategic mobility capabilities have blurred the distinction between separate "masses" of national armies seemingly separated by great distances.

Since Clausewitz' day, the central issue regarding strategic centers of gravity has not been whether units are concentrated into recognizable masses, but whether widely dispersed units have the ability to mass rapidly. In the last fifty years, the question has further matured to whether such units have the ability to simultaneously synchronize (i.e., mass) the effects of their combat power against common objectives for a common goal, even if they are not physically "massed" together. When it comes to considering whether all or only a 'massed' portion of an enemy national army is a strategic center of gravity, it is prudent to focus on the strategic capability of that army to shift forces within and among separate theaters of war. When it comes to the identification of strategic centers of gravity, as long as we understand that the concept of 'mass' may involve forces separated by relatively great distances, we are good to go.

Looking ahead to the CG-CC-CR-CV concept in chapter 4. In a conventional conflict (such as World War II, Korea, and the Persian Gulf War) the potential effectiveness of the enemy's national strategic mobility assets is an important consideration influencing a friendly commander's decision whether to identify all or only a part of an enemy national army as a strategic center of gravity. That decision might hinge on whether the enemy army/nation possessed a particular "critical capability," that is, the ability of that army/nation to mass sufficient forces at key locations and/or to achieve synchronization of fire and maneuver against common objectives. That capability/ability would obviously depend on whether the enemy possessed a

requisite amount of strategic mobility assets. The latter is called a "critical requirement" (CR). One or more "critical requirements" are necessary for the realization of a "critical capability" (CC). One or more "critical capabilities" are necessary for a center of gravity (CG) to function as a center of gravity.

☑ **With the above "check in the box,"**
LET US RETURN TO CLAUSEWITZ AND ON WAR.

1. **Identify Centers of Gravity.**

2. **If Possible (Ideally), Trace Them Back to a Single One – The Hub of all Power and Movement.**

"The first task, then, in planning for a war is to identify the enemy's centers[1] of gravity, and if possible trace them back to a single one." [2]

"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. The attack on these sources must be compressed into the fewest possible actions – again ideally, into one." [3]

"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. That is the point against which all our energies should be directed." [4]

"Once a major victory is achieved there must be no talk of rest, of a breathing space, of reviewing the

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[1] Emphasis added.

[2] On War, p 619.

[3] On War, p 617.

[4] (Emphasis added.) On War, pp 595-596.

position or consolidating and so forth, but only of the pursuit, going after the enemy again if necessary, seizing his capital, attacking his reserves and anything else that might give his country aid and comfort." [1]

Clausewitz viewed "Centers of Gravity" As Sources of Strength, Power & Resistance

From the above passages, it is clear that Clausewitz viewed centers of gravity as sources of moral and physical strength, power and resistance. The first-mentioned and most obvious center of gravity was the (enemy) army, assuming that it was powerful enough to be a factor in the strategic and operational equations. Destroying or neutralizing the enemy's army was a straightforward means to break an enemy's will to fight in most of the Napoleonic wars. Armed forces included enemy naval forces when applicable. The Royal Navy was a powerful British center of gravity. The "country" was a source of manpower and physical support for the armed forces – which might have to be disrupted in the pursuit phase following a major victory over an enemy army so as to destroy possibilities for enemy reinforcement and recuperation. The capital was always seen as a vital part of the "country". (More on the "capital" below.) Destruction or defeat of an enemy army, and occupation of his capital and/or major portions of his country was viewed as a Napoleonic formula to defeat the will of the principal enemy political and military leaders and the peoples and personnel which they ruled and commanded. "Will" – whether of a leader, military commander, or a population (or large segment thereof) – was viewed as a moral center of gravity. Political and military leaders were a source of moral strength by virtue of personal determination and/or by inspiring loyalty and confidence.

[1] On War, p 625.

The Meaning of "HUB"

The Hub of all Power and Movement

Webster defines "hub" as: "The center portion of a wheel, fan, or propeller. A center of interest or activity."[1] "A chief center of activity : focal point."[2] **These meanings are consistent with Clausewitz' use of that word in connection with centers of gravity.** The **field army** was the "hub" of a figurative great wheel comprising the totality of national military power which included its garrisons and depots, reserves, units still training or completing mobilization, and military classes (of teenagers) not yet called to duty. When mobilized and on the move, the **field army** was the chief center and focal point of national military power, activity and movement. Likewise, the **capital** – the chief center and focal point of political activity and power – was the "hub" of a great wheel comprising the totality of all "State" political power, the King and all his agents of power from bureaucrats to regional tax collectors. If the capital was also the main center, or hub, of national social, professional, and political activity, so much the better. Even when the Head of State accompanied the commander of his army into the field, the administrative bureaucracy remained in the capital. And after the battle(s) it was the capital to which the Head of State would return, in glory or in flight.

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[1] Webster's II.

[2] Webster's Third International Dictionary of the English Language Unabridged. Springfield, MA, 1971.

More Than One "Hub" or "Center of Gravity"

The following is one of the most frequently quoted/cited passages from On War:

> "One must keep the dominant characteristics of both belligerents in mind. Out of these characteristics **a certain** center of gravity develops, the hub[1] of all power and movement, on which everything depends. That is the point against which all our energies should be directed." [2] (repeated from page 11 above)

Clausewitz qualified these words, however, in two other carefully worded sentences (also repeated from page 11 above):

> "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." [3]

> "The first task ... in planning for a war is to identify the enemy's centers of gravity, and **if possible** trace them back to a single one." [4]

During the Napoleonic era, a nation's field army and capital both functioned as hubs of "State" military and political power. Mao's observation that "Political power comes from the barrel of a gun" was just as valid in Clausewitz' day. In some countries, a strong army was just as essential to the maintenance of political power as were loyal bureaucrats and tax collectors – the army and

[1] Hub: The Center portion of a wheel, fan, or propeller. A center of interest or activity. [Webster's II.]

[2] (Emphasis added.) On War, pp 595-596.

[3] On War, p 617. (Emphasis added.)

[4] On War, p 619. (Emphasis added.)

the capital both being important psychological and physical symbols of "State" power. There was no assurance then (nor is there today) that a single "certain" center of gravity would emerge at each level of war. In conflicts involving multiple "hubs" of political and military power and movement, the emergence of a single CG at a given level of war has been, is, and always will be conflict and scenario dependent. (Note also the several "s's" in the discussion on "'Mass' as a Center of Gravity" above on page 9.)

MULTIPLE CENTERS OF GRAVITY MAY EXIST AT ANY LEVEL OF WAR

The Strategic Level

The ability of a state to resist and/or the refusal of a state to submit is hereinafter referred to as "☒". Let us consider the case of country D (for Defender), in which "D ☒" is supported at the national-strategic level of war by the following:

- ☑ strong army;
- ☑ popular, strong-willed ruler;
- ☑ strong, functioning apparatus of state power (capital bureaucracy to regional tax collectors);
- ☑ population determined to resist the invader;
- ☑ "country" rich in mineral (gold/silver) resources;
- ☑ "country" rich in agricultural resources;
- ☑ "country" rich in manufacturing capacity (guns, cannons, military supplies, etc.);
- ☑ national treasury with a huge surplus of funds;
- ☑ strong ally.

We have listed nine sources of strength, power and resistance of varying relative importance.

According to Clausewitz, we are supposed to trace "the ultimate substance of enemy strength ... back to the fewest possible sources, and ideally to one alone"; if possible, back to that single "certain center of gravity," the "hub of all power and movement, on which everything depends" which is "the point against which all our energies should be directed." So, how many of the above nine are essential? Which single one is the most important? The strong-willed ruler? But what if he could be easily replaced and his replacement readily accepted by the population? The army, or perhaps the strong ally? But what if the people and their leaders were determined to resist even without their army or ally? The determination of the population to resist? But would the population maintain their determination without the support of at least one other CG (e.g., someone to lead them)? If none of the nine CGs can stand alone/function by itself, how do we determine which of them is "the" most important?

Consider the following two hypothetical situations:

- "D ⊠" relies mainly on one CG during the initial phase of a conflict, but if that CG is neutralized or destroyed, "D" knows that it can shift to a different strategy using a different CG to support "D ⊠".

- "D ⊠" relies on three CGs during the initial phase of a conflict. But when two of them are neutralized or destroyed, "D" is able to adjust its strategy to sustain "D ⊠" on the sole remaining CG.

In the second situation, was the sole surviving CG the most important one from the beginning? What if more than one of the three initial CGs could have been used alone by "D" to sustain "D ⊠"?

The Operational Level

A commander at the operational level of war may frequently have difficulty identifying 'the single' enemy center of gravity. If enemy forces in his area of responsibility are more or less concentrated into two separate highly-mobile masses, what then? Take the case of seven enemy divisions (four infantry, two mechanized, and one armored) "massed" on his left front, with three more enemy armored divisions loosely configured (i.e., deliberately "unmassed") to his right front. Is he confronted with just a single enemy center of gravity? The answer undoubtedly depends heavily on the emphasis which different commanders give to the mobility of 'separated' enemy forces and their ability to reinforce one another in time of need or otherwise act in concert. In many cases the answer could go either way, which is why operational commanders and their staffs should not get 'hung up' in a self-imposed requirement to identify 'the' most important entity as 'the single' enemy center of gravity. Another example at the operational level is the case of a strong enemy force being commanded by an extraordinarily capable, strong-willed, and inspirational general. In the case of the 15th and 21st Panzer and the 90th Light Divisions of the German *Afrika Korps* commanded in 1941 by (then) General Erwin Rommel (the 'Desert Fox'), were there not two German centers of gravity (Rommel and the force he commanded) instead of one?

Identification of a "Single" Center of Gravity
An Ideal, But Not Always Practical, Goal

Clausewitz' advice notwithstanding, determination of one single, overarching enemy center of gravity (CG) at each level of war remains an ideal, but not always a practical goal. Frequently,

multiple centers of gravity will exist at any given level of war. Nevertheless, Clausewitz' admonition to reduce especially those critically important enemy centers of gravity to the lowest number practicable (by the process of critical analysis) remains sound advice. **The job then is to determine the interrelationship of multiple CGs within and among the levels of war, and to devise effective strategies and campaign plans against them.**

Strategic "Centers of Gravity" — Clausewitz Provided Three Explanations/Illustrations in Historical Context

Explanation/Illustration #1 [1]

> **Clausewitz:** "For Alexander, Gustavus Adolphus, Charles XII, and Frederick the Great, the center of gravity was their **army**. If the army had been destroyed, they would all have gone down in history as failures. In countries subject to domestic strife, the center of gravity is generally the **capital.**[2] In small countries, that rely on large ones, it is usually the **army** of their protector. Among alliances, it lies in the **community of interest,**[3] and in popular uprisings it is the personalities of the **leaders** and **public opinion.**[4] It is against these that our energies should be directed. If

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[1] On War, p 596. (All emphasis in these two paragraphs is added.)

[2] In this example, the capital is a CG (a source of strength), with the domestic strife, or the conditions producing it, being a "critical vulnerability".

[3] In this example, the **common** interests shared by allies are a CG; whereas any major **conflicting** interests existing simultaneously would be regarded as an existing or potential "**critical vulnerability**". The cohesion of the alliance would be a "critical requirement" (as discussed in chapter 4).

[4] Note that Clausewitz here listed two centers of gravity (leaders and public opinion).

the enemy is thrown off balance, he must not be given time to recover. Blow after blow must be aimed in the same direction: the victor, in other words, must strike with all his strength and not just against a fraction of the enemy's **[strength]**.[1] **Not by taking things the easy way** – using superior strength to filch some province, preferring the security of this minor conquest to great success – **but by constantly seeking out the center of his power, by daring all to win all,**[2] will one really defeat the enemy.

"Still, no matter what the **central feature**[3] **of the enemy's power** may be – the point on which your efforts must converge – **the defeat and destruction of his fighting force remains the best way to begin**, and in **every case** will be a very significant feature of the campaign." [4]

Explanation/Illustration #2 (Napoleon's "march on Moscow")[5]

Clausewitz: "At the start of the 1812 campaign, the strength with which the Russians opposed the French was even less adequate than Frederick's at the outset of the Seven Years War. But the **Russians could expect to grow much stronger** in the course of the campaign. At heart, **all Europe was opposed to Bonaparte**; he had stretched his resources to the very limit; in Spain he was fighting a war of attrition; and the **vast expanse**

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[1] The word "[strength]" is implied by the grammatical structure of the sentence.

[2] A very clear passage from On War showing that Clausewitz viewed centers of gravity as sources (or even more definitively "centers") of strength, power and resistance. (Extra emphasis on "center" is added.)

[3] Feature: The make-up, shape, proportions, form, or outward appearance. [Webster's II.]
Central: At, in, near, or being the center. [Webster's II.]

[4] On War, p 596. (Emphasis added.)

[5] On War, pp 615-616. (All emphasis in these two paragraphs is added.)

> **of Russia** meant that an invader's strength could be worn down to the bone in the course of five hundred miles' retreat. Tremendous things were possible; not only was **a massive counterstrike a certainty** if the French offensive failed **(and how could it succeed if the Czar would not make peace nor his subjects rise against him?)** but the counterstroke could bring the French to utter ruin. The highest wisdom could never have devised a better strategy than the one the Russians followed unintentionally.
>
> " ... anyone with judgment in these matters will agree that the chain of great events that followed the march on Moscow was no mere succession of accidents. To be sure, had the Russians been able to put up any kind of defense of their frontiers, the star of France would probably have waned, and luck would probably have deserted her; but certainly not on that colossal and decisive scale. It was a vast success; and it **cost the Russians a price in blood and perils** that for any other country would have been higher still, and **which most could not have paid at all.**" [1]

In these two paragraphs, Clausewitz emphasized several sources of Russian moral and physical strength – i.e., centers of gravity: [2]

- the Czar
- the Russian people
- "all Europe was opposed to Bonaparte"
  (the "community of interest" discussed above on page 18 [see On War, p 596])
  (even Napoleon's nominal allies, Austria and Prussia, were allies in name only)

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[1] On War, pp 615-616. The clause (and how ... against him?) is included in the original.

[2] Looking ahead to chapter 4, the vastness of Russia is a "force effectiveness enhancer," and not a CG. The ability of the Russian people to "pay a price in blood and perils" that "most countries could not have paid at all" is a "critical capability" enabling the "people" to function as a CG. The "loyalty" of the people to the Czar is a "critical requirement" in support of that critical capability.

- latent Russian "reserve" strength, (absolute and relative compared to the diminished power of Napoleon's main force as it advanced ever deeper into Russia)

In a separate related passage Clausewitz strongly implied that the Czar and the Russian people (who remained steadfastly loyal to him) were the two critical "certain" CGs (note: more than one) which doomed Napoleon to failure:

> "We maintain that the 1812 campaign failed because the Russian government kept its nerve **and** the people remained loyal and steadfast. The [French] campaign [therefore] could not succeed. Bonaparte may have been wrong to engage in it at all; at least the outcome shows that he miscalculated; ..." [1]

meaning that as long as the Czar steadfastly refused to negotiate and the Russian people remained loyal to him, Napoleon's campaign as conceived and executed had no chance to succeed. Napoleon failed to incorporate into his strategy and campaign a political component designed to erode or destroy the Czar's popular support.

Explanation/Illustration #3
(A Post-Napoleon, Post-1815 Hypothetical Allied Attack Against France)[2]

> **Clausewitz:** "**The** center of gravity of France lies in the **armed forces and in Paris**.[3] The allied aim must, therefore, be to defeat the army in one or more major battles, capture Paris, and drive the remnants of the

[1] On War, p 628. (Emphasis added.)

[2] On War, pp 633-634. (All emphasis in this paragraph is added.)

[3] Note: Clausewitz initially identified **multiple** centers of gravity as "the" center of gravity, but then confused the issue at the end of this paragraph by saying that "**the** center of gravity of **France's power** is where the two lines meet" (i.e., Paris and the region surrounding it). A possible explanation might be that the first reference was to a French CG in the specific hypothetical conflict/campaign, whereas the concluding reference was to the "inherent" and "historical" CG of French national power.

> enemy's troops across the Loire. The most vulnerable area of France is that between Paris and Brussels, where the frontier is only 150 miles from the capital. ... Both invasion lines, the one from the Netherlands and the other from the upper Rhine, are perfectly natural, short, unforced, and effective; and the center of gravity of France's power is where the two lines meet [i.e., Paris and the region surrounding it]." [1]

Here again Clausewitz identified multiple centers of gravity (the army and Paris). Which was more important? It is difficult to choose one over the other. Paris is wide open without a protecting army, and the army could be made irrelevant if the Paris government conformed to the political demands of the Allied Coalition (i.e., if the political reasons for the war ceased to exist).

"Overcoming the Resistance Concentrated in his Center of Gravity"

Consider also one other quotation from On War:

> **Clausewitz:** "...the defeat of the enemy consists in overcoming **the resistance concentrated in his center of gravity...."** [2]

meaning that a CG is capable of offering resistance – i.e., that it is a source of strength and power, not weakness.

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[1] On War, pp 633-634.

[2] On War, p 596. (Emphasis added.)

Colonel Harry G. Summers, Jr.

Enemy Strategic Centers of Gravity in the Vietnam War *á la* Clausewitz

Colonel Harry G. Summers' 1983 renowned critique of American strategy in the Vietnam War (On Strategy: The Vietnam War in Context) is a direct application of Clausewitz' On War.[1] In chapter eleven, Colonel Summers quoted the entire "For Alexander, Gustavus Adolphus, ..." passage reproduced above on page 18 ("Explanation/Illustration #1) to lay the foundation for his discussion of enemy centers of gravity. Colonel Summers then wrote:

> "As we saw in the previous chapter, we had adopted a strategy that focused on none of the possible North Vietnamese centers of gravity – their army, their capital, the army of their protector, the community of interest with their allies, or public opinion." [2]

The North Vietnamese Army could not be a center of gravity **in the context of American strategy**, he continued,

> "because we had made the conscious decision not to invade North Vietnam to seek out and destroy its armed forces. For the same reason, it could not be Hanoi, the North Vietnamese capital. Our desire to limit the conflict and our fear of direct Soviet and Chinese involvement prevented us from destroying 'the army of their protector' (more accurately, to block the influx of massive amounts of Soviet and Chinese

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[1] Colonel Harry G. Summers Jr., USA. On Strategy: The Vietnam War in Context (US Army War College, Strategic Studies Institute -- Reproduced at Quantico Va, July 1983). For "direct application," see the Preface, Foreword, and text throughout.

[2] Ibid., p 80. (Emphasis added.)

> military assistance). The same fears prevented us (until the Nixon-Kissinger initiatives of the early 1970s) from striking at the community of interest among North Vietnam, the Soviet Union, and China. Certainly 'the personalities of the leaders and public opinion' were never targets the United States could exploit. Instead by seeing the Viet Cong as a separate entity rather than as an instrument of North Vietnam, we chose a center of gravity which in fact did not exist...." [1]

A few pages later, Colonel Summers' discussion of enemy centers of gravity is again pure Clausewitz:

> "General Dung's account of the North Vietnamese final offensive [in 1975] read like a Leavenworth practical exercise on offensive operations. His selection of the 'center of gravity' could have come **directly from Clausewitz**: 'The basic law of the war,' said General Dung, 'was to **destroy the enemy's armed forces**, including manpower and war material....the **main target** of our forces was the (South Vietnamese) **regular army**." [2]

In Conclusion:

First:

Clausewitz Viewed Centers of Gravity to be:

- **Sources of moral and physical strength, and Not "Critical Vulnerabilities"**
- **Significant Entities, Relatively Few in Number at Each Level of War**

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[1] Ibid., p 80. (...) (...) included in the original.

[2] Ibid., p 84. (Emphasis added.) "material....the" is in the original. Citing: Van Tien Dung, "Great Spring Victory," Foreign Broadcast Information Service, 7 July 1976, Volume II, p 52.

All centers of gravity are sources of strength, power and resistance. They are not "critical vulnerabilities" which, being actual or potential sources of weakness, are quite the opposite of CGs. Nor (as is explained below in chapter 4, page 48) are CGs such things as command and control systems, transportation nodes, LOCs, and the like, because they are not capable of functions such as making decisions, directing units, leading people, making demands, raising expectations, or resisting enemy moral or physical forces.

Centers of gravity are significant entities readily discernible at any level to skilled practitioners of war. A skilled practitioner is educated in the art and science of war, and knows his enemy (culture, society, personalities, motivations – in addition to orders of battle and the like). Given reasonable and reliable intelligence data, he/she should have little difficulty readily identifying enemy (and friendly) centers of gravity. Because centers of gravity are significant entities, they invariably will be relatively few in number at each level of war.

