

# Forging the Center of Gravity

Defining the term

by Maj Troy E. Mitchell

Throughout military planning courses, the doctrine teaches Dr. Joe Strange's 1996 center of gravity (COG) analysis, articulating a systematic method of identifying the center of gravity, critical capabilities, critical requirements, and critical vulnerabilities.<sup>1</sup> In practicality, planners and analysts lack critical thinking and derive a perceived center of gravity without an exhaustive appreciation of the adversary. As exercises or warfare transitions, many will not revisit and revise their perception of the COG based on the organization's effectiveness.

To meet emerging threats, critical thinking is imperative to mitigate strategic surprise. Because formal or informal threat assessment techniques frame judgments about risk with vulnerabilities, the "lenses" analysts and planners use play decisive roles in preventing strategic surprises. Critical thinking is a cognitive activity. Learning to think in analytical and evaluative ways means using mental processes such as attention, categorization, selection, and judgment.<sup>2</sup> Often planners and analysts believe they do not have enough time to use structured analytic techniques (SAT) to guide them through systematic processes to enable mission accomplishment. Structured techniques save time because they aid group processes and build consensus in the early stages of problem framing.<sup>3</sup> Providing focused critical thinking techniques regarding the COG analysis through critical vulnerability targeting enhances the effectiveness and efficiency regarding the operational design of future warfare.

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A COG may have multiple definitions based on the belief of the individual. *Joint Publication 5-0, Joint Planning*, articulates that "a COG is a source of power that provides moral or physical strength, freedom of action, or will to act."<sup>4</sup> Clausewitz states the COG is the "hub of all power and movement."<sup>5</sup> Either way, the COG is an element of operational design that is physical and linked to objectives at the operational and tactical levels. In planning sessions, analysts and plan-

ners identify their perceived COG and affiliated vulnerabilities based on an understanding of the adversarial system. Identifying vulnerabilities allow for the transition to additional planning steps and efforts to begin a course of action development without a dedicated focus of justifying targetable vulnerabilities that enable mission accomplishment and aid operational design.

