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. 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. 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. 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.

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.” Clausewitz states the COG is the “hub of all power and movement.” 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 planners 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 Forging the Center of Gravity

Defining the term
by Maj Troy E. Mitchell

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Figure 1. Col Eikmeier’s COG Methodology

<table>
<thead>
<tr>
<th>Strategic Framework and Center of Gravity Analysis</th>
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<tbody>
<tr>
<td>Statistical Framework</td>
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<td><img src="image" alt="Diagram" /></td>
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<tr>
<td>Center of Gravity Analysis</td>
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<tr>
<td>Ways (Verb)= Critical Capabilities</td>
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<tr>
<td>Means with the Critical Capability = Center of Gravity</td>
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<tr>
<td>List the Means/Resources</td>
</tr>
<tr>
<td>Determine Center of Gravity by selecting from the list the means with the capability to perform the way.</td>
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Figure 1. Col Eikmeier’s COG Methodology
Eikmeier, the author notes, “Identifying a COG is an art, not a science.” 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 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. Figure 2 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.
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 critical capability or action.” 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.

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.

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.
- Recoverability. 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. 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,
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 warfighter a reason to perform the task(s). If a definition of the COG is “the primary entity that inherently possesses the critical capabilities to achieve the objective,” 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 domestic 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?

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**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).
4. *JP 5-0*.
7. Ibid.
11. “Centers of Gravity.”
13. *On War*.
15. Ibid.
16. Ibid.
18. The use of the word “primary” is attributed to Dr. Joe Strange. See also Dr. Joe Strange and C. Perez.