Second:

Recent and Current Service Doctrines Reflect an Array of Conflicting and Confusing Interpretations of Clausewitz' Concept of "Centers of Gravity"

All American Service doctrinal manuals/publications are influenced (more or less) by On War. FMFM 1 Warfighting, for example, is for the most part a brilliant distillation of On War and a powerful testament to the relevancy of Clausewitz to the modern-day Marine Corps, as well as to the entire DOD community. Unfortunately, as is shown in chapters 3 and 5, the collection of

recent and current Service doctrine manuals/publications reflects a hugely divergent and confusing array of interpretations regarding the original Clausewitzian concept of center of gravity and its relationship to critical vulnerabilities. When not studied in a professional manner On War (like the Bible) is wide open to a kaleidoscope of individual interpretations generated and reinforced by the failure to read, understand, and interpret relevant passages of On War **in context** – i.e., sentences in the context of paragraphs, paragraphs ... pages, pages... chapters, chapters ... individual books (8 total), books in the context of the entire volume, and the entire volume in "the spirit of the age". The Joint and Service doctrine manuals/publications should be more uniformly based on a solid understanding of the Clausewitzian concept of centers of gravity. Doing so will greatly facilitate communication of ideas within the DOD community (and within individual services), **without corrupting or harming in any way the genuine good sense and wisdom** found in each of these doctrine manuals/publications regarding defeating the enemy at the strategic, operational and tactical levels of war.

Chapter 3

The Way We Were – Butch Cassidy and the Center of Gravity: Confusion and Chaos, Not Understanding

A review of some recent (this chapter) and current (chapter 5) Service doctrine manuals reveals quite a discrepancy regarding definitions and/or understandings of the terms "center of gravity" and "critical vulnerability". But first, I offer you the story of "Butch Cassidy and the Center of Gravity," and a commentary by its author.

"Butch Cassidy and the Center of Gravity" [1]

This vignette takes place at a CINC's forward headquarters at the site of the United States' next major military involvement. The CINC's joint campaign planning staff has been working for days trying to develop a suitable concept of operations. The leader of the planning group, sensing the need for everyone to take a break from the task, located a television, video cassette player, and a video tape copy of the movie "Butch Cassidy and the Sundance Kid." We join them in the middle of the movie:

[1] Appendix pp 55-60 of monograph, "The Concept of Center of Gravity: Does It Have Utility in Joint Doctrine and Campaign Planning?" by Lt Col John D. Saxman, USAF, 28 May 1992, School of Advanced Military Studies, United States Army Command and General Staff College, Fort Leavenworth, Kansas.

Butch Cassidy and the Sundance Kid, after a long respite in town where they had enjoyed good food, good drink, and the company of local ladies, are seen returning to their hideout at Hole-in-the-Wall. During their long absence, the remainder of the Hole-in-the-Wall gang had grown restless and decided it was time for some action. Harvey, the biggest, meanest, and toughest of the gang appointed himself the new leader and is in the process of planning a raid on the Western Pacific Railroad, when Butch and Sundance reappear at the hideout. Butch tells the gang that there will be no more train robberies – it is too dangerous. From now on the Hole-in-the-Wall Gang will only rob banks. The gang balks at this order. Harvey decides to challenge Butch's leadership of the gang by daring him to a knife fight. Butch is obviously reluctant to fight. Harvey is clearly twice as big and strong as Butch. Butch stalls and diverts Harvey's attention by asking him about the rules of the fight. Harvey replies that there are no rules in a knife fight. At this point Butch rapidly approaches Harvey and delivers a decisive kick to Harvey's groin, completely catching him off guard. Harvey collapses to the ground. The rest of the gang rushes up to shake Butch's hand and assure him that they were rooting for him all along.

"That's it, that's it. Stop the VCR. Turn on the lights!" The Army armor officer jumped to his feet and turned to face the small group of majors who had been watching the movie with him. "Listen you knuckleheads, we've been working on this campaign plan for nine days now and if we don't soon reach an agreement on what the enemy's center of gravity is and get on with this plan, the CINC is going to have our

butts. Now I asked you guys to watch this movie tonight because I think it illustrates the point I've been trying to make about the enemy's center of gravity. Old Butch here, clearly understands the Army 100-5 concept of a center of gravity better than any of you guys do. Just like the manual says, he identified that 'characteristic capability, or locality from which the force derives its freedom of action, physical strength, or will to fight' and then he decisively destroyed it. Butch recognized that Harvey was the gang's ringleader, source of physical strength, and the major source of opposition to him. By defeating the enemy's source of physical and moral strength, which in this case was Harvey, he rapidly achieved his objective of regaining leadership of the Hole-in-the-Wall gang."

At this point an Army infantry officer in the group spoke up. "I agree with you that Butch Cassidy knew a center of gravity when he saw one, but the center of gravity that he correctly identified was not Harvey, but rather Harvey's testicles. FM 100-5 also says that, 'as with any complex organism, some components are more vital than others to the smooth and reliable operation of the whole. If these are damaged or destroyed, their loss unbalances the entire structure, producing a cascading deterioration in cohesion and effectiveness which may result in complete failure, and which will invariably leave the force vulnerable to further damage'."

After the laughter subsided, the Air Force officer assigned to the planning group stood up. "Look guys, I agree that the key to Butch regaining control of his gang was to defeat Harvey, but the way he did it relied too much on deception, surprise, and luck – things that are great to have in an operation, but not necessarily something you can count on during execution. If Butch had done a little more planning, he would have realized that there were at least four centers of gravity that needed to be attacked. First, he should have

thrown dirt in Harvey's eyes, so that Harvey couldn't see him. Next, he should have hit Harvey on both ears so that Harvey couldn't hear him. Then after Harvey had become deaf and blind, he should have kicked Harvey in the side of his knee to immobilize him. Then and only then, he should have repeatedly struck blows to Harvey's head until he either gave up the will to fight or became unconscious and no longer had the ability to pose any opposition."

With this, a Marine infantry officer in the group literally exploded out of his seat. "You see that's the problem with you flyboys. You take too mechanistic of an approach to warfare. You think that if you destroy A, interdict B, and isolate C that the result will be D. Marine Corps' doctrine takes into account that warfare is not a precisely calculable engineering project, but rather an unpredictable undertaking against an enemy that thinks and reacts to your attack. Our doctrine says to look for a 'critical enemy vulnerability' and then exploit it. In this case Butch should have sparred, jabbed, punched, and poked until he discovered a move that Harvey couldn't parry. Then he should have exploited that vulnerability with repeated blows."

"Enough is enough," chimed in the Naval officer. "The problem with all of you guys is that your services have made you so hung up on what is doctrine and what is not, that none of you can think for yourself. Sure the Navy has tactical doctrine and an overarching maritime strategy, but we haven't saddled our officers' operational and strategic thinking with manuals like FM 100-5, FMFM 1, or AFM 1-1. Under the composite warfare concept (CWC) we simply give the Officer-in-Tactical-Command (OTC) the mission and let him decide how to execute it. Now let's see, in this case the OTC would be the AAWC, or maybe the STWC, no probably the AWC...."

From the back of the room, a new voice interrupted. "Clausewitz would have said Harvey was the center of

gravity because by defeating him, Butch was able to defeat all of Harvey's allies and didn't have to fight each one of them separately." At once, all eyes shifted to the SAMS graduate who until now had been sitting quietly in the back of the darkened room, reading a very dog-eared copy of On War by the light of a camouflaged penlight. For the first time since the campaign planning group had come together, they rapidly achieved unanimous agreement. Turning to the back of the room they shouted in unison, "Who cares!"

Author's[1] commentary. Until recently, "Who cares!" might have been an appropriate answer to someone debating the question of what is, or is not, a center of gravity. For years the term has been confined to the halls of academia where it served to stimulate thinking and generate scholarly debate about how previous campaigns were won or lost. Recently, the term migrated from the realm of academia to the battlefield planning staff and has become what FM 100-5 describes as the "key to all operational design".

Obviously a concept that is considered to be so important should be clearly understood by everyone in the military. Unfortunately, this is not the case. As the hypothetical, but doctrinally-based vignette has suggested, there is often little agreement within a service, and even less among the services about what constitutes a center of gravity, or why it should be attacked. Even when a group of people agree on a common conceptional definition, when the concept is applied to a specific situation they often identify remarkably different enemy characteristics as the center of gravity. This raises the obvious concern that the very foundation of our campaign planning process may be flawed because it is based upon an operational concept that is yet to be unequivocally defined, clearly understood, or consensually applied.

[End of story & author's commentary]

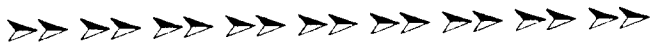
[1] Lt Col Saxman.

Centers of Gravity Definitions – They were 180° Apart

"... yet to be unequivocally defined, clearly understood, or consensually applied." A review of three recent service doctrine manuals/publications (which have now been superseded) and Warden's The Air Campaign reveals that this was no exaggeration:

[1] Army FM 100-5 (May 1986)

Appendix B in the 1986 version of FM 100-5 contained a full-page discussion on centers of gravity.[1] Deleting portions of that discussion here (while saving time and space) would risk failure to convey the complete concept. For that reason, and because it will be referred to in chapter 4 of this manuscript, it is worth quoting in full:



[1] FM 100-5 Operations. HQ Department of the Army, May 1986, pp 179-180, Appendix B "Key Concepts of Operational Design" **(Emphasis added, except where indicated by footnote as being in the original.)**

"THE CENTER OF GRAVITY [FM 100-5, MAY 1986]

"The concept of centers of gravity is **key** to all operational design. It derives from the fact that an armed combatant, whether a warring nation or alliance, an army in the field, or one of its subordinate formations, is **a complex organism** whose **effective operation depends not merely on the performance of each of its component parts, but also on the smoothness with which these components interact and the reliability with which they implement the will of the commander**. As with any complex organism, some components are more vital than others to the smooth and reliable operation of the whole. If these are damaged or destroyed, their loss **unbalances the entire structure**, producing a cascading deterioration in cohesion and effectiveness which may result in complete failure, and which will invariably leave the force vulnerable to further damage.

"The center of gravity of an armed force refers to those **sources of strength or balance**. It is that **characteristic, capability, or locality** from which the force derives its **freedom of action, physical strength, or will to fight**. Clausewitz defined it as "the **hub** of power and movement, on which everything depends." **Its attack is – or should be – the focus of all operations.**

"Tactical formations can and frequently will have centers of gravity – a **key command post**, for example, or a **key piece of terrain** on which the unit's operations are anchored. But the concept is more usually and usefully applied to larger forces at the operational level, where the very size of the enemy force and the scale of its operations make difficult the decision where and how best to attack it.

"Even at this level, the center of gravity may well be a component of the field force -- the **mass** of the enemy

force, the **boundary between two** of its major combat **formations**, a **vital command and control center**, or perhaps its **logistical base or lines of communication**. During the Battle of the Bulge in 1944, St. Vith became a center of gravity for defending American forces, failure to retain which might have resulted in the complete collapse of the Allied center, with potentially disastrous strategic consequences. But an operational center of gravity may be more abstract – the **cohesion among allied forces**, for example, or the **mental and psychological balance of a key commander**.

"Finally, at the strategic level, the center of gravity may be a **key economic resource or locality**, the **strategic transport capabilities** by which a nation maintains its armies in the field, or a **vital part of the homeland** itself. But it may also be a **wholly intangible thing**. At Verdun in 1916, for example, German and French armies sacrificed over a million men contesting a piece of real estate of little intrinsic tactical or operational value, but whose *moral* [1] importance to both sides made its uncontested surrender unthinkable. Similarly neither Dien Bien Phu nor TET seriously threatened the operational capacity of French and American forces respectively. But both attacks struck directly at their strategic centers of gravity – popular and political support of the war.

"At any level, identifying the enemy's center of **gravity requires extensive knowledge of his organizational make-up, operational patterns, and physical and psychological strengths and weaknesses**. Moreover, centers of gravity can change. A major shift in operational direction, the replacement of a key enemy commander, the fielding of new units or weaponry – any of these events can shift the center of gravity significantly,

[1] Emphasis in the original.

just as adding new weights to a scale alters its point of balance. The commander seeking to strike his enemy's center of gravity must be alert to such shifts, recognize them when they occur, and adjust his own operations accordingly.

"Finally, it should be remembered that while attacking the center of gravity may be the surest and swiftest road to victory, it will rarely be the easiest road. More often than not, the enemy recognizing his center of gravity will take steps to protect it, and indirect means will be required to force him to expose it to attack. In the process, the enemy will do his best to uncover and attack our own.

"Identification of the enemy's center of gravity and the design of actions which will ultimately expose it to attack and destruction while protecting our own, are the essence of the operational art." [1]

[2] Air Force Manual 1-1 (March 1992)

The Air Force doctrine manual offered four definitions of center of gravity, all from non-Air Force sources:

"That **characteristic, capability, or locality** from which a force derives its **freedom of action, physical strength, or will to fight**. It exists at the strategic, operational, and tactical levels of war. [Joint Test Pub 3-0]

"The sources of **strength** and **balance** from which a military force derives its freedom of action, physical strength, or will to fight. It may be the mass of the enemy force, the seam between two of its major force elements, a

[1] FM 100-5 Operations. HQ Department of the Army, May 1986, pp 179-180, Appendix B "Key Concepts of Operational Design" **(Emphasis added, except where indicated by footnote as being in the original.)**

vital command and control center, its logistical base, its lines of communication, or something more abstract, such as military cohesion, morale, or the national will. [US Army FM 100-5, May 1986]

"The central feature of the enemy power, '**the hub and movement of all power,**' the point against which every effort should be expended. [General Carl von Clausewitz]

"Typically: in countries subject to domestic strife, the capital; in small countries that rely on large ones, the forces of their protector; among alliances, in the community of interest; in popular uprisings, the personalities of their leaders and public opinion. [General Carl von Clausewitz]" [1]

[3] USMC FMFM 1 Warfighting
(Not "Centers of Gravity" but "Critical Vulnerabilities")

FMFM 1 Warfighting contains a superb discussion on critical vulnerabilities. Modifying Clausewitz with an appropriate page from Sun Tzu, Warfighting espouses the application of "combat power toward a decisive aim" by "concentrating strength against enemy weakness rather than against strength" – that is, we should "seek to strike the enemy where, when, and how he is most vulnerable." [2] Warfighting continues:

"Of all the vulnerabilities we might choose to exploit, some are more critical to the enemy than others. It follows that the most effective way to defeat our enemy is to destroy that which is most critical to him. We should focus our efforts on the one thing which, if eliminated, will do the most decisive damage to his ability to resist us.

[1] Air Force Manual 1-1, Basic Aerospace Doctrine of the United States Air Force, Volume II (March 1992), pp 275-276. (Emphasis added.)

[2] FMFM 1 Warfighting (Washington, DC: Dept of the Navy, HQUSMC, 6 March 1989) pp 35-36.

> By taking this from him we defeat him outright or at least weaken him severely.
>
> "Therefore, we should focus our efforts against a ***critical enemy vulnerability***. Obviously, the more critical and vulnerable, the better. [*footnote 28 located here – see below*] But this is by no means an easy decision, since the most critical object may not be the most vulnerable. In selecting an aim, we thus recognize the need for sound military judgment to compare the degree of criticality with the degree of vulnerability and to balance both against our own capabilities. [superbly stated!!] ***Reduced to its simplest terms, we should strike our enemy where and when we can hurt him most.***" [1]

But what does Warfighting say about centers of gravity? And their relationship to critical vulnerabilities? The answer is buried in footnote 28.

> "28. Sometimes known as the ***center of gravity***.... 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." [2]

There it is in plain English! According to FMFM 1 Warfighting, a center of gravity is not a source of strength but a critical vulnerability: CG = CV. Where did this interpretation come from? Did anyone else share it?

[4] John A. Warden III, *The Air Campaign*.

> **"'CENTER OF GRAVITY' USEFUL IN PLANNING.** The term 'center of gravity' is quite useful in planning war operations, for it **describes that point where the enemy**

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[1] Ibid. (Emphasis in the original.)

[2] Ibid., p 85 (p 36 in the text). (Emphasis in the original.)

> **is most vulnerable** and the point where an attack will have the best chance of being decisive. The **term is borrowed from mechanics**[1], indicating a point against which a level of effort, such as a push, will accomplish more than that same level of effort could accomplish if applied elsewhere. Clausewitz called it the '**hub** of all power and movement.'" [cited was p 595 of On War] [2]

Just as clear as day, there it was again: CG = CV.

Those Four Publications Offered Us a Genuine Smorgasbord

Those four publications offered us the following definitions and examples of centers of gravity:

- smoothness with which military components interact;
- reliability of military components in implementing the will of the commander;
- any component of a military organization or in support of it, which if damaged or destroyed unbalances the entire structure;
- sources of strength or balance (or strength and balance);
- characteristics, capabilities, or localities from which a force derives its freedom of action, physical strength, or will to fight;
- the hub of all power and movement (or "hub and movement of all power") on which everything depends;
- a vital command and control center, or key command post;
- a key piece of terrain;
- the mass of the enemy force;

[1] Mechanics: Analysis of the action of forces on matter or material systems. [Webster's II.]

[2] John A. Warden III. The Air Campaign – Planning for Combat (Washington, DC: National Defense University Press, 1988), p 9.

- the boundary between two major combat formations;
- cohesion among allied forces;
- the mental and psychological balance of a key commander;
- a logistical base or lines of communication;
- strategic transport capabilities;
- a key economic resource or locality;
- a vital part of the homeland;
- a wholly intangible thing;
- that point where the enemy is most vulnerable;
- a critical vulnerability – **not** a source of strength.

What a smorgasbord! 'Everyman,' y'all come.

Confusion and Chaos, Not Understanding

Disagreement about the ultimate answer was (and is) to be expected; but the **absence** of a universal agreement on the need to reduce the current plethora of interpretations regarding centers of gravity to a single, universally understood and applied concept was **disappointing**. Let's return, for example, to the glossary of Air Force Manual 1-1 (which provided four definitions of "center of gravity"):

> Air Force Manual 1-1: " ... Many terms [in this glossary] have several definitions; **the most important terms tend to have the most definitions**. Providing multiple definitions is intended to **amplify or expand understanding** of the term as it is commonly used. While a single rigid definition is useful for academic purposes, in **practice people use terms in different ways**. Multiple descriptions of the meaning of a word or phrase **improve our grasp of the term** and **need never**

> **reduce our understanding.** This glossary, then, is **a compilation of usages**; it is a **record of how people have used the words** most important to basic Air Force doctrine – so far." [1]

What a paragraph! If words have different/multiple meanings it is because they are used in sometimes widely dissimilar professions, environments and contexts. For example, the 1 December 1989 version of Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, did not list "center of gravity," but did contain the following entry:

> "center of gravity limits – (NATO): The limits within which an aircraft's center of gravity must lie to insure safe flight. The center of gravity of the loaded aircraft must be within these limits at take-off, in the air, and on landing. In some cases, take-off and landing limits may also be specified." [2]

This concept of "centers of gravity" is from the aeronautical profession, whereas Colonel Warden borrowed his from the field of mechanical engineering. FM 100-5 relied on Clausewitz, whereas FMFM 1 turned Clausewitz inside out. Air Force Manual 1-1 seemed to be suggesting that a range of diverse professions, environments, and contexts existed within the DOD community (multiple Services, multiple levels of war,[3] multiple types of conflict,[4] etc.), and that this range therefore justified the creation and application of multiple meanings of "centers of gravity". What a sweet Siren song! [5] The Air Force could have defined its own

[1] Air Force Manual 1-1, Basic Aerospace Doctrine of the United States Air Force, Volume II (March 1992), p 269.

[2] Joint Pub 1-02 (Formerly JCS Pub 1), Department of Defense Dictionary of Military and Associated Terms, 1 December 1989, p 63.

[3] National-strategic, theater-strategic, operational and tactical.

[4] Nuclear, conventional, revolutionary, insurgency/counterinsurgency, OOTW/MOOTW.

[5] Siren: Greek Mythology. One of a group of sea nymphs who by their sweet singing lured mariners to destruction on the rocks surrounding their island. Siren song: a deceptively alluring plea or appeal. [Webster's II.]

definition of "centers of gravity". Barring that, it could have fallen in line behind the Army and accepted and supported FM 100-5's version. But with one or both of these options probably too difficult politically, the easier way out was to list multiple definitions – an understandable course of action. But to also call it virtuous is nonsense. Air Force Manual 1-1 did enhance our understanding of the multiple interpretations of "centers of gravity" operative throughout the DOD community. But when it came to facilitating a common understanding of a concept critical to a **"Joint"** DOD community, Air Force Manual 1-1, Colonel Warden's The Air Campaign, and FMFM 1 Warfighting mightily muddied waters which even FM 100-5 had left none too clear.

Just because the term "center of gravity" means different things to aircraft pilots, mechanical engineers, and ship drivers (center of buoyancy), that does not justify it meaning different things to soldiers, airmen, sailors, and Marines. **The term "center of gravity" should have the same meaning at the strategic, operational and tactical levels of war to all members of the DOD community, whether they be Army, Air Force, Navy, Marine, DOD civilians, or our nation's political leaders and their staffs.** [1]

Not Just One Problem, But Two

At this point, it was evident that the DOD community was faced with a twin challenge. First, the notion that disparate understandings and applications of "center of gravity" yields largely positive, not negative, results (or the belief that the situation at least poses no great danger) had to be challenged. The second challenge was to derive [2] a sensible, practical concept of

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[1] That said, the mechanical engineering concept of "centers of gravity" has direct application to the concept of "critical vulnerabilities" introduced in FMFM 1. Once we understand (as was explained in chapter 2) that "critical vulnerabilities" are the opposite of "centers of gravity" and not just different terms for the same thing, FMFM 1 Warfighting and Warden's The Air Campaign are otherwise right on target.