Eikmeier Methodology w/ SATs

In an article written by Col Dale

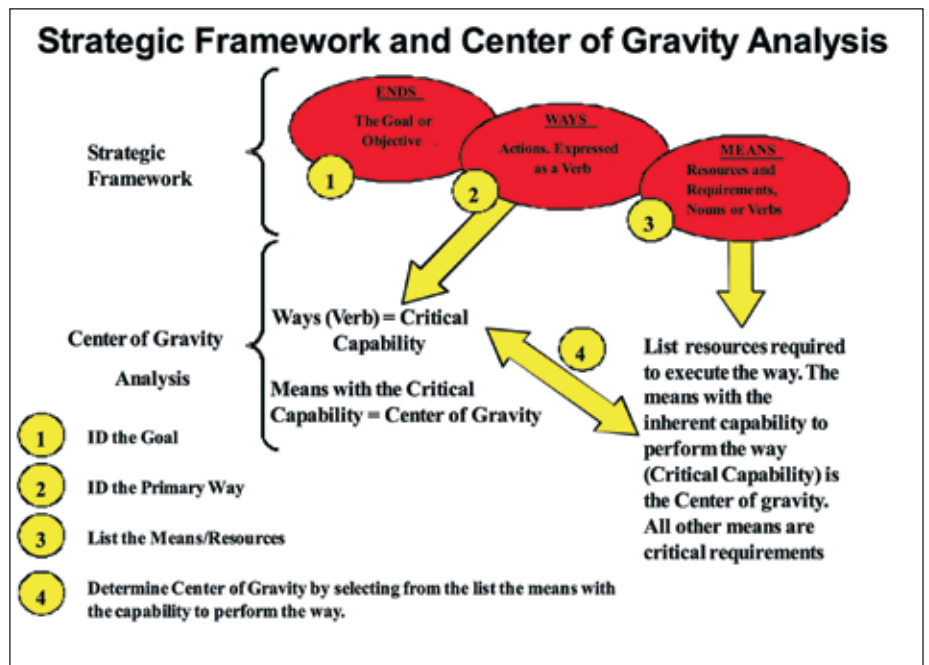


Figure 1. Col Eikmeier's COG Methodology<sup>6</sup>

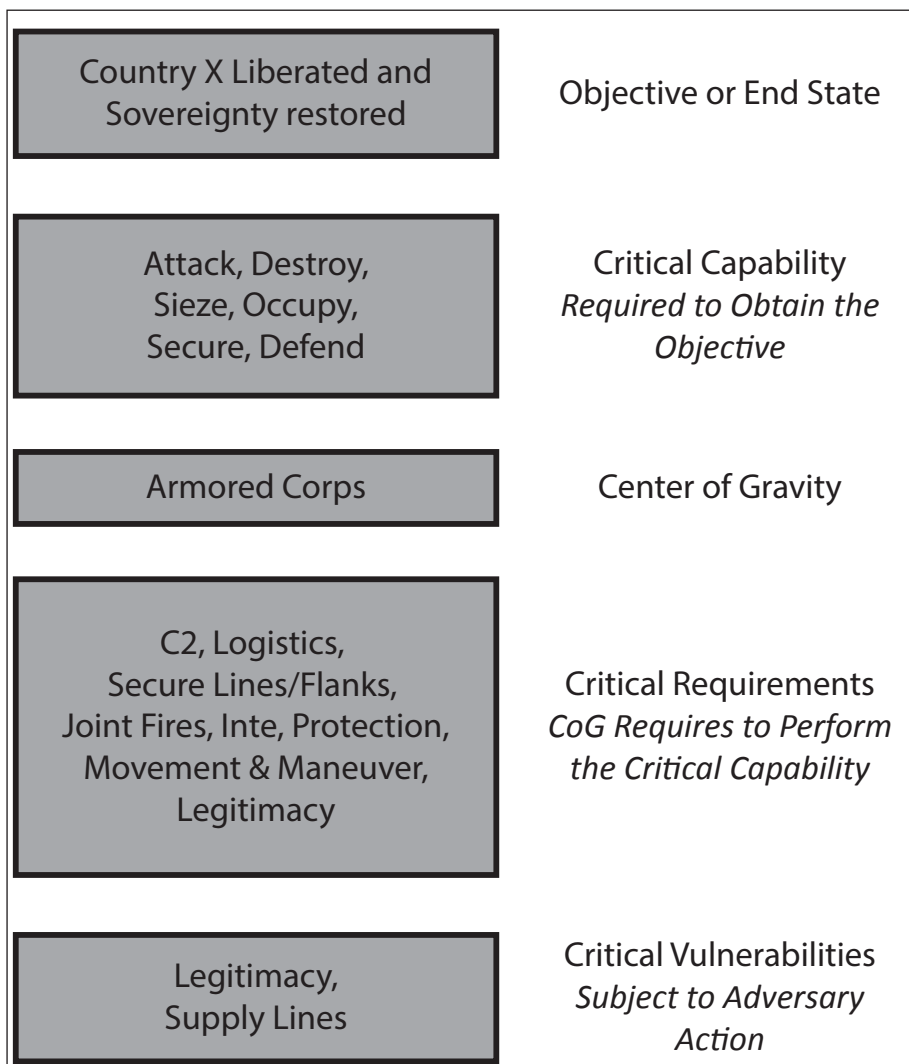


Figure 2. Example of COG analysis.<sup>8</sup> (From COL Eikmeier, MCG, Nov10.)

Eikmeier, the author notes, “Identifying a COG is an art, not a science.”<sup>7</sup> His method focuses on *ends, ways, and means* linked to critical capabilities vice starting COG analysis with the “correctly” identified “hub of all power” that may cause flawed analysis. Based on his November 2010 *Marine Corps Gazette* article, he depicts his framework (see Figure 1). Further analysis is provided below in the revised outline:

Step 1: Identify adversaries’ goals/endstate/objective in a succinct statement.

Step 2: Define via verbs what ways the adversary uses to achieve their desired endstate. Then, select the most essential action that forms critical capabilities.

Step 3: What are the resources/means (nouns) available that the adversary

requires achieving the articulated ways from Step 2.

Step 4: What entity (noun) from the list of means possesses the inherent ability to achieve the endstate? This

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**Redesign the endstate/  
objective statement  
based on clarity ob-  
tained.**

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is the COG—the “doer” achieving the ends.

Step 5: From the remaining items on the means list, select those critical for

the execution of the critical capability. These are critical requirements.

Step 6: Identify critical requirements vulnerable to adversary actions. The most critical and targetable entities (noun) form-critical vulnerabilities. (See Figure 2 for an example.)

Of all the steps, Step 1 is the most important. If the proclaimed endstate/objective of the adversary is too broad, the planners or analysts will not get a focused COG. To aid in ensuring planners or analysts draft an accurate endstate, they should conduct an issue development SAT. The issue development SAT is a technique to ensure the identification of the central issues and alternative explanations of a problem in a problem statement aiding in getting the best answer.<sup>9</sup> Figure 3 provides an example of a redesigned issue development of the adversary’s endstate. To properly draft the adversary’s endstate, follow these steps for Step 1 then continue with Col Eikmeier’s COG analysis:

Step 1. Paraphrase. Redefine the issue without losing the original meaning.

Step 2. 180-degree question. What is the opposite of what the adversary desires to achieve?

Step 3. Broaden the focus. Instead of focusing on one piece of the puzzle, step back and look at several pieces combined.