[2] Derive: To arrive at by reasoning. [Webster's II.]

"centers of gravity" and their relationship to "critical vulnerabilities," which could be commonly understood and applied throughout the DOD community.

Unfortunately, in the last few years only limited progress has been made in addressing these twin problems. A review of **current** Joint and Service manuals/publications in chapter 5 reveals that while a common definition of centers of gravity has been adopted, that definition and the accompanying explanations and illustrations provided in each publication show that considerable discrepancies still exist regarding the specific nature of CGs and their relationship to "critical vulnerabilities" (CVs). But before we get to that, chapter 4 offers a common-sense approach to this CG-CV problem, which can then be compared to the recent progress (or lack thereof) shown in chapter 5.

Chapter 4

The Fix:
The CG-CC-CR-CV Concept

The fix for the "Butch Cassidy" phenomenon is the adoption and application of the following definitions and concepts by the entire DOD community:

Centers of Gravity: Primary sources of moral or physical strength, power and resistance.

Critical Capabilities: Primary abilities which merits a Center of Gravity to be identified as such in the context of a given scenario, situation or mission. [1]

Critical Requirements: Essential conditions, resources and means for a Critical Capability to be fully operative. [2]

Critical Vulnerabilities: Critical Requirements or COMPONENTS THEREOF which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive results – the smaller the resources and effort applied and the smaller the risk and cost, the better.[3]

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[1] **Ability:** Physical, mental, financial, or legal power to perform. **Function:** The activity for which one is specifically fitted or employed. Assigned duty or activity. [Webster's II.]

[2] **Operative:** Exerting influence or force. Functioning effectively : efficient. [Webster's II.]

[3] Thus involving the concept of disproportionality. **Disproportional:** Being out of proportion, as in relative size, shape, or amount. [Webster's II.]

Moral and Political Centers of Gravity

Leaders

Moral CGs are fairly straightforward and commonly understood. Examples: General Robert E. Lee for the Confederacy at both the national strategic level for the nation, and the operational and tactical levels for the troops in the field. The presence of Napoleon on the battlefield was a powerful moral CG for any army which he led and directed; same for Rommel and Patton. Prime Minister Winston Churchill is one of the greatest examples of a national leader being a moral and political CG at the strategic level. So too was President Franklin D. Roosevelt for the United States. While his leadership might not have made all that much difference regarding the fate of Japan (given the mood and determination of the American public after 7 December 1941), he made a great deal of difference regarding strategy against Nazi-Germany. "By a purely intellectual effort," it was largely he who sustained the Germany-first strategy at the national strategic level during the first year after Pearl Harbor (when the public favored a Japan-first strategy by a two-to-one margin). Operation TORCH, the invasion of French Northwest Africa in November 1942, happened because of President Roosevelt (not the American public) who overruled the (Joint) Chiefs of Staff. It was President Roosevelt who refused to wait until the spring of 1943 to mount and execute the first major Anglo-American offensive in Europe. President Roosevelt was clearly a moral and political CG at the strategic level vis-a-vis the war against Hitler's Germany. Hitler remained a moral and political CG in Nazi-Germany until near the end.

Public/popular[1]/national[2] support

The "cause" of independence was a strong moral CG for the Confederacy at the national strategic level, as were strong state loyalties (Lee considered himself first and foremost a Virginian). American desire for vengeance and retribution against the Japanese after 7 December 1941 turned American public opinion into a powerful moral national CG in the war against Japan. Communism and Premier Joseph Stalin were not particularly popular among the peoples of the Soviet Union in 1941; nevertheless the latter strongly supported Stalin's resistance to Hitler's invading Nazi hordes. Strong belief in a cause or leader or both is the foundation for all national public/popular/people CGs.

Physical Centers of Gravity

Physical centers of gravity fall into three categories. The first category is armed forces, strength, and power at all levels of war. The second and third categories pertain to the strategic level: national economic/industrial power, and power stemming from large populations.

Armed forces/strength/power

Pretty straightforward – armies, navies, air fleets (at the strategic and theater-strategic level); military units (at all levels) which have the capability to exert power, to influence (offensively or defensively) unfriendly opponents.

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[1] Popular: Of, representing, or carried on by the people at large. Originating among the people. [Webster's II.]

[2] National: Of, relating to, or belonging to a nation as an organized whole. [Webster's II.]

National industrial/economic [1] power

Industrial/economic centers of gravity are the foundations of national physical strength. Commonly cited as World War II economic/industrial centers of gravity are the Ruhr for Germany, the factories which the Soviet Union moved and built east of the Urals, and the industrial strength of Great Britain and the United States. Our industrial strength (ten-to-one over Japan on 7 December 1941) was a critical American center of gravity sustaining an enormous American war machine – and dwarfing the loss of a few old battleships at Pearl Harbor. Total United States Lend-lease aid to our allies in World War II was the financial and physical equivalent of 555 armored divisions. Now that was power, generated by one awesome center of gravity.

In World War II, all American centers of gravity at the national/strategic level could be traced back to American political will (the will to fight) and American industrial strength. All moral and physical centers of gravity stemed from, or were dependent upon, those two bedrock CGs. This explains why the Japanese "victory" in the battle of Pearl Harbor on 7 December 1941 was such a monumental disaster. The role and importance of the US Pacific Fleet (including its three aircraft carriers) as a center of gravity needs to be understood in the perspective of American national power. On 7 December 1941, the United States was building a fleet of warships which would more than double the size of the entire US Navy. When these were completed, we had the money, the resources, and the will to again double the size of the Navy. Admiral Yamamoto knew this. He understood the bedrock foundations of American national power. Because there was nothing he or Japan could do about our industrial capacity, Admiral Yamamoto banked on "Operation Hawaii" to destroy or seriously degrade our national will to fight. His miscalculation and terrible blunder lay in his method, not his objective.

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[1] Economic: Of or relating to the development, production, and management of material wealth, as of a country, household, or business enterprise. Of or relating to matters of finance. [Webster's II.]

Large national populations

Large populations can be strategic centers of gravity. Just ask the Japanese and Germans who fought the Chinese and Russians during World War II. As one high-ranking Japanese officer pleaded just before being executed for failure: "For every one [Chinese soldier and guerrilla fighter] we kill, two more appear!" Likewise, the common (incorrect) post-war refrain from some German Russian-front generals that "We won all the battles but lost the war," reflected their awe of the seemingly limitless Soviet manpower resources and industrial strength.

Centers of Gravity are
Dynamic [1] **Agents** [2] **of Action or Influence**

Moral CGs at all levels, and political CGs at the strategic level, cause things to happen by virtue of their will, influence, and leadership. Moral and political CGs are based upon persons and people. Moral and political CGs must possess such qualities as determination; courage (moral and physical); and the power to persuade, inspire, or intimidate. Examples: a strong political leader; public opinion, or an influential segment of it, galvanized and motivated by a cause; a strong (effective/capable) military leader influencing the course of a battle or campaign by virtue of his strong will and/or effective plan or stratagem.

Physical CGs at the strategic level can include direct sources and/or centers of military strength, as well as principal indirect sources of that strength to include economic/industrial power and power stemming from large national populations. At the operational and tactical levels, physical CGs are primary

[1] Dynamic: Of or relating to energy, force, or motion in relation to force. Marked by vigor and energy. [Webster's II.]

[2] Agent: One that acts or has the authority to act. A force or substance that causes change. A means of doing something : instrument. [Webster's II.]

sources and/or centers of military strength (i.e., military units and formations), which cause things to happen by virtue of their military power.

CENTERS OF GRAVITY ARE NOT "critical requirements" such as C2 systems, transportation nodes, LOCs, and the like. Although the latter facilitate communication and movement, they do not harbor and express fears, hopes, and expectations; make demands; make decisions; lead people; or direct units; as do moral and political CGs. Nor do they manufacture essential products, hold ground, or oppose enemy forces, as do physical CGs. Furthermore, and contrary to the current Joint Pub definition discussed in chapter 5, **centers of gravity are not characteristics, capabilities, or locations**; they are the moral, political and physical entities which **possess** certain characteristics and capabilities, or benefit from a given location/terrain. [1]

The Relationship Between Critical Capabilities & Critical Requirements

A National Leader: Critical Capabilities

What does a national leader have to be able to do, to function as a moral or political center of gravity (i.e., to govern effectively, to direct or influence national policy and political and military courses of action, to lead and/or inspire "the people")? Likely answers would suggest that normally such leaders must be able to (i.e., have the "ability" to):

[1] See below, chapter 5, page 93. If we apply the term "center of gravity" only to certain characteristics, capabilities or locations which affect designated military forces, then what do we call the military forces themselves?

(1) remain alive – unless he is more valuable as a dead martyr;

(2) stay informed (receive critical intelligence and information);

(3) communicate with government officials, military leaders, and the nation; and

(4) remain influential

Communication can be in person, word of mouth, electronic means, or letters and written proclamations. Whatever the means, the "people" must continue to believe that a leader-CG is alive and providing leadership even when they see no direct evidence. Dispossessing a leader-CG of some or all of these "critical capabilities" will degrade his overall ability to direct, govern, lead, and inspire. If this "overall ability" is degraded far enough, the leader will cease to be (cease to function as) a center of gravity.

A National Leader: Critical Requirements

There is a difference between "theoretical" critical capabilities and "real" critical capabilities. "Real" critical capabilities do not materialize out of thin air – they are created and sustained by the conditions, resources, and means[1] which are **required/essential** to make them real. Such conditions, resources, and means are in fact **critical requirements** which enable a critical capability to be fully operative (as opposed to being only theoretical,[2] notional,[3] or abstract [4]).

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[1] Means: ... a method or instrument by which an act can be accomplished ... [Webster's II.]

[2] Theoretical: Lacking verification or practical application : restricted to theory. [Webster's II.]

[3] Notional: Speculative or theoretical. Existing in the mind : imaginary. [Webster's II.]

[4] Abstract: Considered apart from concrete existence <an abstract idea>. Not applied or practical : theoretical. [Webster's II.]

A National Leader (who is a Center of Gravity)

Critical Capability (to) (examples of functions)	Corresponding Critical Requirements (examples of essential conditions, resources and means)
Remain alive:	☑ resources and means to be protected from all threats
Stay informed:	☑ resources and means to receive essential intelligence
Communicate: (Govern/command)	☑ resources and means to communicate with government officials, military leaders, national elites and "the people"
Remain influential:	☑ the leader's determination to persevere in a "cause" or course of action (whether for positive or negative reasons) (a condition)
	☑ a reason to maintain confidence or hope, or the realization that there is no viable alternative (either for his country, or for him personally, or both) (a condition)

(continued on next page)

Critical Capability (to)	Corresponding Critical Requirements
	☑ the continued support of the people and other powerful government and military leaders (regardless of whether said support stems from positive or negative motivations) (a condition)
	☑ (perhaps even) the freedom and means to travel and make public appearances safely

National Will/Public Support: Critical Capabilities

To function as a moral and political CG, what must a national public be capable of doing? Likely answers would suggest that normally the "people" must be able to (i.e., have the "capability" to):

(1) receive communications (information, propaganda, inspiration and instructions) from the national leadership and government;

(2) to communicate desires to a national leader/government;

(3) believe in and/or support a "cause" or particular course of action;

(4) believe in and/or continue to support a national leader and government; and

(5) impact/influence positively other CGs

National Will/Public Support: Critical Requirements

Again, each "critical capability" has to be supported by one or more corresponding "critical requirements":

Critical Capability (to) (examples of functions)	Corresponding Critical Requirements (examples of essential conditions, resources and means)
Receive communications:	☑ the means to receive communications
Communicate desires:	☑ the means to communicate (usually via strata of government or bureaucracy – lower to higher)
Believe in and/or support of a cause, course of action, or leader/gov't:	☑ motivation stemming from: ✓ confidence or hope in ultimate victory or success ✓ voluntary belief/support in a noble/necessary cause ✓ situations where the "people" see no viable alternative even in the absence of confidence or hope ✓ fear and intimidation (of/by own leaders)

(continued on next page)

Critical Capability (to)	Corresponding Critical Requirements
	☑ a popular perception that the cost of resistance will not exceed the anticipated benefits from victory or success (except in situations where the "people" see no viable alternative even in the absence of confidence or hope – as in a war of national extermination or suchlike)
Positively impact or influence other CGs: (a nat'l leader or gov't already covered above)	☑ means for effective mobilization of human resources for: ✓ labor for war industries, mining, agriculture, transportation, and other essential services ✓ manpower for active/auxilliary armed forces ✓ financial support and related activities ✓ armed resistance (guerrilla-type conflicts/operations) ✓ critical political activities (from local to national, on both sides of the front lines)

War/Defense Industrial Base: Critical Capabilities

To function as a physical CG, what must a national war/defense industrial base be capable of doing? Essentially it boils down to:

- Obtain essential physical resources,
- Transport them to manufacturing centers,
- Process them into effective weapons and related essential/supporting products, and
- Transport finished products to military forces.

War/Defense Industrial Base: Critical Requirements

These four basic capabilities (above) involve a host of critical requirements:

Critical Capability (to) (examples of functions)	Corresponding Critical Requirements (examples of essential conditions, resources and means)
Obtain essential physical resources:	☑ National ownership of accessible essential physical resources, or international access to them (meaning, countries being willing to sell them to you) ☑ Financial resources (for mining or international purchase) ☑ Skilled labor required for mining
Transport essential physical resources to manufacturing centers:	☑ Effective/efficient transportation system, to include ☑ Power to run vehicles/carriers (POL, electricity, etc.) ☑ The means to maintain the systems' essential components: ✓ Financial resources ✓ Skilled labor ✓ Equipment & resources

(continued next page)

War/Defense Industrial Base: Critical Requirements
(continued)

Critical Capability (to)	Corresponding Critical Requirements
	☑ The means to protect the system's essential components
Process physical resources into effective weapons and related essential/supporting products:	☑ Requisite manufacturing centers, to include ☑ Power to run the plants (electricity, etc.) ☑ The means to maintain the plants/ manufacturing capacity ✓ Financial resources ✓ Skilled labor ✓ Equipment, machine tools, other resources ☑ The means to protect vital manufacturing centers
Transport finished products to military forces:	(Same as "Transport ... to manufacturing centers.")

The above represents only a general depiction of "critical capabilities" and associated "critical requirements" at the strategic level. Nevertheless, it is easy to see how this concept could be applied to the "operational" and "tactical" levels, where the focus would be on individual components and even sub-components of the four main functions – obtain, transport, process, transport – of the overall system. (Looking ahead a bit, the relationship between "critical requirements" and "critical vulnerabilities" will become readily apparent.)

The Difference Between Economic/Industrial Centers of Gravity and Critical Requirements at the Strategic Level of War

"The first task ... in planning for a war is to identify the enemy's centers of gravity, and if possible trace them back to a single one." [1] The difference between an economic/industrial center of gravity and an entity which we would label as a critical requirement at the strategic level is a matter of strategic perspective. Admittedly, one could view the enormous American industrial strength in World War II as a "critical requirement" necessary to create and sustain our armies, fleets and air forces, and label it accordingly. That label and characterization, however, would misrepresent the strategic importance and status of our national industrial strength, especially in relation to the individual components (such as oil, coal, iron ore, railroads, electricity, factories, skilled workers, etc.) which contributed to it.

How Are We Doing So Far?

[1] On War, p 619. See this monograph, chapter 2, page 9.

"Centers of Gravity," "Critical Capabilties" and "Critical Requirements"

Examples Relating to the U.S. Pacific Fleet in WWII

U.S. Physical Centers of Gravity in the Pacific:

- **US Pacific Fleet**
  - **Submarines (Attacking the Japanese Merchant Marine)**
  - **Third/Fifth Fleet**
  - **Amphibious Assault Task Forces**

- Joint/Combined forces under MacArthur's command

- B-29s based in the Mariana Islands after June 1944

The next six pages contain examples relating **only to the U.S. Pacific Fleet's three major components** during World War II. **The examples listed are suggestive and not exhaustive.** Not listed, for example, are such things as doctrine and C2 systems. Although several tactical examples are provided, there is no end to the possible lists of tactical requirements associated with any single operational or tactical critical requirement, such as, for example, communication gear and systems for task force communication to higher headquarters, inter-task force communication (as with Operation Forager in June 1944), and the coordination of naval gun fire and close air support during an amphibious assault.

Submarines
(Attacking the Japanese Merchant Marine)

Critical Capability (examples of functions)	Corresponding Critical Requirements (examples of essential conditions, resources and means)
Project (theater-strategic) Power Long Distances: (MOVE / REACH)	☑ Forward bases (Darwin, Midway, Tulagi, Saipan/Guam) ☑ Long-legged, fuel-efficient, high-fuel capacity "boats"
Locate (operational) Targets: (SEE / FIND) (tactical)	☑ Excellent intelligence (ULTRA, etc.) ☑ General knowledge of shipping and convoy routes ☑ Excellent optics, RDF gear ☑ Sub-borne radar (later in war)
Surprise (tactical) Targets and their Escorts: (SURPRISE)	☑ Quiet "boats" ☑ Long-range optical gear (later, sub-borne radar) ☑ Ability to fire at long ranges ✓ Long-range torpedoes ✓ Long-range targeting system
Hit and (tactical) Destroy Targets: (KILL)	☑ Excellent optics and targeting system ☑ Good torpedoes (explode on contact/proximity) ☑ Good tactics (good firing angles at effective ranges)

(continued next page)

Submarines
(Attacking the Japanese Merchant Marine)
(continued)

Critical Capability		Corresponding Critical Requirements
Escape: (SURVIVE)	(tactical)	☑ Submarines capable of (after firing torpedoes): ✓ Diving deep, ✓ Getting away before convoy escorts close in, ✓ Remaining quiet, or otherwise hiding
Take Punishment: (SURVIVE)	(tactical)	☑ Well-built submarines able to withstand depth charges (except for very near or direct hits) ☑ Damage control procedures (for minor damage) ☑ Well-trained, well-steeled crews
Maintain Sub Fleet Strength: (RECOVER and EXPAND)	(national-strategic) (theater-strategic)	☑ Capacity to more than replace losses in boats and crews ☑ Excellent permanent repair facilities (Pearl Harbor)

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Up Next: U.S. Third/Fifth Fleet

Third/Fifth Fleet

Critical Capability (examples of functions)		Corresponding Critical Requirements (examples of essential conditions, resources and means)
Project Power	(theater-strategic)	☑ Secure bases/anchorages (Pearl Harbor, Ulithi)
Long Distances:	(theater-strategic)	☑ Well-provisioned forward logistics bases
(MOVE)	(operational)	☑ Robust, long-legged sea train
(REACH)	(operational)	☑ Fast, fuel-efficient, high-fuel capacity large warships
	(operational)	☑ Large fleet carriers
	(tactical)	☑ Excellent carrier aircraft, flown by skilled airmen
	(tactical)	☑ Excellent ship-to-ship refueling and supply system
Locate Enemy Fleet Units: (SEE)	(theater-strategic)	☑ Excellent theater-strategic intelligence (ULTRA, etc.)
	(operational)	☑ Long-range recce aircraft; RDF; submarine patrols
	(tactical)	☑ Carrier-borne reconnaissance aircraft; shipboard radar

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Third/Fifth Fleet
(continued)

Critical Capability	Corresponding Critical Requirements
Parry and Survive Enemy Air & Sub Attacks: (DEFEND) (SURVIVE) (tactical)	☑ Excellent anti-aircraft defenses ✓ Shipboard radar ✓ Excellent defensive fighter control system ✓ Heavy & effective AAA ☑ Excellent damage-control procedures ☑ Rugged, well-built ships ☑ Excellent anti-submarine escort vessels ☑ Well-trained, highly-motivated sailors
Destroy Enemy Fleet Units: (KILL) (tactical)	☑ Effective carrier-borne attack aircraft ☑ Effective surface warships (if ship-to-ship engagements) ✓ Shipboard radar, fire-control systems, etc.
Maintain Fleet Strength: (RECOVER) (& EXPAND) (national-strategic)	☑ National capacity to more than replace losses ✓ Warships and aircraft (all types) ✓ Superb pilot training program ✓ Sea train units ✓ Logistics, logistics, logistics
(theater-strategic)	☑ Excellent permanent repair facilities (Pearl Harbor)
(operational)	☑ Excellent mobile repair facilities (floating dry docks)

(Applies also to Amphibious Assault Task Forces, next page)

Amphibious Assault Task Forces

Critical Capability (examples of functions)	Corresponding Critical Requirements (examples of essential conditions, resources and means)
Select (theater-strategic) **Targets:** **(LOOK)** (operational) **(EXAMINE)**	☑ Intelligence on enemy plans, capabilities (ULTRA, etc.) ☑ Intelligence on suitability of target vis á vis strategic and campaign objectives (airfields/sites for)
(tactical)	☑ Intelligence on enemy defenders and defenses and terrain obstacles (submerged coral reef)
Project (theater-strat) Power (operational) Long Distances: **(MOVE/REACH)**	☑ Forward troop bases/assembly ports ☑ Long-legged troop transports ☑ Robust, long-legged sea train
Parry (operational) **Enemy Threats in Transit to** (tactical) **Target Area: (ARRIVE INTACT)**	☑ Protection by US Pacific Fleet or the ☑ Absence of threat by the Imperial Japanese Navy ☑ Escort screen (against submarines)
Amphibious (tactical) **Assault -- Ship-to-Shore Movement: (MOVE to CLOSE)**	☑ Air supremacy over the objective area ☑ Noninterference by the Imperial Japanese Navy/subs ☑ Sufficient, suitable landing craft ☑ Well-trained landing-craft crews ☑ Well-trained, well-steeled assault troops

Amphibious Assault Task Forces
(continued)

Critical Capability	Corresponding Critical Requirements
Amphibious Assault -- Suppress/Destroy Enemy Defensive Firepower: (SUPPRESS or KILL) (tactical)	☑ Air supremacy over objective area ☑ Effective naval bombardment force ✓ Older battleships dedicated, trained and equipped for Naval Gun Fire (NGF) against enemy defenses ☑ Close Air Support (CAS) from escort-carrier force ✓ Pilots trained/dedicated to close air support ✓ CAS aircraft ✓ CAS ordnance
Capture Heavily-defended Objectives: (tactical)	☑ Suppression of enemy (ground) firepower by NGF/CAS ☑ Elite units able to function while suffering high casualties ☑ Ship-to-shore logistical support ✓ Transports off shore for the duration of the operation
Preserve Infantry Assault Units: (PRESERVE & RECOVER) (oper/tac) (operational) (strategic) (unit level)	☑ Rotate/replace units during operations (if possible) ☑ Withhold units from current operation to prepare for the next ☑ Capacity to replace losses; create new units ☑ Excellent Esprit de corps of assault units (old and new) ☑ Veteran soldiers maintain perseverance and will to win

Look at "Critical Requirements" to Discover "Critical Vulnerabilities"

Critical Vulnerabilities: Critical Requirements or COMPONENTS THEREOF which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive results – the smaller the resources and effort applied and the smaller the risk and cost, the better.

For three years the Japanese sought desperately to find critical vulnerabilities among the critical requirements [1] associated with American amphibious operations leap-frogging across the Pacific toward the Japanese Home Islands. The Japanese failed time and again; but they came uncomfortably close on at least five occasions:

Guadalcanal
8-9 August 1942

Betio (Tarawa Atoll)
20 Nov 1943

Leyte Gulf
24 October 1944

Iwo Jima
19 February 1945

Okinawa
April - June 1945

[1] Although they did not use the CG-CC-CR-CV vocabulary, Japanese commanders thought and planned in accordance with at least a rough approximation of this concept in each of the five occasions described.

Guadalcanal
8-9 August 1942

U.S. Critical Capability:	Seize Island Objectives (Japanese-held islands)
U.S. Critical Requirement Considered by the Japanese to be a Critical Vulnerability:	Ship-to-shore logistical support

In quick reaction to American landings on Tulagi & Guadalcanal, Japanese aircraft at Rabaul launched a series of daylight attacks against the supporting U.S. cargo ships, so disrupting their activities that by nightfall (8 August) some of them were only 25 percent offloaded. Heading toward the area at full speed was a Japanese force of five heavy and two light cruisers and a destroyer, commanded by Vice Admiral Gunichi Mikawa. His mission was to break up the invasion by a night attack on the transports. In a confused night battle which began one hour after midnight, Mikawa's ships sank 4 Allied cruisers with only minor damage to themselves. At 0220, Mikawa ordered his ships to regroup north of the battle area. Mindful that he had not completed his mission, Mikawa considered reentering "Iron-bottom" Sound to blast the transports. He instead elected to retire speedily northwestward, so as to escape retaliatory daylight air strikes from nearby American carriers, and also to lure those carriers closer to Rabaul-based Japanese aircraft.

In the heat of battle, Mikawa changed his priorities (and his mission) from destruction of the American transports to the preservation of his own force and the destruction of the American carriers. Understandable as his decision might be, he thereby lost his opportunity to sink the critically important American cargo ships.

Betio (Tarawa Atoll)
20 Nov 1943

U.S. Critical Capability:	Suppress Japanese Defensive Firepower
U.S. Critical Requirements Considered by the Japanese to be Critical Vulnerabilities:	Adequate Intelligence on Japanese Defenses, and an Effective Naval Bombardment Force

The Japanese on Betio conceived, constructed and concealed their defenses to ensure that enough troops and defensive firepower would survive a preinvasion American air and naval bombardment to slaughter the American assault troops in the water and on the beach, thereby defeating an invasion of Betio island (even if the Japanese Navy could not come to their aid). The Japanese commander on Betio was banking that hoped-for deficiencies in two American critical requirements would be great enough to turn them into critical vulnerabilities:

(1) "Adequate" Intelligence. The Americans knew the extent of the Japanese defenses, but failed to appreciate their "hardness" or invulnerability to ordinary high explosive bombs or shells. Nor did the American planners heed vital information (written into Admiral Turner's operation plan) about the depth of water over an offshore coral reef during periods of neap tides. This omission, miscalculation or mistake meant that on D-Day the conventional non-tracked landing craft carrying the 4th, 5th and 6th waves of Marines grounded on the edge of the reef. Unexpectedly their passengers had to wade through six hundred yards of chest-deep, machine-gun swept water just to reach a beach which was itself under intense enemy fire.

Betio (Tarawa Atoll)
20 Nov 1943
(continued)

(2) **An Effective Naval Bombardment Force**. Whereas the Americans thought that it would be more than adequate, the preparatory bombardment was woefully insufficient because the ammunition used failed to penetrate bunkers sheltering Japanese troops. When the naval bombardment was lifted (to avoid friendly casualties) the first wave was still 15 minutes from the beach – plenty of time for the relatively unscathed Japanese defenders to emerge from their bunkers and man their defenses. Although the amtracs carrying the first three waves of Marines were able to crossover the coral reef, they did so under a crescendo of anti-boat, machine-gun and rifle fire that killed or wounded many of the passengers.

The Marines succeeded in seizing the tiny island in a gruesome four-day battle in which they paid a shockingly high price in dead and wounded. Had there not been enough Marines in the task force to compensate for the terrible D-Day casualties, or had they been ordinary soldiers, history would have recorded a Japanese victory in the battle for Betio on 20 November 1943. Fortunately significant deficiencies in two American critical requirements (i.e., "potential" critical vulnerabilities) were more than compensated for by a third critical requirement: a sufficient number of elite assault troops able to function – to close with and destroy the enemy – while suffering horribly high casualties.

Leyte Gulf
24 October 1944

U.S. Critical Capability:	Seize Island Objectives (Japanese-held islands)
U.S. Critical Requirement Considered by the Japanese to be a Critical Vulnerability:	Ship-to-shore Logistical Support

The Japanese responded to the American invasion of Leyte on 20 October 1944 with their SHO-1 plan. SHO-1 was designed to defeat the invasion by destroying the US cargo ships which supported it – if necessary by sacrificing most of what remained of the Imperial Japanese Navy. The success of SHO-1 depended on Admiral Takeo Kurita's "Center Force" of 5 battleships, 12 cruisers and 15 destroyers, which would be assisted by a smaller "Southern Force". The mission of both forces was to destroy the American transports and cargo ships in Leyte Gulf in a simultaneous attack from two different directions. A third Japanese "Northern Force" under Admiral Ozawa acted as a decoy to lure Admiral Halsey's US Third Fleet – including its fast battleships – northward. The plan started well in that Halsey took the bait – but only after his big fleet carriers had given Kurita's ships a good pounding and reported them retreating. But Kurita reversed course again, and shortly after midnight emerged undetected from the San Bernardino Strait with most of his force intact. Reassured by Japanese reports that Halsey was (finally) off to the north in pursuit of Ozawa's decoy force, Kurita sped east, then cut south along the coast of Samar toward Leyte Gulf.

Leyte Gulf
24 October 1944
(continued)

Between 0600 and 1130 Kurita's ships engaged in a running battle with aircraft and destroyers from three groups of American escort carriers supporting the invasion. Although inflicting little serious damage, the intensity and aggressiveness of the air attacks in particular confused and unnerved Kurita. He believed that such furious attacks could come only from Halsey's big fleet carriers which must be nearby (despite Japanese reports to the contrary), and that Halsey's fast battleships must also be closing rapidly behind him. Kurita therefore ordered his entire force to (again) turn about. It is not clear whether he was motivated by fear (to preserve his force to fight another day) or glory (to engage a target far more worthy of a warrior than a bunch of lowly cargo ships). Regardless, by the time he discovered that Halsey's battleships were not in his rear, he had steamed too far north to turn back around in pursuit of his original mission.

Under SHO-1, it was clearly understood that Kurita's force was expendable in the context of an opportunity to destroy the American cargo ships and transports. Kurita, however, changed his priorities and mission in the heat of battle. In so doing, he squandered a "possible" opportunity to accomplish his original mission – had, of course, he been able to deal successfully with the older American Seventh-Fleet battleships (which had already destroyed the Japanese "Southern Force" in the Surigao Strait) as he entered the mouth of Leyte Gulf.

Iwo Jima
19 February 1945

U.S. Critical Capability:	Suppress Japanese Defensive Firepower
U.S. Critical Requirements Considered by the Japanese to be Critical Vulnerabilities:	Adequate Intelligence on Japanese Defenses, and an Effective Naval Bombardment Force

With all hopes of victory long since gone, by 1945 the Japanese had adopted a strategy designed to inflict maximum casualties on American ground and naval forces in the hopes of securing something more than unconditional surrender. The Japanese conceived, constructed and concealed their defenses on Iwo Jima toward that end. There would be no defiant, futile direct defense of the landing beaches. Instead all likely landing areas were covered indirectly with all manner of weapons dug into the volcanic rock of Iwo Jima in deadly combinations of reverse and frontal slopes. A successful Japanese defense was predicated on the expectation that American intelligence resources would be unable to detect the full extent and nature of their defenses – and that the American preinvasion air and naval bombardment plans would be flawed accordingly.

The Japanese plan almost worked. H-Hour on D-Day, 19 February 1945, was preceded by an intense three-day bombardment which culminated in the heaviest "prelanding" bombardment of the war (85 minutes of deliberate, aimed shelling; followed by rocket, machine gun, and bombing attacks by more than a hundred Fifth Fleet aircraft; followed by a fast "neutralizing fire"; fol-

Iwo Jima
19 February 1945
(continued)

lowed by planes again strafing the beaches just prior to touchdown by the first wave of landing craft). Nevertheless, most of the Japanese defenses and defenders remained intact – to the horrible surprise of the Marines hitting the beach.

The US bombardment force had been relatively ineffective in neutralizing the Japanese defenses. Had there not been enough Marines in the task force to compensate for the terrible D-Day casualties, or had they been ordinary soldiers, on 19 or 20 February 1945 history would have recorded a Japanese victory in the battle for Iwo Jima. As was the case at Betio, the inherent strength in a third critical requirement prevented significant deficiencies in two other critical requirements from becoming critical vulnerabilities. Once again, an American amphibious task force contained sufficient numbers of elite assault troops able to suffer horribly high casualties and still close with and destroy the enemy – even though total American casualties exceeded those suffered by the Japanese defenders.

Okinawa
April - June 1945

U.S. Critical Capability:	Seize Island Objectives (Japanese-held islands)
U.S. Critical Requirements Considered by the Japanese to be Critical Vulnerabilities (i.e., deficient or lacking in effectiveness):	Intelligence on Japanese Defense Capabilities, Air Defense Fighter Screen, and Anti-Aircraft Armament (AAA) on US Fifth Fleet Warships Protecting Ship-to-Shore Logistical Support

The Japanese based their defense of Okinawa on the Shuri line and the *kamikaze*. As was the case at Peleliu and Iwo Jima, the Japanese established their main line of resistance inland – constructing an elaborate system of caves and pillboxes with deadly fields of fire in naturally hilly terrain at a narrow waist of the island about five miles north of the port of Naha. From that position the Japanese believed that their 77,000 defenders could defend the southern third of the island for a good long while. Time enough for *kamikaze* air attacks to inflict decisive losses on U.S. Fifth Fleet warships, which shielded the transports and cargo ships which supported the American ground forces. The Japanese imagined two possible victorious scenarios. The *kamikazes* might compel the Americans to quit the invasion outright. If not, a serious weakening of the Fifth Fleet would permit the Japanese to redirect their *kamikazes* against the American ship-to-shore logistical support. Deprived of full air support and critical supplies and ammunition, the American ground forces would themselves be vulnerable to counter-attack by the carefully husbanded Japanese gar-

Okinawa
April - June 1945
(continued)

rison. The Japanese perceived two American critical vulnerabilities: (1) poor U.S. intelligence regarding Japanese defenses on Okinawa as well as the existence of large numbers of *kamikazes* in the Japanese Home Islands, and (2) the vulnerability of American warships to large-scale *kamikaze* attacks.

It was a good plan. Several Marine and Army divisions took nearly three months to break through the Shuri line, at a cost of 7,613 killed and 31,800 wounded. Fifth Fleet fighters could not form an impenetrable barrier, and the relentless *kamikazes* sank 34 vessels (none larger than a destroyer) and damaged 368 others (many seriously). Fortunately the fighters were able to break up most of the *kamikaze* formations and to shoot many of them down. Shipborne AAA accounted for many more; while thousands of skilled and courageous sailors made damage control an effective last line of defense. Once again, strengths in several critical requirements enabled the vast armada of warships, transports and cargo ships to continue supporting the battle ashore, while it inflicted and suffered serious damage in its own deadly battle at sea. When it was all over, American intelligence had proven to be somewhat deficient, and the vast American invasion armada had proven to be somewhat vulnerable. But because the American fighter screen and ship-borne AAA and damage control parties were more effective than the Japanese had anticipated, because of the sheer size of the invasion armada, and because of the fighting spirit and stamina of the soldiers and Marines ashore – there were no American "critical" deficiencies or vulnerabilities.

A Precise Relationship Exists Between "Centers of Gravity" and "Critical Vulnerabilities"

Critical Vulnerabilities are weaknesses which can be exploited to undermine, neutralize and/or defeat an enemy center of gravity. **By definition, a center of gravity cannot also be a critical vulnerability.** Currently, there is considerable confusion on this point. Understanding the relationship among CGs, critical capabilities, and vulnerable critical requirements (i.e., critical vulnerabilities) not only permits, but compels, greater precision in thought and expression. In our business, greater precision is important.

Take for example an enemy air defense system that is well developed and equipped, robust, and manned with well-trained crews. The friendly commander regards it as an enemy center of gravity – an agent/instrument of strength and power. But his planners have also identified a number of critical vulnerabilities: the system's primary power supply, its command and control net, and its radar sites (the latter to advanced technology missiles when the sites are 'turned on'). There are two ways to express/brief this situation:

> First: "Sir. The enemy air defense system is a vital component of the enemy's overall military power in this theater of operations; it is one of his principal centers of gravity in this theater of operations. It must be destroyed or neutralized before we can conduct effective, sustained air attacks against any of his front-line ground forces or his mobile, elite reserve units. Fortunately, the air defense system is highly vulnerable. In fact, we consider it to be the enemy's

> number one critical vulnerability, which we intend to exploit in the following manner. Prior to D-Day we will use our advanced technology missiles to destroy or neutralize the system's radar sites while we simultaneously target the system's primary power supply and principal command and control centers. Sir, with the air defense system disposed of, the rest of our plan will unfold in the following manner. ...."

OK. What do you think? Not bad? Think that was clear enough? Despite calling the air defense system both a center of gravity and a critical vulnerability, the briefing probably is clear enough and good enough. But consider the alternative:

> Second: "Sir. We regard the enemy's air defense system to be one of his principal centers of gravity in this theater of operations. It must be destroyed or neutralized before we can conduct effective, sustained air attacks against any of his front-line ground forces or his mobile, elite reserve units. To be effective, the vital components of the air defense system have to be able to see us, communicate internally, and shoot us. See, talk, shoot – these are the system's critical capabilities. Based on our examination of the system's critical requirements, which enable it to see, talk, and shoot, we have identified and plan to exploit three critical vulnerabilities: prior to D-Day we will use our advanced technology missiles to destroy or neutralize the system's radar sites while simultaneously targeting the system's primary power supply and principal command and control centers. Sir, with the air defense system no longer able to see, talk, or shoot, the rest of our plan will unfold in the following manner. ...."

The second version expresses more clearly the relationship and linkage between center of gravity and critical vulnerabilities. The power supply, command and control net, and radar sites are the "critical vulnerabilities," **not the air defense system itself.** The Imperial Japanese Navy in World War II provides another example. The fleet oilers necessary to refuel the fleet at sea and the fuel supply itself (critical requirements) were both "critical vulnerabilities". **A critical vulnerability is the thing which makes a center of gravity vulnerable. Even when a center of gravity itself contains/possesses a critical vulnerability, CG still** does not equal CV.

Furthermore, only vulnerabilities related to centers of gravity are "critical" vulnerabilities. If something is vulnerable but relatively irrelevant, then so what? We can list it as vulnerability, but not as a "critical vulnerability".

The CG-CC-CR-CV Concept Applied to the 1986 Version of Army FM 100-5

Because chapter 5 will review only **current** Joint/Service doctrinal manuals/publications (regarding discussions of centers of gravity and critical vulnerabilities), it will address the June 1993 version of FM 100-5, which contains a briefer discussion of centers of gravity with far fewer examples compared to the 1986 version of Army FM 100-5. But because so many folks are familiar with it, and because its treatment of centers of gravity is more elaborate with many more examples (than the 1993 version), the 1986 version will be analyzed below in light of the CG-CC-CR-CV concept. (The passage dissected below was reprinted above on pages 33-35.) Much of what the 1986 version said regarding centers of gravity applies instead to critical requirements. If its

definition of centers of gravity were modified *à la* the CG-CC-CR-CV concept, the following two sentences **would apply directly to the concept of critical requirements** (instead of centers of gravity):

> "As with any complex organism, some components are more vital than others to the smooth and reliable operation of the whole. If these are damaged or destroyed, their loss **unbalances the entire structure**, producing a cascading deterioration in cohesion and effectiveness which may result in complete failure, and which will invariably leave the force vulnerable to further damage."

According to the CG-CC-CR-CV concept, most of the items listed as examples of centers of gravity in the 1986 version of FM 100-5 are instead critical requirements as is indicated below and on the next four pages:

Examples Centers of Gravity according to 1986 FM 100-5:	**As indicated below, most of these items are "Critical Requirements" (CR) (corresponding CCs and CGs are indicated in parenthesis):**
Tactical:	
• a key command post	**Caution!** CG only if "command post" = the commander himself; but if it = the whole works, then it is a CR. (CC = capability to exercise effective C2) (CR = required equipment and staff)
• a key piece of terrain	CR (CC = capability of a given force to defend an area – either via superior firepower, possession of "good" ground, or some other advantage) (CG = the force defending the area/key piece of terrain)

Operational:

• the mass of the enemy force	CG (but see chapter 2, page 9, "A Word of Caution Regarding 'Mass' Since Clausewitz' Day")
• boundary between two major combat formations	**CV: boundaries are usually prime candidates for being weaknesses** CR = the means to coordinate and to cover gaps, seems and flanks. (CC = the capability of the two formations to coordinate operations side-by-side) (CG = the formations themselves or the larger force to which these formations belong, or a related entity such as a commander controlling the formations)
• vital command and control center	CR (see "a key command post" above)
• logistical base or LOCs	CR (CC = capability for logistical sustainment) (CG = forces being sustained, and/or the commander controlling the forces being sustained)
• St. Vith (Battle of the Bulge 1944)	St. Vith itself should <u>not</u> be referred to as a CG, CC, or CV. (CRs = surrounding terrain and road network.) (CC = the capability of the outnumbered American forces to disrupt and delay German spearheads long enough to permit General Eisenhower to assemble a strategic response to the German offensive.)

	(Local CG = the American forces defending St. Vith.) (Potential CV = a US command **decision** to defend St. Vith too long with too many US forces which would have been surrounded and lost.) (See discussion on "Obstacles" later in this chapter.)
• (Abstract) cohesion among allied forces	CRs = factors which contribute to cohesion (CC = the capability of Allied forces to work well together) (CG = the forces themselves)
• (Abstract) mental, psychological balance of a key commander	CR = mental/psychological balance of a commander. (CC = the capability of a commander to exert a positive influence on battles, campaigns, and strategies.) (CG = the commander himself and/or the forces he commands)

Strategic:

• a key economic resource or locality	CG(?) The words "manufacturing asset" would be more appropriate. The word "resource" can apply to specific components of the total economic system, such as for example, oil, coal, or iron ore, which – even if they exist in great abundance – do not by themselves manufacture anything. (The CG is not the "locality" per se but the manufacturing assets capable of producing significant quantities of vital strategic finished products –

such as the assets located in the Ruhr, Silicon Valley, or the Youngstown-Pittsburgh area in WWII. Oil, coal, minerals, electricity are supporting critical requirements.)