Step 4. Narrow the focus. Take the question and ask about the components creating the problem.

Step 5. Redirect question. What outside forces infringe on the problem?

Step 6. Why? Ask “why” of the initial issue or question. Develop a new question based on the answer. Then, ask “why?” of the second question and develop a new question based on that answer. Repeat this process until you believe the real problem emerges.

Step 7. Redesign the endstate/objective statement based on clarity obtained.

Once completed with the issue development SAT for the adversary’s endstate, the planners and analysts must challenge their assumptions that enabled the redesigned endstate throughout the rest of the COG analysis. To do this, the planners and analysts ask why the response/answer is true and whether it remains valid under all conditions.<sup>10</sup>

Country X Liberated and Sovereignty restored IOT Transition the host nation government and prevent human suffering	Initial Endstate Statement
Country X Liberated and Sovereignty restored	Paraphrase
Why would Country X NOT be Liberated and Sovereignty restored?	180-question
Regional stability of Country X to prevent protracted regional conflicts	Broaden the focus
Province X successfully establishes governance as a model for Country X	Narrow the focus
Opportunities for external actors to effect operating environment of Country X	Redirect question
Why does Country X require liberation? Because adversarial regime conducted a coup d'état and installed a totalitarian dictatorship	Why
Why did Country X have a coup d'état? Because the act initiated a revolution prior to the commencement of the upcoming elections	Why
Why did Country X have a revolution amongst the pending elections? Because the current government was marred by massive corruption, voter intimidation and direct electoral fraud	Why
Why does Country X have massive corruption? Because Adversary X used military power through criminal elements as instruments of individual enrichment	Why
Adversary X pursuit of military revolt of Country X to reinstate governmental power from opposition	Redesigned Endstate

Figure 3. *Redesigned Adversary's endstate.* (From COL Eikmeier, MCG, Nov10.)

Identify the assumptions via a list and continue to refine the list to only those that “must be true” to sustain the elicited response during the steps.

When defining an issue and using the Eikmeier method, the planners and the analysts conduct a “does and uses” test to validate their work. If the COG is the “doer,” then it “has the inherent ability to perform or execute the critical capability or action.”<sup>11</sup> If something is “used,” or supports the entity executing, then it is a requirement vice COG. Once completed, the planners and analysts need to confirm accurate and targetable critical vulnerabilities. Success is achieved by focusing on a combination of vulnerable critical requirements leading to the destruction, neutralization, or interdiction in sequential or simultaneous attacks.<sup>12</sup>

The utility in confirming critical vulnerabilities steers operational design. In *On War*, Clausewitz devotes Book Three to a discussion of strategy and defines strategy as:

A strategy is the use of engagement for the purpose of the war. The strategist must ... define an aim ... in accordance with its purpose ... he will draft the plan of the war, and the aim of the war will determine the series of actions intended to achieve it: he will, in fact, shape the individual campaigns and ... decide on the individual engagements.<sup>13</sup>

***The key to the success of CARVER is quantifying and standardizing risk ...***

To aid in determining the “series of actions,” the CARVER method is recommended to develop critical vulnerabilities.

**CARVER**

Similar to the does and uses test, the CARVER method validates criti-

cal vulnerabilities a unit can exploit. The CARVER Vulnerability Assessment Methodology was developed in the mid-1970s to meet the emerging threat of international terrorism.<sup>14</sup> Initially, CARVER was defined as an offensive method to identify a target or asset meeting a prescribed strategic or tactical objective. It was an examination of potential targets to determine military/intelligence significance, a priority of attack, and the weapons required to get the desired level of damage.<sup>15</sup> Revisiting the CARVER method to deconstruct adversarial systems’ components recognized as critical vulnerabilities is a way to test the Eikmeier method and begin concurrent planning for target packages.

The key to the success of CARVER is quantifying and standardizing risk based on a variety of threats and adversaries. Here is the CARVER method:

- **Criticality.** A target is critical when its damage or destruction *significantly impairs* the adversary’s abilities.
- **Accessibility.** This factor assesses the ability of intelligence and operational assets to reach a target.
- **Recuperability.** The length of time it would take the adversary to replace, repair, or bypass damage inflicted by a target’s destruction.
- **Vulnerability.** Level of exposure to attack.
- **Effect.** Scope and magnitude of adverse consequences resulting from malicious actions.
- **Recognizability.** The ability of an adversary to recognize a target as a target.

CARVER is an analytical tool facilitating a qualitative and a quantitative approach to target selection using a value structure of one to five (1-5). The higher the number, the better that target meets the objectives of planners.<sup>16</sup> Figure 4 identifies a rubric to quantify target selection for operational design.