- strategic transport capabilities

CC (See pages 53-55, this chapter.)
CR = strategic transport assets

- vital part of the homeland

CG – but only if it is a base for manufacturing or human assets, or a capital city. Plain old "key terrain" does not qualify as a CG. (See the discussion on "Obstacles" later in this chapter.)

- a wholly intangible thing – such as the moral importance of Verdun in 1916

Caution! At the national strategic level the French will to fight would be considered a moral CG – since the people of France might continue to resist even if most of her field armies were destroyed, as in 1870. However, at the operational level the following terms would apply:

CRs = French will to fight for Verdun, and the terrain and defenses surrounding Verdun.

CC = the capability of French forces to defend Verdun against the German onslaught.

CG = the French forces defending Verdun (and, to a higher level commander, those which could be committed to its defense). Without forces to

defend Verdun, it will be lost to the Germans whether France continues to resist or not. The forces are the CG; the CC is their capability to defend Verdun; the CRs are the conditions, resources, and means necessary to make the CC a reality.

(Potential CV = If the Germans had possessed enough forces to envelop Verdun, and the French High Command remained determined to hold it at all costs, sizable French forces could have been surrounded.) (See the discussion on "Obstacles" later in this chapter.)

- popular and political support of the war (struck directly by enemy attacks at Dien Bien Phu in 1954 and TET in 1968)

Caution! French and American popular support for the respective war efforts had already begun to wane before these battles (especially in 1954). Far then from being a Clausewitzian center of gravity, **"the existence of a <u>minimum level</u> of popular support for the war effort"** had become a problematical CR in support of a CC – the ability of the gov't to continue waging war. In 1954 Dien Bien Phu was merely the last nail in the French coffin. While TET in 1968 was not the last nail in the American coffin, neither was it the first. If French and American public support ever was a genuine CG in either conflict, it ceased to be well before Dien Bien Phu and sometime before TET.

(Discussion of 1986 version of FM 100-5 continued)

True, extensive knowledge of an enemy's "physical and psychological strengths and weaknesses" is necessary to identify his centers of gravity, as well as his critical vulnerabilities. However, knowledge of his "organizational make-up," and "operational patterns" is likely to be more directly applicable to the identification of critical capabilities, critical requirements, and critical vulnerabilities. The "replacement of a key enemy commander [or] the fielding of new units" can in fact produce changes in an enemy's center(s) of gravity. However, a "major shift in [his] operational direction" is more likely to affect his critical capabilities and corresponding critical requirements than it is to change his operational center(s) of gravity – unless the change in "direction" is accomplished with new units. "New weaponry" may or may not change an enemy's center of gravity. On the one hand, it may merely enhance capabilities of units already identified as CGs. On the other hand, it may involve a totally new type of enemy unit, or transform the capabilities of existing (nonCG) units so dramatically that they are upgraded to CG status.

Finally, the 1986 version of FM 100-5 admonished commanders to adopt "indirect means" to deal with enemy centers of gravity, because in all likelihood they will be well protected.[1] While this is sound advice *à la* the CG-CC-CR-CV concept, it is confusing in the context of what it was meant to say in 1986 – which was: do not attack **directly** those things listed on the above four-and-a-half pages (examples of the source of an enemy's *balance*) because they are likely to be strongly defended; instead use "indirect means" to force the enemy to "expose" these things to attack. **The irony is that most of the things listed on the above four-and-a-half pages are typical of objectives commonly targeted by indirect attacks against enemy critical vulnerabilities (vulnerable critical requirements). If we are not to attack things such as these, what are we to attack?** The admonition cited at the beginning of this paragraph makes sense

[1] FM 100-5 Operations. HQ Department of the Army, May 1986, pp 179-180, Appendix B "Key Concepts of Operational Design".

only according to the Clausewitzian meaning of CGs: that we should use indirect means to degrade, destroy, or neutralize "vulnerable" critical requirements relative to selected enemy CGs; and not attempt to attack well-defended or otherwise inaccessible critical requirements. In the future, our enemies will present us with two kinds of critical vulnerabilities: those which he presents to us through negligence (faulty strategies and operations) and those which will exist (despite the enemy's best efforts) because of our superior national military and supporting capabilities (see Appendix, pages 149-152). But there are no guarantees that either kind of critical vulnerability will exist; which is why we should retain the capability to pit strength against strength successfully in situations where it will be required.

(End discussion of 1986 version of FM 100-5)

O.K.

How Do Force Multipliers & Obstacles Fit into the CG - CC - CR - CV Concept?

"FORCE MULTIPLIERS" are Critical Requirements in support of Critical Capabilities; They are NOT Centers of Gravity

A "force multiplier" is not a center of gravity. It is instead an advantage derived from a stratagem; deception; or superior training, equipment, technology, command and control, etc., which enables a force to fight with an effectiveness beyond that which would normally be indicated by force ratios. A force multiplier,

for example, could transform a 1-1 actual force ratio into a 3-1 effectiveness force ratio; a 1-2 into a 2-1 ratio; or a 2-1 into a 10-1, etc. A laser-based targeting system and long-range main armament, for example, are "force multipliers" which made each M1A1 tank worth "X" number of Iraqi tanks during the Persian Gulf War. The Seventh Corps was an operational Allied CG. A critical capability relative to that CG was the ability of American tanks to shoot farther and with greater accuracy than enemy tanks in good and poor visibility. The M1A1's targeting system and armament were "critical requirements" for that capability. **Force multipliers are "critical requirements" (or components thereof) which support "critical capabilities". (To avoid confusion, the converse is not always true; CRs are not always force multipliers.)**

Radar and The Battle of Britain

British CG:	RAF Fighter Command
Critical Capability:	To meet Luftwaffe attacks in a timely manner
Critical Requirement:	Advance warning regarding the timing, strength and location of Luftwaffe attacks

Because of its critical importance, radar is sometimes (mistakenly) referred to as a British center of gravity during the Battle of Britain. More accurately, it was a vital component of a critical requirement supporting one of Fighter Command's critical capabilities – other components were ULTRA and forward air observers. Advance warning acted as a force multiplier for an outnumbered and beleaguered RAF Fighter Command. The fragility and vulnerability of the radar system made it a classic critical vulnerability; but not realizing its full importance, the Germans failed to follow up their early desultory attacks against it.

Operation FORTITUDE *and* *Operation* OVERLORD *(examples)*

Allied CG: Capable amphibious and airborne divisions

Critical Capability: To deceive the Germans as to the precise timing, location and scale of the invasion

Critical Requirement: An effective deception plan

The FORTITUDE deception plan was a critical requirement in support of a critical capability deemed necessary by Eisenhower for the success of OVERLORD. FORTITUDE acted as a force multiplier by freezing critically important German reserve divisions in place while Eisenhower's assault forces seized and secured a beachhead. FORTITUDE itself had a vast array of components (dummy equipment, false radio traffic, false intelligence, the double-cross system of turned enemy agents, etc.) which contributed to its amazing success. Neither the plan nor the capability it reflected should be referred to as a center of gravity.

The P-51 Mustang
and
Operation OVERLORD
(examples)

Allied CG:	Strategic and Tactical Air Forces under General Eisenhower's command or direction
Critical Capabilities:	To gain and maintain air supremacy over northern France (dominate the Luftwaffe), and simultaneously provide air support to Allied ground forces (attack ground targets)
Critical Requirements:	Superior air-to-air, long-range fighter planes, and capable air-to-ground attack aircraft

Allied possession of a superior air-to-air long-range fighter plane in the P-51 Mustang was an effective force multiplier that made all other aircraft in the Allied strategic and tactical air forces supporting Operation OVERLORD far more effective. As did the P-47 Thunderbolt ground-attack aircraft, the P-51 Mustang possessed performance characteristics which met a critical requirement in support of a critical capability necessary for Allied air forces to function as a center of gravity in relation to OVERLORD. Examples of related critical requirements would be on-the-ground forward air controllers, a ground-to-air communication system, a targeting and sortie allocation system, etc. The P-51 Mustang should not be referred to as an Allied center of gravity for Operation OVERLORD.

It Is More Precise To Say ....

Thinking about British radar, FORTITUDE, and the P-51 Mustang as "critical requirements" or vital components thereof (instead of centers of gravity) permits us to be more precise about the relationship between CGs and CVs – whereas the current doctrinal menu encourages some folks to call radar in 1940 a British CG and others to call it a critical vulnerability. British radar was a force multiplier serving as a vital component of a critical requirement. Because it was extremely vulnerable to Luftwaffe attack, it was also a critical vulnerability. It is less precise to say that Fighter Command (a center of gravity) was vulnerable, or to call Fighter Command itself a critical vulnerability. **It is more precise to say that the vulnerability of the radar system – if fully exploited by the Luftwaffe – could have made the pilots and machines of Fighter Command much less effective.**

CRITICAL OBSTACLES (Geographical, Topographical, Terrain and Meteorological Features) [1] – Though Less Easily Dismissed – Are Also NOT Centers of Gravity

The same goes for critical obstacles, which are closely related to "force multipliers". Both enable fewer forces to accomplish a task or mission than would otherwise be the case;

[1] Geographical: Of or relating to geography. Concerning the topography of a specific region.
Topography: The physical features of a place or region.
Terrain: The physical character of land : topography.
Meteorological: Atmospheric phenomena, esp. weather and weather conditions. [Climatical]
[Webster's II.]

both can be powerful force effectiveness enhancers; neither are centers of gravity. (That is not to say that a CG cannot produce a force multiplier effect – such as Napoleon's appearance on the field of battle galvanizing French troops, or overwhelming air support for advancing ground forces.)

A Mountain Range. Let's take the case of a rugged mountain range which is impassable except via two long, narrow passes. A defending force of only four high-quality, appropriately-equipped divisions stands a good chance of holding off an attacking force three times its number. The defenders have two key advantages: (1) defending on "good ground," and (2) in all likelihood only two of the attacking divisions can be used simultaneously. This situation "enhances" the effectiveness of the four defending divisions well beyond what it would be in ordinary open ground. But suppose three of the attacker's divisions are air-assault divisions, akin to the 101st Air-Assault Division, and another is an airborne division – with the capability to fly over the mountain range and operate in the enemy's undefended rear area. Are the narrow mountain passes still an obstacle for the attacker, or a death-trap for the defender?

A Wide Desert. A wide desert can have a similar effect. Having ten armored divisions to pit against the defender's three loses its pizzazz if the ten have to cross a 400-mile wide desert with a two-division logistical support system (i.e., to get them across the desert and to support them on the far side in sustained combat operations). In this case the desert hugely enhances the effectiveness of the three defending divisions. But suppose the attacker has a ten-division logistics capability, total air supremacy, and the ability to conceal/mask his route(s) of approach across the desert. Is that desert an obstacle enhancing the effectiveness of the defenders, or is it a highway offering the attacker multiple avenues for surprise attack?

The two examples above show that an obstacle can in some cases be a double-edged sword depending on the capabilities of the combatants. We should not focus on obstacles being centers of

gravity; we should instead focus on critical capabilities and critical requirements as they are driven or influenced by obstacles.

The English Channel in World War II

The English Channel is commonly viewed as one of the greatest geographical or topographical obstacles in modern history. It is credited with saving Great Britain from invasion in 1940, following the sudden and unexpected collapse of the French Army. In 1942 and 1943, it gave Hitler a chance to economize on forces in the West so he could make maximum efforts in the East. In 1944, it gave a second-rate German garrison in France a chance to defeat the impressively superior Allied military power in England.

As an Obstacle. In 1944 two-thirds of the German garrison in France defending the "Atlantic Wall" consisted of second and third-rate divisions. German naval and air power was minimal. Nevertheless, the German defenders had two huge advantages: (1) General Eisenhower could conduct a D-Day amphibious assault with only a fraction of his available divisions, and (2) the limited number of suitable invasion beaches were defended by German units heavily dug in with plenty of firepower and backed by powerful panzer reserves. (The Germans had a third advantage in that any opposed amphibious assault is inherently risky business.) Although D-Day, 6 June 1944, was an overwhelming Allied success, that result should not obscure the fact that to achieve an acceptable level of risk required **monumental** planning, preparation, and air-sea-land forces. In a normal campaign or operation across open ground, the German forces in France could have been defeated handily with less than half the effort. This summary of German advantages supports those who would call the English Channel a German CG (or words to that effect).

As a Double-edged Obstacle, or even a Highway. On the other hand, the Channel also gave the Allies some important advantages in 1944. It was a huge barrier to German intelligence;

in many cases the Germans saw only what the Allies wanted them to see. Secondly, the world's oceans and seas offer sea worthy vessels an expanse of highways. Was a task force departing Southampton bound for Brest, Cherbourg, Le Havre, or Calais (assuming that the Germans even spotted it)? The Channel thus offered a mixed bag of pluses and minuses for both sides. **But what if General Eisenhower had been able to get his hands early and easily on enough landing craft to conduct an amphibious assault with thirty divisions simultaneously?** How would that alteration have affected the relationship between the Channel and German power? In all likelihood, far fewer folks would call the Channel a German CG (or words to that effect), because it would no longer have functioned as a force effectiveness enhancer for the Germans; their coastal defense formations and mobile reserves being unable to cope with what Eisenhower could have thrown at them on D-Day. That altered situation would have further magnified the negative consequences of having to defend the long coastline from Holland to Spain; Hitler's determination to defend the entire length of the French Channel coast would then have become a massive German strategic and operational liability.[1]

The foregoing is offered as an admonition to military planners and commanders to focus strictly and keenly on enemy and friendly "critical capabilities" and "critical requirements" as they are driven or influenced by obstacles, and to refrain from identifying an obstacle itself as an enemy or friendly CG. To do otherwise might lock a commander and his staff into an early mindset precluding them from realizing the full range of possible advantages and stratagems. Secondly, more often than not a good commander and his staff will devise a scheme which takes advantage of a barrier, using it as a mask, shield, or highway, or turning the enemy's preoccupation with defending it into **his** disadvantage. At that moment they will see the obstacle in a different light, and cease thinking of it, and referring to it, as an enemy center of gravity.

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[1] It can be argued that it was anyway, even in the actual historical event.

In Conclusion

As will be shown in chapter 5, current Joint and Service doctrinal manuals/publications still contain significant variations regarding the application of "centers of gravity" and "critical vulnerabilities" as concepts critical to the formulation and discussion of strategy and operations. The CG-CC-CR-CV concept will enable the DOD community to think about, express, and discuss these concepts in a more precise and consistent manner.

According to the CG-CC-CR-CV construct, phenomenon traditionally viewed as "force multipliers" are not CGs or quasi-CGs; they are "critical requirements" in support of "critical capabilities" associated with CGs. Obstacles, too, are not CGs or quasi-CGs; instead the focus and emphasis should be on "critical capabilities" and "critical requirements" as they are driven or influenced by obstacles.

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Chapter 5

Did You Know that Saddam Hussein and the Republican Guard were NOT Centers of Gravity?

The (Still) Confused and Contradictory State of Current Doctrine, and How It Could Be Revised

The good news is that all of the current Service manuals/publications have adopted the same (or close to the same) definition of "centers of gravity". Now the bad news. To begin with, even tossing aside the CG-CC-CR-CV concept, the current Joint/Service definition is a remarkably curious and confusing oddity. According to this definition, Saddam Hussein and the Republican Guard; Ho Chi Minh and the North Vietnamese Regular Army; Emperor Hirohito, Admiral Isoroku Yamamoto, and the Imperial Japanese Navy; and General Robert E. Lee and the Army of Northern Virginia were not moral or physical centers of gravity.

> **Joint Pub 3-0**: "those characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight. [1]
>
> **Joint Pub 1-02**: "Those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight." [2]

[1] Joint Pub 3-0, Doctrine for Joint Operations, 1 February 1995, p III-20.

[2] Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, 23 March 1994, p 63.

Army FM 100-5: "that characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength, or will to fight. [1]

Naval Doctrine Publication 1 - Naval Warfare: "That characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength, or will to fight."[2]

Air Force Doctrine Document Number 1 (AFDD-1) (Draft) (replacing AFM 1-1): contains the same definition of "center of gravity" as Joint Pub 1-02, 23 March 1994, except that the word "military" is deleted to make an appropriate philosophical point that not all forces in war are "military" forces. [3]

This is not exactly what the term "centers of gravity" meant to folks such as Generals Norman Schwarzkopf, Colin Powell, William Westmoreland, Douglas MacArthur, and Ulysses S. Grant, or to the authors of a few hundred classics on modern military history, not to mention Carl von Clausewitz. **This alone is reason enough to modify the new definition,** even laying aside the CG-CC-CR-CV concept. Even greater modifications will be required should the DOD community accept the CG-CC-CR-CV concept. Furthermore, in addition to merely stating this definition, all of the Joint/Service doctrine manuals/publications provide accompanying texts elaborating on the concept of centers of gravity. These, too, will have to be modified – some seriously so. Finally, regardless of whether it accepts or rejects the CG-CC-CR-CV concept, at a minimum the DOD community needs to resolve the **wide range of conflicting interpretations** on centers of gravity and critical vulnerabilities which still exist in these "elaborating texts" – despite the acceptance (willingly or otherwise) of a standard definition of centers of gravity.

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[1] FM 100-5 Operations. HQ Department of the Army, June 1993, p 6-7.

[2] Naval Doctrine Publication 1 - Naval Warfare, 28 March 1994, p 72.

[3] 16 February 1996 phone conversation between Colonel Lawrence B. Wilkerson (USA), Deputy Director, Marine Corps War College and the Chief, Doctrine Division, Directorate of Plans, Office of the Deputy Chief of Staff for Plans and Operations, United States Air Force.

(Even Laying Aside the CG-CC-CR-CV Concept) The Current Joint Definition is A Curious Oddity

> Joint Pub 3-0: "those characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight."

Even if we lay aside the CG-CC-CR-CV concept, the current Joint definition of centers of gravity has a curious built-in oddity: **by this definition a military force** (and by implication any other force, moral or physical) **can never be a CG**. (Have I read the words correctly?) That means that neither Saddam Hussein nor the Republican Guard, nor any other Iraqi military force, were Iraqi centers of gravity during the late Persian Gulf War(?!). Yet, any one of us can lay our hands on official military plans, reports, and briefings which have stated otherwise. Not to mention the scores of professional military analysts nightly on television, or daily and weekly in the national news media. Nor the (seemingly) hundreds of lectures and discussions we have all heard on the war between then and now. Not only is the current Joint/Service definition of centers of gravity not Clausewitzian, it is at odds with the way in which the American academic and professional military communities have understood and applied the term since I don't know when (with the recent exception, of course, of FMFM 1). That phenomenon is remarkable. It is also quite unnecessary, even without CG-CC-CR-CV.

A partial explanation (or defense) of Joint Pub 3-0 is that **perhaps** its definition of centers of gravity is meant to apply only to the operational level of war and below – since the definition is followed immediately by: "At the strategic level, centers of gravity **might include a military force** ..."[1] A few short

[1] Joint Pub 3-0, Doctrine for Joint Operations, 1 February 1995, p xi, and Joint Doctrine Capstone and Keystone Primer, 25 May 1995, p 31. (Emphasis added.)

paragraphs later, we again see: "For example, if the center of gravity is **a large enemy force** ... " [1] But again, what about all those folks who called the Republican Guard an Iraqi operational CG? It also begs the question: Why have different definitions of centers of gravity for separate levels of war? And what is the definition for the strategic level? Fortunately, the second question can be easily dismissed because there doesn't need to be, nor should there be, two separate definitions. The definition of "center of gravity" should be the same for all levels of war. To do otherwise is a self-inflicted wound which serves only to perpetuate confusion about the nature and characteristics of CGs at all levels of war.

Revising the Current Joint/Service Manuals to Conform with the CG-CC-CR-CV Concept and Eliminate Contradictory Interpretations Regarding Centers of Gravity and Critical Vulnerabilities

The following pages will reprint relevant passages from each of the Joint/Service doctrine manuals/publications in full and show how each passage could be revised to bring it into conformity with the CG-CC-CR-CV concept and/or to eliminate confusion between centers of gravity and critical vulnerabilities. For the convenience of the reader, the format will be as indicated on the following page:

>> >> >> >> >> >> >> >> >>

[1] Joint Pub 3-0, Doctrine for Joint Operations, 1 February 1995, p III-21. (Emphasis added.)

Format
for the remainder of Chapter 5

Left-side pages
(even-numbered pages):

- Relevant passages reprinted in full.
- All emphasis in the original texts is indicated by *italic type*.
- Passages which require significant revision are indicated by **[brackets and bold type]**.
- Note: ***italic bold type*** indicates both of the above.
- For easy reference, paragraphs are labeled [A] thru [G].

Right-side pages
(odd-numbered pages):

How each paragraph could be revised to bring it into conformity with the CG-CC-CR-CV concept, and/or to eliminate confusion between centers of gravity and critical vulnerabilities.

Joint Pub 3-0 (As Is):

[A] **["Centers of Gravity. The essence of operational art lies in being able to mass effects against the enemy's sources of power in order to destroy or neutralize them."]** [1]

" j. *Centers of Gravity*[2]

[B] "• ***[Centers of gravity are the foundation of capability]*** – what Clausewitz called 'the hub of all power and movement, on which everything depends . . . **['the point at which all our energies should be directed.']** ***[They are those characteristics, capabilities, or locations from which a military force derives its freedom of action, physical strength, or will to fight.]*** At the strategic level, centers of gravity might include a military force, an alliance, national will or public support, **[a set of critical capabilities or functions,]** or national strategy itself.

[C] "• The **[centers of gravity]** concept is useful as an *analytical tool*, while designing campaigns and operations to assist commanders and staffs in analyzing friendly as well as enemy sources of strength as well as weaknesses and vulnerabilities. ***Analysis of [centers of gravity,]*** both enemy and friendly, *is a continuous process* throughout an operation.

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[1] Joint Pub 3-0, Doctrine for Joint Operations, 1 February 1995, p xi, and Joint Doctrine Capstone and Keystone Primer, 25 May 1995, p 31.

[2] Joint Pub 3-0, Doctrine for Joint Operations, 1 February 1995, p III-20.

Joint Pub 3-0 (Revised *á la* CG-CC-CR-CV):

[A] Centers of Gravity and Critical Vulnerabilities. The essence of operational art lies in being able to mass effects against an appropriate combination of enemy CGs or CRs (preferably vulnerable CRs) in order to neutralize, weaken, or destroy CGs in a cost effective manner.

j. Centers of Gravity and Critical Vulnerabilities

[B] • Centers of gravity are agents and/or sources of moral or physical strength, power, and resistance – what Clausewitz called 'the hub of all power and movement, on which everything depends . . . the point at which all our energies should be directed.' At the strategic level, centers of gravity might include a military force, an alliance, a political or military leader, or national will. All CGs have inherent "critical capabilities" enabling them to function as CGs. In turn, all critical capabilities have essential "critical requirements" necessary for the realization of those capabilities. "Critical Vulnerabilities" are those critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive or significant results, disproportional to the military resources applied.

[C] • The concept of centers of gravity and critical vulnerabilities is useful as an analytical tool while designing campaigns and operations to assist commanders and staffs in analyzing friendly as well as enemy sources of strength as well as weaknesses and vulnerabilities. Analysis of centers of gravity and critical vulnerabilities, both enemy and friendly, is a continuous process throughout an operation.

Joint Pub 3-0 (As Is):
(continued)

[D] "• The essence of operational art lies in being able to mass effects against the enemy's sources of power in order to destroy or neutralize them. In theory, *destruction or neutralization of enemy centers of gravity is the most direct path to victory.* However, centers of gravity can change during the course of an operation, and, at any given time, centers of gravity may not be apparent or readily discernible. **[For example, the center of gravity might concern the mass of enemy units, but that mass might not yet be formed. In such cases, determining the absence of a center of gravity and keeping it from forming could be as important as defining it.]**

[E] "• *Identification of* [*enemy centers of gravity*] *requires detailed knowledge and understanding* of how opponents organize, fight, make decisions, and their physical and psychological strengths and weaknesses. JFCs [Joint Force Commanders] and their subordinates should be alert to circumstances that may cause centers of gravity to change and adjust friendly operations accordingly.

[F] "• [*Enemy centers of gravity will frequently be well* ***protected,***] making direct attack difficult and costly. This situation may require joint operations that result *in indirect attacks* [ ] until conditions are established that permit successful direct attacks.

[G] "• It is also important *to identify friendly* ***[centers of gravity]*** so that they can be *protected.* **[Long sea and air LOCs from CONUS or supporting theaters can represent a center of gravity. National will can also be a center of gravity, as it was for the United States during the Vietnam and Persian Gulf Wars.]**

Joint Pub 3-0 (Revised *á la* CG-CC-CR-CV): (continued)

[D] & [E] • The essence of operational art lies in being able to mass effects against an appropriate combination of enemy CGs or CRs (preferably vulnerable CRs) in order to neutralize, weaken, or destroy CGs in a cost effective manner. Identification of enemy centers of gravity and critical vulnerabilities requires knowledge and understanding of how opponents organize, fight, make decisions, and their physical and psychological strengths and weaknesses. JFCs and their subordinates should be alert to circumstances that may cause centers of gravity and critical vulnerabilities to change and adjust friendly operations accordingly. At any given time during the course of an operation, critical capabilities and associated critical requirements can change; or certain critical capabilities and requirements may not yet exist. For example, an enemy critical capability might be contingent upon his forces being massed (and ipso facto upon his ability to mass them). If that mass is not yet formed, keeping it from being realized could be vitally important.

[F] (Incorporated into H, F & D below.)

[G] • It is also important to protect friendly critical capabilities and critical requirements to prevent the latter from becoming critical vulnerabilities. Examples can be long sea and air LOCs from CONUS or supporting theaters, or public opinion when it is not an outright CG (as was the case for the United States during the latter years of the Vietnam War). In cases when public support is not a CG, friendly strategy and operations (in all but the briefest of affairs) will have to be conceived and conducted in such a manner as to preserve the level of public support which does exist.

Joint Pub 3-0 (As Is):
(continued)

[H] "k. *Direct versus Indirect.* **[To the extent possible, JFCs attack enemy centers of gravity directly.** ***Where direct attack means attacking into an opponent's strength, JFCs should seek an indirect approach.***] For example, if the center of gravity is a large enemy force, the joint force may attack it indirectly by isolating it from its C2, severing its LOCs (including resupply), and defeating or degrading its air defense and indirect fire capability. **[*When vulnerable, the enemy force can be attacked directly* by appropriate elements of the joint force.]** In this way, JFCs will employ a synchronized combination of operations to expose and attack enemy centers of gravity through weak or vulnerable points – seams, flanks, specific forces or military capabilities, rear areas, and even military morale and public opinion and support."[1]

General Commentary on Joint Pub 3-0

The definition of "centers of gravity" (paragraph B) requires modification for it to be in harmony with Clausewitz, as do the last sentence in paragraph D and the second sentence in paragraph G. Paragraph F merely states the obvious – that centers of gravity "will frequently be well protected," and recommends in such cases (as does H also) the adoption of an indirect approach – a concept made popular by Sir Basil Liddell Hart after World War I. Using an indirect approach (a circuitous or devious route or a sur-

(continued in box on next page)

[1] Joint Pub 3-0, Doctrine for Joint Operations, 1 February 1995, pp III-20 and III-21.

Joint Pub 3-0 (Revised *á la* CG-CC-CR-CV): (continued)

[H] [F] & [D] k. Direct versus Indirect. In theory, direct attacks against enemy centers of gravity resulting in their neutralization or destruction is the most direct path to victory -- if it can be done in a prudent manner (as defined by military and political dynamics of the moment). Where direct attacks against enemy CGs mean attacking into an opponent's strength, JFCs should seek an indirect approach until conditions are established that permit successful direct attacks. For example, if the center of gravity is a large enemy force, the joint force may attack it indirectly by isolating it from its C2, severing its LOCs (including resupply), and defeating or degrading its air defense and indirect fire capability. In this way, JFCs will employ a synchronized combination of operations to weaken enemy centers of gravity indirectly by attacking traditional weaknesses, such as seams and flanks, and critical requirements which are sufficiently vulnerable: LOCs, rear area logistics, C2, specific forces or military systems, and even military morale and public opinion.

surprise stratagem) is the same or closely akin to exploiting a critical vulnerability (*á la* FMFM 1 Warfighting). The concept of indirect strategies is not inconsistent with the Clausewitzian concept of CGs being sources of strength, power, and resistance. To the contrary, Liddell Hart so detested the practice of pitting "strength against strength" or "CG against CG," as was commonplace in World War I, that he promoted the "Indirect Approach" as a superior alternative. Had Liddell Hart thought of, or seen, the term "critical vulnerability," he would surely have fallen in love with it.

Joint Pub 1 (As Is):

[A] " ... The challenge for joint force commanders normally is not to amass more data but to extract and organize the knowledge most useful for overcoming the enemy. **[A key concept that integrates intelligence and operations is centers of gravity, a term first applied in the military context by Clausewitz to describe 'the hub of all power and movement, on which everything depends.' Joint doctrine 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."]** [1]

[B] [ ] (See Revised)

[1] Joint Pub 1, Joint Warfare of the Armed Forces of the United States, 10 January 1995, pp III-8 and III-9.

Joint Pub 1 (Revised *á la* CG-CC-CR-CV):

[A] ... The challenge for joint force commanders normally is not to amass more data but to extract and organize the knowledge most useful for overcoming the enemy. Two key concepts that integrate intelligence and operations are "centers of gravity" and "critical vulnerabilities". Centers of gravity are sources and/or agents of moral or physical strength, power, and resistance at a given level of war. Examples at the strategic level can be national leaders, a strong-willed national population (the people), a military service or component of it, strong financial resources, or a critical manufacturing resource. At the lower levels common examples are a military force or component of it, or a skilled and inspirational military commander.

[B] Centers of gravity and critical vulnerabilities are linked by "critical capabilities" and "critical requirements". Critical capabilities are the inherent abilities which enable a center of gravity to function as such. To be an effective center of gravity, a national leader, for example, must have the ability to stay alive, stay informed, communicate with government officials and senior military leaders, and remain influential. A national defense industrial base requires the ability to obtain essential physical resources, transport them to manufacturing centers, process them into effective weapons and essential supporting products, and transport those weapons and products to the armed forces. At the lower levels of war an armored force must have the ability to move, shoot, and kill. The critical capabilities for a military commander identified as a center of gravity are similar to those of a national leader.

Joint Pub 1 (As Is):
(continued)

[C] [ ] (See Revised)

Joint Pub 1 (Revised *á la* CG-CC-CR-CV): (continued)

[C] All critical capabilities require essential conditions, resources and means to make them fully operative. These are called "critical requirements". An armored force requires POL and a flexible logistics system. Elite units require *esprit de corps*. Military commanders need intelligence and the means to communicate. We examine critical requirements to discover enemy critical vulnerabilities – actual or potential – which we can exploit to undermine, neutralize and/or defeat his center(s) of gravity. Critical Vulnerabilities are those critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive or significant results, disproportional to the military resources applied. **Within the context of pitting friendly strengths against enemy weaknesses,** commanders will understandably want to focus their efforts against those objects which will do the most decisive damage to the enemy's ability to resist. **But in selecting those objects we must compare their degree of criticality with their degree of vulnerability and to balance both against our capabilities.** Friendly capabilities to extend offensive efforts throughout the theater, including deep penetrations of enemy territory, can increase the number of enemy critical vulnerabilities.

Joint Pub 1 (As Is):
(continued)

[D] "**[Finding and attacking enemy centers of gravity]** is a singularly important concept. **[Rather than attack peripheral enemy vulnerabilities, attacking centers of gravity means concentrating against capabilities whose destruction or overthrow will yield military success. Though providing an essential focus for all efforts, attacking centers of gravity is often not easy. 'Peeling the onion,' that is, progressively first defeating enemy measures undertaken to defend centers of gravity, may be required to expose centers of gravity to attack, both at the strategic and operational levels.]** Actions to extend offensive efforts throughout the theater, including deep penetrations of enemy territory, **[can increase the vulnerability of enemy centers of gravity]**.

[E] "This concept of centers of gravity [ ] helps joint force commanders focus their intelligence requirements (including the requirement to identify friendly centers of gravity [ ] that must be protected from enemy attack). Intelligence should be timely, objective, responsive, complete, accurate, and relevant. (Joint Pub 2-0, "Doctrine for Intelligence Support to Joint Operations.") It should aid the identification of centers of gravity and suggest how they might most effectively be dealt with. Beyond that, however, intelligence should provide the capability to verify which desired military effects have or have not been achieved and generally support the commander's situational awareness in what will often by a dynamic, fast-moving, and confusing (fog of war) situation.

Joint Pub 1 (Revised *á la* CG-CC-CR-CV): (continued)

[D] & [E]

Identifying enemy centers of gravity and critical vulnerabilities is a singularly important concept which helps joint force commanders focus their intelligence requirements (including the requirement to identify friendly centers of gravity and critical vulnerabilities that must be protected from enemy attack). Intelligence should be timely, objective, responsive, complete, accurate, and relevant. (Joint Pub 2-0, "Doctrine for Intelligence Support to Joint Operations.") It should aid the identification of enemy centers of gravity and suggest how they might most effectively be dealt with. Beyond that, however, intelligence should provide the capability to verify which desired military effects have or have not been achieved and generally support the commander's situational awareness in what will often by a dynamic, fast-moving, and confusing (fog of war) situation.

Joint Pub 1 (As Is):
(continued)

[F] " • *Knowing oneself and the enemy allows employment of friendly strength against the enemy's weaknesses and avoids exposing friendly weaknesses to the enemy strengths.* This fundamental and familiar precept is designed to preserve the competitive advantage for one's own forces. It suggests a strategy of indirection – avoiding head-on attacks when enveloping movements, for example, will better capitalize on one's strengths and enemy weaknesses.... "[1]

(end of Joint Pub 1 "As Is" section)

General Commentary on Joint Pub 1:

"As Is" Paragraph:

[A] Better to emphasize right up front the "**two**" concepts of centers gravity **and** critical vulnerabilities, instead of just the single concept of centers of gravity.

[D] "Finding and attacking enemy centers of gravity" is not the point -- finding and attacking enemy critical vulnerabilities is the point. The 'peeling the onion' analogy is too general. It could mean attacking centers of gravity via enemy critical vulnerabilities; or it could mean applying friendly strengths against strong enemy defensive measures protecting a center of gravity in a series of attrition-type operations/tactics until the center of gravity becomes 'unprotected' and exposed to direct attack. The latter practice is clearly contrary to the concept of critical vulnerabilities; but it may nevertheless be necessary where

(continued in box on next page)

[1] Joint Pub 1, Joint Warfare of the Armed Forces of the United States, 10 January 1995, pp III-8 and III-9.

Joint Pub 1 (Revised *á la* CG-CC-CR-CV): (continued)

[F] • *Knowing oneself and the enemy allows employment of friendly strength against the enemy's weaknesses and avoids exposing friendly weaknesses to the enemy strengths.* This fundamental and familiar precept is designed to preserve the competitive advantage for one's own forces. It suggests a strategy of indirection – avoiding head-on attacks when enveloping movements, for example, will better capitalize on one's strengths and enemy weaknesses....

(end of Joint Pub 1 "As Revised" section)

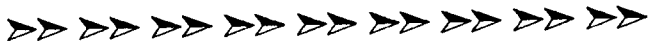
there are no obvious critical vulnerabilities. Therefore, it will always be left to the judgment of the commander how best to defeat an enemy center of gravity: whether indirectly via enemy critical vulnerabilities, or semi-indirectly via the application of strength against strong enemy defensive measures protecting a center of gravity; or by utilizing overwhelming friendly strength in a straight-on direct attack against an enemy center of gravity.

[E] Again, it is **not just** the concept of centers of gravity, **but also** that of critical vulnerabilities (friendly and enemy) which "helps joint force commanders focus their intelligence requirements ...."

[F] Knowing the enemy – everything that makes him tick (his national history, society, culture, and psychology, in addition to orders of battle statistics and other military data) – and yourself is the first principle of war at the strategic level ("capital W" war) according to the "Principles of War (W/w)" outlined on pages 140-141. Failure regarding this principle generally means mission failure, whether at the strategic, operational, or tactical level of war.

Joint Pub 1-02
(As Is):

["centers of gravity – Those characteristics, capabilities, or localities from which a military force derives its freedom of action, physical strength, or will to fight."] [1]



[1] Joint Pub 1-02, Department of Defense Dictionary of Military and Associated Terms, 23 March 1994, p 63.

Joint Pub 1-02
(Revised *á la* CG-CC-CR-CV):

Centers of Gravity:
Agents and/or sources of moral or physical strength, power, and resistance.

Critical Capabilities:
Inherent abilities enabling a Center of Gravity to function as such.

Critical Requirements:
Essential conditions, resources and means for a Critical Capability to be fully operative.

Critical Vulnerabilities:
Critical Requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive or significant results, disproportional to the military resources applied.

Army FM 100-5
(As Is):

"**[Center of Gravity.]** The center of gravity **[is the hub of all power and movement upon which everything depends. It is that characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength, or will to fight.]** Several traditional examples of a potential center of gravity include the **[mass of the]** enemy army, **[the enemy's battle command structure,]** public opinion, national will, and an alliance or coalition structure. The concept of **[a center of gravity]** is useful as an analytical tool to cause the joint commander and his staff to think about their own and the enemy's sources of strength [ ] as they design the campaign and determine its objectives." [1]

General Commentary on FM 100-5:

At the strategic level, the enemy "army" or a portion of it is the CG; whereas the "massing" of the army is a critical requirement to achieve a specific critical capability. (See above page 9, "A Word of Caution Regarding 'Mass' Since Clausewitz' Day".) At the operational level, a "mass" of forces could be a CG. The "enemy's battle command structure," however, should be thought of as a critical requirement in support of a critical capability, instead of being a CG – it might in fact be a critical vulnerability. The

(continued in box on next page)

[1] FM 100-5 Operations. HQ Department of the Army, June 1993, p 6-7.

Army FM 100-5
(Revised *á la* CG-CC-CR-CV):

Centers of Gravity and Critical Vulnerabilities. Centers of gravity are agents and/or sources of moral or physical strength, power, and resistance. Several traditional examples of a potential center of gravity include an enemy army or air force (or component thereof at lower levels of war) national will, an alliance, or a coalition. CGs at all levels of war have inherent "critical capabilities" enabling them to function as CGs. In turn, all critical capabilities have essential "critical requirements" necessary for the realization of those capabilities. "Critical Vulnerabilities" are those critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive or significant results, disproportional to the military resources applied. The concept of centers of gravity and critical vulnerabilities is useful as an analytical tool to cause the joint commander and his staff to think about their own and the enemy's sources of strength and weakness as they design the campaign and determine its objectives.

ability to exercise effective C2 at the operational and tactical levels of war is a critical capability; an effective battle command structure is merely an associated critical requirement enabling that capability to be realized. (That does not alter its importance.) The ability of an alliance or coalition to maintain itself is a critical capability; a corresponding critical requirement is the existence of a strong community of interest among the alliance or coalition members. The "structure" of an alliance can be a CG.

Air Force Doctrine Document Number 1 (AFDD-1) (Draft)

(As Is):

The current **draft** of AFDD-1 (replacing AFM 1-1) contains the same definition of "center of gravity" as Joint Pub 1-02, 23 March 1994, except that the word "military" is deleted to make an appropriate philosophical point that not all forces in war are "military" forces. AFDD-1 (Draft) stipulates that centers of gravity exist at all levels of war, and that almost always multiple CGs exist at any particular level of war. [1]

General Commentary on AFDD-1 (Draft):

The deletion of the word "military" before "force" is most appropriate, since CGs can be forces other than "military" forces. AFDD-1 (Draft) also stipulates correctly that CGs exist at all levels of war. The AFDD-1 (Draft) stipulation that multiple CGs "almost always" exist at any particular level of war is based on the current Joint/Service definition. Under the CG-CC-CR-CV concept, however, it would be more appropriate to say that multiple CGs may exist at any particular level. This is simply because CGs are fewer and more significant entities *á la* CG-CC-CR-CV than is the case with Joint Pub 3-0.

[1] 16 February 1996 phone conversation between Colonel Lawrence B. Wilkerson (USA), Deputy Director, Marine Corps War College and the Chief, Doctrine Division, Directorate of Plans, Office of the Deputy Chief of Staff for Plans and Operations, United States Air Force.

Air Force Doctrine Document Number 1 (AFDD-1) (Draft)

(Revised *á la* CG-CC-CR-CV):

Centers of Gravity and Critical Vulnerabilities. Centers of gravity are agents and/or sources of moral or physical strength, power, and resistance. Several traditional examples of a potential center of gravity include an enemy army or air force or component thereof at lower levels of war) national will, or an alliance. CGs at all levels of war have inherent "critical capabilities" enabling them to function as CGs. In turn, all critical capabilities have essential "critical requirements" necessary for the realization of those capabilities. "Critical Vulnerabilities" are those critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive or significant results, disproportional to the military resources applied.