By nesting the CARVER method to modern warfare as an output of critical vulnerabilities, analysts and planners enable scientific approaches to critical thinking for operational design. The CARVER method enables a targeting and prioritization systems’ analysis for critical vulnerabilities. Through a nodal analysis of the targeted system,

Value	Criticality	Accessibility	Recuperability	Vulnerability	Effects	Recognizability
5	Loss would be a mission stopper	Easily accessible; Away from security	Extremely difficult to replace, long down times (>1 year)	Unit has the means and expertise to attack	Favorable sociological impact; OK impact on civilians	Easily-recognized by all with no confusion
4	Loss would reduce mission performance considerably	Easily accessible outside	Difficult to replace with long downtimes (<1 year)	Unit probably has the means and the expertise	Favorable impact; No adverse impact on civilians	Easily recognized by most with little confusion
3	Loss would reduce mission performance	Accessible	Can be replaced in a relatively short time (months)	Unit may have the means and expertise to attack	Favorable impact; Some adverse impact on civilians	Recognized with some training
2	Loss may reduce mission performance	Difficult to gain access	Easily replaced in a short time (weeks)	Unit has little capability to attack	No impact on unit; Adverse impact on civilians	Hard to recognize, confusion probable
1	Loss would not affect mission performance	Very difficult to gain access	Easily replaced in a short time (days)	Unit has very little capability to attack	Unfavorable impact; Assured adverse impact on civilians	Extremely difficult to recognize without extensive orientation

Figure 4. CARVER Evaluation Scale.

this method focuses planners vice identifying perceived vulnerabilities and transitioning to the creation of the next planning tool or step.

### Conclusion

The mission or purpose drives the functioning of the military system of systems. The purpose provides the war-fighter a reason to perform the task(s).<sup>17</sup> If a definition of the COG is “the primary entity that inherently possesses the critical capabilities to achieve the objective,”<sup>18</sup> then the planning keeps specificity regarding the COG with a scientific approach. Adversaries are not homogeneous. They differ in terms of capabilities, motivations, decision making, skills, processes, and organizational or personal psychology. Providing focused critical thinking methodologies to planners regarding COG analysis enhances the effectiveness and efficiency regarding operational design.

Recent concepts relating to the operational and tactical problems facing Western-style militaries suggest U.S. adversaries understand our vulnerabilities: aversion to casualties and collateral damage, sensitivity to do-

mestic and world opinion, and a lack of commitment to conflicts of duration measured in years vice months. They perceive Western-style militaries retain a form of warfare focused on combined arms. Moreover, they are considering how to target Western vulnerabilities while capitalizing on their intrinsic advantages: time, will, and the inherent power of the defensive. Are we prepared to dismantle their system of systems?

### Notes

1. Definitions for critical capabilities, critical requirements, and critical vulnerabilities are in Joint Chiefs of Staff, *Joint Publication 5-0 (JP 5-0), Joint Planning*, (Washington, DC: June 2017).

2. Stella Cottrell, *Critical Thinking Skills—Developing Effective Analysis and Argument*, (New York, NY: Palgrave MacMillan, 2005).

3. Randolph Pherson, “The Five Habits of the Master Thinker,” *Journal of Strategic Security*, (San Jose, CA: Henley-Putnam School of Strategic Security, 2013).

4. *JP 5-0*.

5. Carl von Clausewitz, *On War*, translated by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984).

6. Dale Eikmeier, “Centers of Gravity,” *Marine Corps Gazette*, (Quantico, VA: November 2010).

7. *Ibid.*

8. Celestino Perez, *Addressing the Fog of COG: Perspectives on the Center of Gravity in US Military Doctrine*, (Fort Leavenworth, KS: Combat Studies Institute Press, 2012).

9. Defense Intelligence Reference Document, *Tradecraft Primer: Basic Structured Techniques*, (Washington, DC: Defense Intelligence Agency, 2010).

10. CIA, *A Tradecraft Primer—Structured Analytic Techniques for Improving Intelligence Analysis*, (March 2009), available at <https://www.cia.gov>.

11. “Centers of Gravity.”

12. Joe Strange and Richard Iron, *Understanding Centers of Gravity and Critical Vulnerabilities*, (Undated), available at <http://www.au.af.mil>.

13. *On War*.

14. Leo Labaj, “The CARVER Methodology: The Evolution of the CIA’s Offensive Targeting Methodology into the Security Industry’s Definitive Vulnerability Assessment Tool,” *The Journal of Counterterrorism & Homeland Security International*, (Arlington, VA: The International Association for Counterterrorism & Security Professionals, December 2011).

15. *Ibid.*

16. *Ibid.*

17. Jeffrey Smith, Jayashree Harikumar, and Brian Ruth, *An Army-Centric System of Systems Analysis (SoSA) Definition*, (White Sands, NM: Army Research Laboratory, February 2011).

18. The use of the word “primary” is attributed to Dr. Joe Strange. See also Dr. Joe Strange and C. Perez.