Naval Doctrine Publication 1 - Naval Warfare (As Is):

[A] **["Center of Gravity: That characteristic, capability, or location from which enemy and friendly forces derive their freedom of action, physical strength, or will to fight."]** [1]

"Center[ ] of Gravity and Critical Vulnerabilit[y] [2]

[B] "The center of gravity is something the enemy must have to continue military operations -- a source of his strength, **[but not necessarily strong or a strength in itself.] [There can only be one center of gravity.]** Once identified, we focus all aspects of our military, economic, diplomatic, and political strengths against **[it.]** **[As an example, a lengthy resupply line supporting forces engaged at a distance from the home front could be an enemy's center of gravity. The resupply line is something the enemy must have – a source of strength – but not necessarily capable of protecting itself. Opportunities to access and destroy a center of gravity are called critical vulnerabilities.]** To deliver a decisive blow to the enemy's center of gravity, we must strike at objectives affecting the center of gravity that are both critical to the enemy's ability to fight and vulnerable to our offensive actions. If the object of a strike is not critical – essential to the enemy's ability to stay in the fight – the best result we can achieve is some reduction in the enemy's strength. Similarly, if the object of a strike is not vulnerable to attack by our forces, then any attempts to seize or destroy it will be futile.

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[1] Naval Doctrine Publication 1 - Naval Warfare, 28 March 1994, p 72.

[2] Naval Doctrine Publication 1 - Naval Warfare, 28 March 1994, pp 35.
(Emphasis in the original indicated by *italicized words*.)
(Emphasis added indicated by **bold words**.)

Naval Doctrine Publication 1 - Naval Warfare
(Revised *á la* CG-CC-CR-CV):

[A] Centers of Gravity and Critical Vulnerabilities. Centers of gravity are agents and/or sources of moral or physical strength, power, and resistance. Several traditional examples of a potential center of gravity include an enemy army or air force or component thereof at lower levels of war) national will, or an alliance. CGs at all levels of war have inherent "critical capabilities" enabling them to function as CGs. In turn, all critical capabilities have essential "critical requirements" necessary for the realization of those capabilities. "Critical Vulnerabilities" are those critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive or significant results, disproportional to the military resources applied.

Centers of Gravity and Critical Vulnerabilities

[B] In order to continue military operations or national resistance, the enemy must have a least one center of gravity; but there may be multiple centers of gravity at any particular level of war. Once identified, we focus all aspects of our military, economic, diplomatic, and political strengths against enemy CGs – either directly or indirectly. Frequently the best means to weaken and/or neutralize a center of gravity is to exploit one or more critical vulnerabilities, such as for example, a lengthy unprotected resupply line supporting forces engaged at a distance from the home front. To deliver a decisive blow to the enemy's center of gravity, we must strike at objectives affecting the center of gravity that are both critical to the enemy's ability to fight and vulnerable to our offensive actions. If the object of a strike is not critical – essential to the enemy's ability to stay in the fight – the best result we can achieve is some reduction in the enemy's strength. Similarly, if the object of a strike is not vulnerable to attack by our forces, then any attempts to seize or destroy it will be futile.

Naval Doctrine Publication 1 - Naval Warfare (As Is): (continued)

[C] "The appearance of critical vulnerabilities depends entirely upon the situation and specific objective. Some – such as electrical power generation and distribution facilities ashore or the fleet oilers supporting a task group – may be obvious. On a strategic level, examples may include a nation's dependence on a certain raw material imported by sea to support its warfighting industry, or its dependence on a single source of intelligence data as the primary basis for its decisions. Alternatively, a critical vulnerability might be an intangible such as morale. In any case, we define critical vulnerabilities by the central role they play in maintaining or supporting [ ] the enemy's center of gravity and, ultimately, his ability to resist. [We should not attempt to always designate one thing or another as a critical vulnerability.] A critical vulnerability frequently is transitory or time-sensitive. **[Some things, such as the political will to resist, may always be critical, but will be vulnerable only infrequently. Other things, such as capital cities or an opponent's fleet, may often be vulnerable, but are not always critical.]** What is critical will depend on the situation. What is vulnerable may change from one hour to the next. Something may be both critical and vulnerable for a brief time only. The commander's challenge is to identify quickly enemy strengths and weaknesses, and recognize critical vulnerabilities when they appear. He must rapidly devise plans to avoid the strengths, exploit the weaknesses, and direct the focus of effort toward attacking the critical vulnerabilities so that he can ultimately collapse the enemy's center of gravity.

Naval Doctrine Publication 1 - Naval Warfare

(Revised *á la* CG-CC-CR-CV):
(continued)

[C] The appearance of critical vulnerabilities depends entirely upon the situation and specific objective. Some – such as electrical power generation and distribution facilities ashore or the fleet oilers supporting a task group – may be obvious. On a strategic level, examples may include a nation's dependence on a certain raw material imported by sea to support its warfighting industry, or its dependence on a single source of intelligence data as the primary basis for its decisions. Alternatively, a critical vulnerability might be an intangible such as morale. In any case, we define critical vulnerabilities by the central role they play in maintaining or supporting critical capabilities relative to enemy centers of gravity and, ultimately, his ability to resist. Once having designated one thing or another as a critical vulnerability, we should remain observant and flexible. A critical vulnerability frequently is transitory or time-sensitive. Some things, such as the will of a leader or population to resist, may always be critical, but might be vulnerable only infrequently. Other things, such as capital cities or an opponent's fleet oilers, may often be vulnerable, but are not always critical. What is critical will depend on the situation. What is vulnerable may change from one hour to the next. Something may be both critical and vulnerable for a brief time only. The commander's challenge is to identify quickly enemy strengths and weaknesses, and recognize critical vulnerabilities when they appear. He must rapidly devise plans to avoid the strengths, exploit the weaknesses, and direct the focus of effort toward attacking critical vulnerabilities so that he can weaken or neutralize enemy centers of gravity by such indirect means alone, or so that he may conduct successfully direct attacks against enemy centers of gravity in a prudent manner.

Naval Doctrine Publication 1 - Naval Warfare (As Is): (continued)

[*"Focus of Effort and Main Effort*]

[D] **["The focus of effort is the paramount objective to be accomplished by the force [and is therefore always on the critical vulnerability] that will expose the enemy's center of gravity. ... "]** [1]

General Commentary on Naval Doctrine Publication 1 - Naval Warfare

As currently written, paragraph B is seriously flawed on several counts -- all of them stemming from the entire paragraph being based on a flawed definition of CGs.

One: The contention that a center of gravity is "not necessarily strong or a strength in itself," makes sense only according to the current (flawed) Joint/Service definition of centers of gravity. Otherwise, it not only contradicts Clausewitz, but it flies in the face of common sense and the traditional, commonly understood meaning of the term (as explained at the beginning of this chapter). Under the CG-CC-CR-CV concept, the assertion would continue to be valid only within a very narrow meaning of "strong" and "strength" (i.e., only if the words were intended to mean powerful military forces/units or hardened protected targets in an operational or tactical context). Then again, what about moral CGs at the lower levels of war? And what about having one definition of CGs which applies to all levels of war?

(continued in box on next page)

[1] Naval Doctrine Publication 1 - Naval Warfare, 28 March 1994, pp 35, 37.
(Emphasis in the original indicated by *italicized words*.)
(Emphasis added indicated by **bold words**.)

Naval Doctrine Publication 1 - Naval Warfare

(Revised *á la* CG-CC-CR-CV):
(continued)

Focus of Effort -- The Commander's Judgment

[D] The focus of effort is directed at that object which will cause the most decisive damage to the enemy and which holds the best opportunity for success. Commanders should always seek critical vulnerabilities that will indirectly expose the enemy's center of gravity and thereby facilitate the accomplishment of the mission. Nevertheless, the allocation of friendly forces to attack critical vulnerabilities, or not-so-vulnerable critical requirements, or enemy forces directly, and/or to defend friendly assets, is the essence of operational art and is thereby left to the commander's judgment.

Two: The assertion that there "can only be one center of gravity" (at each level of war? at the operational level of war? only one CG period?) is ludicrous – if anything, it is more ludicrous under the current Joint/Service definition of CGs than it is under the CG-CC-CR-CV concept. True, the enemy must have a resupply line, but is that the only thing that he must have to sustain the fight?

Three: To use lengthy resupply lines as a sole example of a CG, when historically more often than not they have been sources of actual or potential weakness, is guaranteed to generate confusion and misunderstanding. Let's be precise. The "capability" to sustain military forces at the end of long supply lines has often been a "critical capability" relevant to countless strategies throughout history. Although Britain and the United States historically have possessed the "critical requirements" to make the capability a reality, a list of British and American successes stands in contrast to

(continued in box on page 126)

Naval Doctrine Publication 1 - Naval Warfare (As Is): (continued)

YORKTOWN

Exploiting A Critical Vulnerability

[E] During the Revolutionary War, British forces in North America depended on free use of the adjacent seas to move and resupply their ground troops. This became especially critical to the British ability to continue fighting in August 1781, on the peninsula between Virginia's York and James Rivers, when American land forces successfully severed the British Army under General Lord Cornwallis from their ground-based resupply. At this location, British resupply by sea was vulnerable because access to the Yorktown port could be denied by controlling entry at the mouth of the Chesapeake Bay. The French West Indian Fleet under Rear Admiral Francois de Grasse positioned itself at this strategic location in advance of the British fleet. When British Admiral Thomas Graves arrived to support Cornwallis, de Grasse maneuvered his ships to engage the enemy outside the bay. His actions not only denied Cornwallis his needed support, but permitted another French squadron sailing from Rhode Island to enter the bay and reinforce American and French land forces. As a result, the British succumbed at Yorktown surrendering their entire Army of 7,600 men. The Franco-American alliance was effective in blocking British access to and from the sea and thereby exploiting this critical vulnerability. Losing their ability to sustain their forces by sea doomed the British war effort in North America.[1]

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[1] Naval Doctrine Publication 1 - Naval Warfare, 28 March 1994, p 36.

Naval Doctrine Publication 1 - Naval Warfare
(Revised *á la* CG-CC-CR-CV):
(continued)

[E] During the Revolutionary War, the British Army in North America (a strategic CG) used adjacent seas for both troop movement and resupply. They therefore depended heavily on the Royal Navy (a second strategic CG) to maintain naval superiority, local and general. This became especially critical to the British ability to continue fighting in August 1781, on the peninsula between Virginia's York and James Rivers, when American land forces successfully severed the British Army under General Lord Cornwallis from their ground-based resupply. At this location, British resupply by sea (a critical capability) was vulnerable because access to the Yorktown port (a critical requirement) could be denied by controlling entry at the mouth of the Chesapeake Bay. The French West Indian Fleet under Rear Admiral Francois de Grasse (an operational CG) positioned itself at this strategic location in advance of the British fleet. When British Admiral Thomas Graves arrived to support Cornwallis, de Grasse successfully blocked Grave's squadron from entering the bay. This maneuver not only denied Cornwallis his needed support, but permitted another French squadron sailing from Rhode Island to enter the bay and reinforce American and French land forces. As a result, the British succumbed at Yorktown, surrendering their entire Army of 7,600 men. With British sea power stretched around the world, and therefore a bit thin off the American Atlantic coast (a critical vulnerability), the Franco-American alliance (a strategic CG) saw an opportunity to trap Cornwallis and to gain local naval superiority (a critical requirement for both sides) at a decisive point, thereby blocking British access to and from the sea (a critical capability). By exploiting a temporary critical vulnerability, the Franco-American alliance negated the British ability to sustain a critical component of their land forces by sea, resulting in the surrender of that force, and the loss of Britain's will to continue the struggle in North America (a critical requirement at the strategic level).

General Commentary on Naval Doctrine Publication 1 - Naval Warfare
(continued)

a long list of classic failures by all nations including, for example, the French and German experiences in Russia in 1812 and 1941, Grant in 1862-63 and Sherman in 1864 until both temporarily "broke away" from their supply lines, German-Italian forces in North Africa in 1942-43, German forces in Normandy in 1944, isolated far-flung Japanese garrisons in the Pacific in World War II, and MacArthur's UN forces in North Korea in November 1950.

Paragraph C, on the other hand, does its readers a great service by stressing the need to remain flexible regarding opportunities to exploit transient enemy critical vulnerabilities.

Although paragraph E (Yorktown) clearly explains how Cornwallis was cut off and compelled to surrender, it leaves each reader to his own conclusions regarding which things were centers of gravity and which were critical vulnerabilities. With or without acceptance of the CG-CC-CR-CV concept, it should be revised to make these distinctions clear.

Up Next: USMC FMFM 1, WARFIGHTING

FMFM 1, Warfighting

The next twelve pages deal with pages 35-37 in FMFM 1, which discuss the twin-concept of critical vulnerabilities and exploiting opportunities. The twelve pages are organized in the following manner:

- FMFM 1 **as written** (left-side pages 128, 130 and 132.). (Each paragraph is numbered [1 through 7] for reference in the general commentary.)
- FMFM 1 **as revised** *à la* the CG-CC-CR-CV concept (right-side pages from 129 to 139 inclusive)
- A **general commentary** on this section of FMFM 1 (pages 134, 136, 138 and 139).

These pages are followed by:

- An outline of **Principles of War (W/w)** used at the Marine Corps War College to analyze, assess and formulate strategy (pages 140-141) – an intellectual construct which is relevant to all Joint/Service doctrinal manuals/publications.

USMC FMFM 1, Warfighting (As Is):

EXPLOITING VULNERABILITY AND OPPORTUNITY [1]

[1] It is not enough simply to generate superior combat power. We can easily conceive of superior combat power dissipated over several unrelated efforts concentrated on some indecisive object. To win, we must concentrate combat power toward a decisive aim. **[footnote number 27 here; reprinted at bottom of this page]**

[2] We obviously stand a better chance of success by concentrating strength against enemy weakness rather than against strength. So we seek to strike the enemy where, when, and how he is most vulnerable. This means that we should generally avoid his front, where his attention is focused and he is strongest, and seek out his flanks and rear, where he does not expect us and where we can also cause the greatest psychological damage. We should also strike at that moment in time when he is most vulnerable.

[3] **[Of all the vulnerabilities we might choose to exploit, some are more critical to the enemy than others. It follows that the most effective way to defeat our enemy is to destroy that which is most critical to him. We should focus our efforts on the one thing which, if eliminated, will do the most decisive damage to his ability to resist us. By taking this from him we defeat him outright or at least weaken him severely.]**

[Footnote 27: "We should note that this concept is meaningless in attrition warfare in its purest form, since the identification of critical vulnerability by definition is based on selectivity, which is a foreign thought to the attritionist. In warfare by attrition, any target is as good as any other as long as it contributes to the cumulative destruction of the enemy.] [2]

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[1] FMFM 1 Warfighting (Washington, DC: Dept of the Navy, HQUSMC, 6 March 1989) pp 35-37.

[2] Ibid., p 85.

USMC FMFM 1, Warfighting
(Revised *à la* CG-CC-CR-CV):

EXPLOITING VULNERABILITY AND OPPORTUNITY

It is not enough simply to generate superior combat power. We can easily conceive of superior combat power dissipated over several unrelated efforts concentrated on some indecisive object. To win, we must concentrate combat power toward a decisive aim.

We obviously stand a better chance of success by concentrating strength against enemy weakness rather than against strength. So we seek to strike the enemy where, when, and how he is most vulnerable. This means that we should generally avoid his front, where his attention is focused and he is strongest, and seek out his flanks and rear, where he does not expect us and where we can also cause the greatest psychological damage. We should also strike at that moment in time when he is most vulnerable.

Choosing which vulnerabilities to exploit and when to exploit them requires sound military judgment based upon a mature understanding of enemy centers of gravity and related critical vulnerabilities. Centers of gravity are sources and/or agents of moral or physical strength, power and resistance at a given level of war. Examples at the strategic level are national leaders, a strong-willed national population (the people), a military service or component of it, strong financial resources, or a critical manufacturing resource. At the lower levels common examples are a military force or component of it, or a skilled and inspirational military commander.

USMC FMFM 1, Warfighting (As Is): (continued)

[4] Therefore, we should focus our efforts against a *critical enemy vulnerability*. **[Obviously, the more critical and vulnerable, the better. [footnote number 28 here; reprinted at bottom of this page] But this is by no means an easy decision, since the most critical object may not be the most vulnerable.]** In selecting an aim, we thus recognize the need for sound military judgment to compare the degree of criticality with the degree of vulnerability and to balance both against our own capabilities. Reduced to its simplest terms, *we should strike our enemy where and when we can hurt him most.*

Footnote 28: "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 (p. 485): 'A center of gravity is always found where the mass is concentrated the 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 climatic test of strength against strength 'by daring all to win all' (p. 596). 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." [[1]]

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[1] Ibid., p 85. (Emphasis in the original.) Clausewitz page numbers refer to the 1984 Howard-Paret edition of On War.

USMC FMFM 1, Warfighting
(Revised *à la* CG-CC-CR-CV): (continued)

Centers of gravity and critical vulnerabilities are linked by "critical capabilities" and "critical requirements". Critical capabilities are the inherent abilities which enable a center of gravity to function as such. To be an effective center of gravity, a national leader, for example, must have the ability to stay alive, stay informed, communicate with government officials and senior military leaders, and remain influential. A national defense industrial base requires the ability to obtain essential physical resources, transport them to manufacturing centers, process them into effective weapons and essential supporting products, and transport those weapons and products to the armed forces. At the lower levels of war an armored force must have the ability to move, shoot and kill. The critical capabilities for a military commander identified as a center of gravity are similar to those of a national leader.

All critical capabilities require essential conditions, resources and means to make them fully operative. These are called "critical requirements". An armored force requires POL and a flexible logistics system. Elite units require *esprit de corps*. Military commanders need intelligence and the means to communicate. We examine critical requirements to discover critical enemy vulnerabilities – actual or potential – which we can exploit to undermine, neutralize and/or defeat his center(s) of gravity.

USMC FMFM 1, Warfighting (As Is): (continued)

[5] This concept applies equally to the conflict as a whole – the war – and to any episode of the war – any campaign, battle, or engagement. From this we can conclude that the concept applies equally to the strategic, operational, and tactical levels. At the highest level a critical vulnerability is likely to be some intangible condition, such as popular opinion or a shaky alliance between two countries, although it may also be some essential war resource or a key city. At the lower levels a critical vulnerability is more likely to take on a physical nature, such as an exposed flank, a chokepoint along the enemy's lines of operations, a logistics dump, a gap in enemy dispositions, or even the weak side armor of a tank.

[6] **[In reality, our enemy's most critical vulnerability will** rarely be obvious,] particularly at the lower levels. We may have to adopt the tactic of exploiting any and all vulnerabilities until we discover a decisive opportunity.

[7] This leads us to a corollary thought: exploiting opportunity. **[Decisive results in war are rarely the direct result of an initial, deliberate action. Rather, the initial action creates the conditions for subsequent actions which develop from it.]** As the opposing wills interact, they create various, fleeting opportunities for either foe. Such opportunities are often born of the disorder that is natural in war. They may be the result of our own actions, enemy mistakes, or even chance. By exploiting opportunities, we create in increasing numbers more opportunities for exploitation. It is often the ability and the willingness to ruthlessly exploit these opportunities that generate decisive results. The ability to take advantage of opportunity is a function of speed, flexibility, boldness, and initiative. [[1]]

(End FMFM 1 "As Is")

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[1] FMFM 1 Warfighting (Washington, DC: Dept of the Navy, HQUSMC, 6 March 1989) pp 35-37. (Emphasis in the original.)

USMC FMFM 1, Warfighting
(Revised *à la* CG-CC-CR-CV): (continued)

"Critical Vulnerabilities" are those critical requirements or components thereof which are deficient, or vulnerable to neutralization, interdiction or attack (moral/physical harm) in a manner achieving decisive or significant results, disproportional to the military resources applied. **Within the context of pitting friendly strengths against enemy weaknesses,** commanders will understandably want to focus their efforts against those objects which will do the most decisive damage to the enemy's ability to resist. **But in selecting those objects we must compare their degree of criticality with their degree of vulnerability and to balance both against our capabilities.**

Understanding the relationship among centers of gravity, critical capabilities, and critical vulnerabilities (i.e., vulnerable critical requirements), permits and demands precision in thought and expression. In our business, precision is important. Consider the example of an enemy air defense system that is well developed and equipped, robust, and manned with well-trained crews. The friendly commander regards it as an enemy center of gravity – an agent/instrument of strength and power. But his planners have also identified a number of critical vulnerabilities: the system's primary power supply, its command and control net, and its radar sites (the latter to advanced technology missiles when the sites are 'turned on'). There are two ways to express/brief this situation:

First: "Sir. The enemy air defense system is a vital component of the enemy's overall military power in this theater of operations; it is one of his principal centers of gravity in this theater of operations. It must be destroyed or neutralized before we can conduct effective, sustained air attacks against any of his front-line ground forces or his mobile, elite reserve units. Fortunately, the air defense system is highly vulnerable. In fact, we consider it to be

("Revised" continued on page 135)

General Commentary on FMFM 1, Warfighting

"As Is" Paragraph:

[1] Footnote 27 is not necessary. Nor is it fair. Referring to attrition warfare in its "purest form" is meaningless and a cheap shot against all practitioners of attrition warfare. The implication that all (or even most) past practitioners of attrition warfare have selected just any old target is both false and misleading. There is such a thing as intelligent or enlightened attrition warfare – and there may be times when it has to be adopted. A danger associated with the promotion and adoption of 'maneuver warfare' is that Marines and soldiers and the public which they serve may come to expect that all future warfare and conflict will be relatively bloodless. (In this respect, the results of Operation Desert Storm may be as much of a curse in the future as they were a blessing in 1991.)

[3] The first two sentences are inherently addressed in the CG-CC-CR-CV concept. I believe that the last two sentences in this paragraph are not sound advice. The practice of placing 'all your eggs in a single basket' is usually not wise. Moreover, there is rarely just "one" such thing ... ; or commanders may miscalculate what that "one" thing is. Furthermore, the debate which identifies that "one" thing may be so intense and may hinge upon discriminators which are too fine, as to lead to eventual disharmony among planners and/or those responsible for executing the plans.

(continued in box on page 136)

USMC FMFM 1, Warfighting
(Revised *à la* CG-CC-CR-CV): (continued)

the enemy's number one critical vulnerability, which we intend to exploit in the following manner. Prior to D-Day we will use ouradvanced technology missiles to destroy or neutralize the system's radar sites while we simultaneously target the system's primary power supply and principal command and control centers. Sir, with the air defense system disposed of, the rest of our plan will unfold in the following manner. ...." Despite calling the air defense system both a center of gravity and a critical vulnerability, the briefing probably would be clear enough and good enough, most of the time for most people. But consider the alternative:

Second: "Sir. We regard the enemy's air defense system to be one of his principal centers of gravity in this theater of operations. It must be destroyed or neutralized before we can conduct effective, sustained air attacks against any of his front-line ground forces or his mobile, elite reserve units. To be effective, the vital components of the air defense system have to be able to see us, communicate internally, and shoot. See, talk, shoot – these are the system's critical capabilities. Based on our ex- amination of the system's critical requirements which enable it to see, talk and shoot, we have identified and plan to exploit three critical vulnerabilities: prior to D-Day we will use our advanced technology missiles to destroy or neutralize the system's radar sites while simultaneously targeting the system's primary power supply and principal C2 centers. Sir, with the air defense system no longer able to see, talk, or shoot, the rest of our plan will unfold in the following manner. ...."

The second version expresses more clearly the relationship and linkage between center of gravity and critical vulnerability. The power supply, command and control net, and radar sites are the "critical vulnerabilities," **not** the air defense system itself. The

("Revised" continued on page 137)

General Commentary on FMFM 1, Warfighting
(continued)

"As Is" Paragraph:

[4] First, delete footnote 28 (on page 85 of FMFM 1) which turns the traditional Clausewitzian definition of a center of gravity inside out by stating that today we think of centers of gravity as being critical vulnerabilities – sources of weaknesses, instead of strength. Second, the second and third sentences create confusion by suggesting degrees of vulnerability among the possible collection of all critical vulnerabilities (i.e., that some CVs may be more or less vulnerable than others), as well as suggesting that one or more CVs may be more important (more critical) than others. While this may be true, I believe that it overly complicates the matter given the small amount of space available in FMFM 1 to discuss the matter. They also suggest that there may be a wide range of enemy CVs, which risks watering down the concept of a CV (regarding both its "criticality" and its "vulnerability") to the point where its critical meaning and usefulness is lost. To be so identified, a CV should be a 'critically' important requirement (not a 'quite' important requirement) and it should be 'readily/highly' vulnerable (not 'somewhat' vulnerable).

This does raise the issue of the choice between attacking a CV or attacking another object/critical requirement which may be more important but less vulnerable (i.e., the cost of attacking it may be greater, but the reward for neutralizing, degrading, or destroying it may also be greater). This is nothing more than the traditional "cost vs. gain" dilemma. The revised wording of these sentences is sufficiently open and balanced to address both the CV concept and the traditional cost vs. gain dilemma.

(continued in box on page 138)

USMC FMFM 1, Warfighting
(Revised *à la* CG-CC-CR-CV): (continued)

vulnerability is the **thing** which makes the center of gravity vulnerable. At the strategic level critical vulnerabilities range from such things as weak popular support or a shaky alliance between two countries, to an essential economic resource such as oil, electric power, or a key port. At the lower levels common examples of critical vulnerabilities are an exposed flank or a gap in enemy dispositions (traditionally referred to as "weaknesses"), or a chokepoint along the enemy's lines of operations, a logistics dump, or even the weak side armor of a tank.

At the strategic level we should generally be able to discern the enemy's critical vulnerabilities – including his most critical vulnerability – assuming that we conduct a thorough analysis of his moral and physical characteristics, and understand the true nature of the conflict. At the lower levels, where the fog and friction of battle have their greatest effect, our enemy's most critical vulnerability is normally less obvious. There is always the possibility of miscalculation and error at any level, even if we believe that we know our enemy well and have reliable intelligence. Therefore, the success of any plan of action (particularly at the lower levels) should not be **overly** predicated upon decisive results being achieved by an initial, deliberate action.

This leads us to a corollary thought: exploiting opportunity. In all cases, the commander and his subordinates should be **prepared** to react to the unexpected and to exploit opportunities created by conditions which develop from the initial action. In cases where identification of enemy critical vulnerabilities is particularly difficult, we **may have no choice** but to adopt the tactic of exploiting any and all vulnerabilities until we discover a decisive opportunity. As the opposing wills interact, they create various, fleeting opportunities for either foe. Such op-

("Revised" continued on page 139)

General Commentary on FMFM 1, Warfighting
(continued)

"As Is" Paragraph:

[6] First, regardless of past experience, in the future we can do better at discerning our enemy's most critical vulnerabilities, assuming that we do our homework in a professional manner in accordance with the Principles of War (W/w) outlined on pages 140-141. Second (and contrary to the first sentence in this paragraph), in counterinsurgency warfare we have seen many examples of where enemy critical vulnerabilities were **all too obvious at the lower levels of war**, which is why many misguided counterinsurgency strategies have over-emphasized military solutions at the expense of political ones. Finally, the fact that all battles involve some degree of fog and friction does not excuse operational and tactical commanders from knowing their enemy's general strengths and weaknesses.

[7] At the strategic level, the initial strategy and its associated operations should be so conceived and executed as to ensure at least ultimate "decisive results". That is the very purpose and function of strategy. Whereas bad strategy and bad ideas = bad results; good and good = good. (After all, there are reasons why some planners and plans are better than others.) Even at the lower levels of war, initial deliberate actions often **have** achieved decisive results. This is in fact the aim of initial deliberate actions. Given good decisions based on the best available information, a commander should design an opening gambit to place the enemy in a situation where he is damned if he does and damned if he doesn't. **None of this, however, negates the main thrust of this paragraph.** Even if we think we know the enemy's critical vulnerabil-

(continued in box on next page)

USMC FMFM 1, Warfighting
(Revised *à la* CG-CC-CR-CV):
(continued)

portunities are often born of the disorder that is natural in war. They may be the result of our own actions, enemy mistakes, or even chance. By exploiting opportunities, we create in increasing numbers more opportunities for exploitation. It is often the ability and the willingness to ruthlessly exploit these opportunities that generate decisive results. The ability to take advantage of opportunity is a function of speed, flexibility, boldness and initiative.

(End FMFM 1 Revised)

General Commentary on FMFM 1, Warfighting
(continued)

"As Is" Paragraph:

ity(ies), there is the chance and risk of miscalculation. And despite our best efforts, there will be times when we can not be sure about enemy vulnerabilities. There will also be times when there just ain't no easy path, no alternative except to take the first step and go from there. For these reasons, and because there will continue to be some degree of fog and friction on any battlefield, commanders should always be prepared (and prepare their forces) to react to the unexpected and to exploit opportunities as they occur.

(End General Commentary on FMFM 1)

PRINCIPLES OF WAR (W/w)

❑ Capital "W" War (the strategic level)

- Know Your Enemy, Yourself & Allies (history, culture, society, in addition to orders of battle, etc.)
- Determine (and Shape) the Nature of the Conflict.
- Identify Enemy & Friendly Centers of Gravity and Critical Vulnerabilities.
- Know and Respect the Limits of Military Power:
  - Hearts and Minds of the People, and Orders of Battle;
  - Legitimacy and the Credible Capacity to Coerce.
- Ponder: [1]
  1) Relationship between Military Victory and End State,
  2) Assumptions (their validity and criticality),
  3) Alternative Strategies for various Possibilities or Failure at Future Decision Points,
     - Branches and Sequels (if that happens, then what?)
  4) Odds for Victory.
- Proceed – or Not – Accordingly:
  - without modifications
  - with modifications
  - or, do not proceed.
- Operate IAW Holistic[2] National Security and Military Effectiveness (i.e., Coherent[3] and Synergistic[4] Actions At and Among All Levels of War/MOOTW: National-Strategic, Theater-Strategic, Operational and Tactical)

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[1] Ponder: Weigh or appraise carefully. Think about : consider. Meditate : reflect.

[2] Holistic: 2a. Emphasizing the importance of the whole and the interdependence of its parts. Holism: The theory that reality is made up of organic or unified wholes greater than the simple sum of their parts.

[3] Coherent: 1. Sticking together : cohering. 2. Marked by an orderly or logical relation of parts that affords comprehension or recognition. Cohere: vi. 2. To be logically connected. vt. To cause to form a united or orderly whole.

[4] Synergism: 1. The action of two or more substances, organs, or organisms to achieve an effect of which each is individually incapable.

PRINCIPLES OF WAR (W/w)
(continued)

❑ small "w" war (operational and tactical levels):

- Operate IAW appropriate small "w" Principles of Conventional War, Unconventional War (Counterinsurgency and Small Wars), or Military Operations Other Than War.

Notes:
1) Capital "W" war and small "w" war *generally* overlap at the theater-strategic level.
2) Having said that, in Unconventional War and MOOTW actions and dynamics at the operational and tactical levels have a greater potential to affect actions and dynamics at the national-strategic level more quickly and profoundly (and vice versa) than is *generally* the case with conventional war.

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Chapter 6

Parting Shots & Recommendations

Critical Capabilities Are Important, But They Are Not Centers of Gravity

Critical Capabilities are just that – very, very important (even vital) capabilities without which one will most likely fail. But that does not make them centers of gravity. Furthermore, and contrary to the current Joint Pub definition discussed in chapter 5, **centers of gravity are not characteristics, capabilities, or locations**; they are the moral, political and physical entities which **possess** certain characteristics and capabilities, or benefit from a given location/terrain. [1]

Identifying Centers of Gravity Should Not Normally Be the Hard Part

Identifying enemy and friendly centers of gravity should be relatively easy. Centers of gravity are **significant entities** at a given level and are **usually obvious** to skilled practitioners of war operating in accordance with the Principles of War (W/w) outlined above on pages 140-141. If any part of this process is hard, it should be how to defeat enemy centers of gravity (especially in

[1] See chapter 4, page 43.

conflict and operations other than conventional war), not how to identify them. This is another reason why the current Joint/Service definition of centers of gravity needs to be revised. The current Joint/Service definition, if taken literally, can make the identification of enemy and friendly centers of gravity an overly complicated and contentious process.

Don't Throw the Baby Out with the Bathwater

Adopting a single Joint/Service definition of a center of gravity (one is also required for critical vulnerabilities, even without accepting the CG-CC-CR-CV concept) is the right thing to do. However, it must also be an appropriate definition, which it currently is not. The preceding chapters have shown the degree to which previous Joint/Service doctrine manuals/publications are flawed by confusion and contradiction regarding centers of gravity and critical vulnerabilities. On this matter, the current Joint/Service doctrine manuals/publications are not much better than their predecessors.

A possible explanation for the current situation may be insufficient understanding of, or regard for, Clausewitz' On War and the traditional meaning of the term "centers of gravity" as it was understood by Clausewitz and has been used by hundreds of preeminent American military professionals and scholars of military history in the 20th Century. Still waters run deep; and we should be more cautious about changing the meaning of such fundamental concepts as cavalierly as one would erase a classroom blackboard. Old ideas no longer relevant must be replaced by newer, more relevant ideas – that is progress. Without it, we will atrophy as military professionals – a condition which is inexcusable, unprofessional, and intolerable. But we don't always have to throw the baby out with the bathwater.

The preceding chapters have demonstrated that we can promote and practice all the common sense, insight, and wisdom associated with the concepts of "maneuver warfare" and "critical vulnerabilities" without reinventing the definition of "centers of gravity". To do otherwise is to perpetuate a needless self-inflicted wound, which automatically placed the current Joint/Service doctrinal definition of centers of gravity at odds with most of the books on the USMC Commandant's Reading List/Program as well as the vast number of those which directly or indirectly support all of the Intermediate and Senior Service School curricula within the DOD Professional Military Education system. This is a foolish situation, which can be easily fixed.

Next Page: **"The CG-CC-CR-CV PROCESS"**
and a couple of "remembers"

The CG-CC-CR-CV PROCESS

At each level of war the commander and his staff should:

(1) Identify enemy and friendly centers of gravity.

(2) Identify those "critical capabilities" inherent in each center of gravity which enable it to function as a center of gravity (i.e., what things must each CG be able to do to exert the moral or physical power which makes it a CG).

(3) Identify those "critical requirements" which enable each of the "critical capabilities" to be realized. (Example: if "mobility" is listed as a critical capability for a RED armored corps at the operational level, then "an effective POL supply and resupply system" would be an associated "critical requirement". Likewise, if "mobility during the **day**" were listed as a RED critical capability, then "a reasonably effective air defense system" would be another associated "critical requirement" – given, of course, the existence of a powerful BLUE air interdiction capability.)

(4) Identify "critical requirements" or components thereof which are deficient, or vulnerable (or potentially so) to friendly neutralization, interdiction or attack. These are the enemy's "critical vulnerabilities".

(5) Devise a strategy, campaign plan, or plan of attack which takes maximum advantage of one **or more** enemy "critical vulnerabilities".

- **REMEMBER:** (1) Steps 1 - 4 do <u>not</u> have to be conducted in a precise or rigid sequential manner. (2) Insights related to a higher-numbered step might influence decisions made at a lower-numbered step and *vice versa*. (3) While all steps need to be accomplished in a professional manner, steps 4 & 5 may require <u>superior</u> creativity and judgment.

RECOMMENDATIONS

Even if we do NOT accept the CG-CC-CR-CV concept we at least need to :

1. Get the current Joint/Service doctrinal manuals/publications straight regarding centers of gravity and critical vulnerabilities. This means returning to the Clausewitzian meaning of centers of gravity as being agents or sources of strength and adopting the meaning of critical vulnerabilities as sources of actual or potential weakness as explained in USMC FMFM 1 (with the exception, of course, of footnote 28). [1] We should discard all other notions of either concept, regardless of the source of their inspiration, whether it be the dynamics of mechanical engineering or the buoyancy of ships, or whatever. This is not to say that insights and analogies from these latter fields are not useful in illustrating the importance and effects of "critical requirements" in support of "critical capabilities" inherent in centers of gravity (i.e., the nature and structure of the relationship between critical requirements, critical capabilities and centers of gravity).

If we ACCEPT the CG-CC-CR-CV concept, then we need to do even more:

2. Revise the current Joint/Service definition of centers of gravity.

3. Include the CG-CC-CR-CV concept and definitions in all current Joint/Service doctrinal manuals/publications.

4. Modify the accompanying "elaborating texts" in each manual/publication accordingly, along lines suggested in chapter 5.

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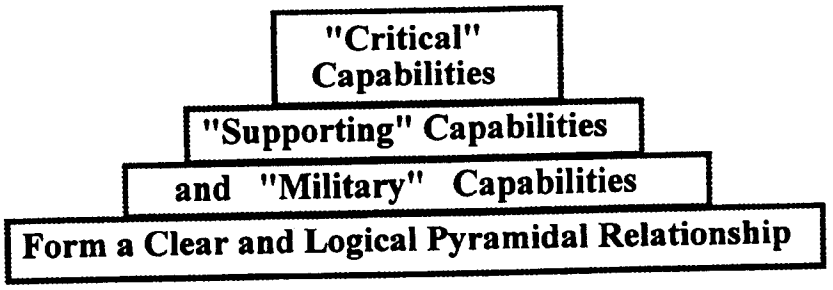
[1] See above, pages 130 and 136 of chapter 5, for the footnote and a discussion of it.

5. Follow through with appropriate changes regarding Joint/Service education and training programs at all levels.

6. **Talk the same language regardless of service and regardless of level of war,** while we – in all services and DOD departments and agencies – continue to formulate strategy and conduct operations consistent with the **sound insight and wisdom** found in **all** of the current Joint/Service doctrine manuals/publications.

Appendix

"Critical Capabilities" and "Critical Requirements" in Relation to Other "Capabilities" and "Requirements" Terms Used in the DOD Community



The term "Military Capability" is defined in Joint Pub 1-02 (23 March 1994, page 237):

> "**military capability** – The ability to achieve a specified wartime objective (win a war or battle, destroy a target set). It includes four major components: force structure, modernization, readiness, and sustainability. **a. force structure** – Numbers, size, and composition of the units that comprise our Defense forces; e.g., divisions, ships, airwings. **b. modernization** – Technical sophistication of forces, units, weapon systems, and equipments. **c. readiness** – The ability of forces, units, weapon systems, or equipments to deliver the outputs for which they were

> designed (includes the ability to deploy and employ without unacceptable delays). **d. sustainability** – The ability to maintain the necessary level and duration of operational activity to achieve military objectives. Sustainability is a function of providing for and maintaining those levels of ready forces, materiel, and consumables necessary to support military effort."

The discussion of "military capabilities" in National Military Strategy of the United States of America 1995 (pages ii-iii and 17-18) stresses that United States "combat forces and supporting capabilities are built on five fundamental foundations": the high quality of manpower, readiness, force enhancements, modernization, and balance.

"Supporting Capabilities" – as discussed in Joint Pub 1 (chapter IV, pages 7-9) – are "the key collective capabilities of the Armed Forces of the United States to wage war," which are the "foundations of the joint operational art" and "joint campaigns". These collective capabilities are capabilities relative to:

- securing **air and maritime superiority** and **space control**;
- **forcible entry** operations;
- **transportation** assets required for strategic **power projection** and the operational **mobility** of air, naval, and land forces;
- **deep-ranging direct attacks** against enemy strategic centers of gravity ("by air, missile, special operations," etc.);
- **special operations** at the operational level;
- exploiting the **information differential** (information warfare); and
- friendly forces achieving **leverage** (advantages) against enemy forces in both symmetrical ("land versus land") and asymmetric ("air versus sea") engagements.

That "supporting capabilities" stem directly from "military capabilities" is intuitively obvious. In turn, "supporting capabilities" and "critical capabilities" are closely related concepts. They are often (but not always) nearly identical; when they are not, a

given "critical capability" will invariably be a narrow aspect of a related broader category of "supporting capability". Collectively, these three concepts form a bottom-up pyramidal relationship, in which basic "military capabilities" provide the foundation for progressively more specific "supporting" and "critical" capabilities.

"Critical" Requirements,
"Military" Requirements,
and Acquisition Requirements

Oranges,
Tangerines and
Apples

Apples. In the realm of Defense Acquisition, acquisition requirements are established to achieve and maintain national and Service military capabilities and supporting capabilities. Tangerines. In the realm of strategy and operations, "Military Requirements" are "established need[s] justifying the timely allocation of resources to achieve a capability to accomplish approved military objectives, missions, or tasks." [1] Oranges. The reader knows the definition and meaning of the term "critical requirements" *à la* the CG-CC-CR-CV concept. Among these three terms, the first exists in a totally separate and distinct environment and context – the realm of Defense Acquisition (apples). The latter two terms, however, *are* closely related and used in similar environments and contexts (as are tangerines and oranges). Nevertheless, there are differences between tangerines and oranges; and there is a clear and distinct difference between "military" and "critical" requirements. "Critical requirements" is a concept integral to an intellectual process used by military commanders and their planning staffs to identify enemy (and

[1] Joint Pub 1-02, 23 March 1994, p 240.

friendly) centers of gravity and critical vulnerabilities, for the purpose of determining the best strategy, campaign plan, and course of action in a given scenario. The term "military requirements" comes into play outside of that process, either before or after that process occurs. ***Before*** that process, in the sense that peacetime "military requirements" for a CINC's Area of Responsibility (AOR) are established in accordance with preapproved military (peacetime and wartime) objectives, missions and tasks. In the event of a crisis, a CINC and his staff already know the forces, assets and capabilities which are available or likely to be automatically forthcoming. In response to a crisis, the CINC and his staff conduct the CG-CC-CR-CV process to determine the best way to achieve mission success based on those forces, assets and capabilities. ***After*** that process, in the sense that the CINC and his staff might conclude that the available (and automatically forthcoming) forces, assets and capabilities are insufficient for the objectives, missions and tasks confronting them. In this case the CINC would request either (1) an increase in the forces, assets, and capabilities allocated to him based on an increased need/"military requirement," or (2) a reduction in the objectives, missions and tasks expected of his command. (The same is more or less true for commanders at the operational level during war or times of crises.) The terms "military requirement" and "critical requirement" need not create confusion as long as we understand their relationship and the context in which each applies.

The End