

Using Assessment to Achieve Predictive Battlespace Awareness

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Over the past 13 years, the amount of time allowed for decision making during military operations has been compressed across strategic, operational, and tactical levels. This compression highlights a need to rethink how combat assessment (CA) processes support operational planning and execution. During the planning for Operation Desert Storm, Gen H. Norman Schwarzkopf—the commander of United States Central Command (USCENTCOM)—established an operational requirement to degrade Iraqi armor by at least 50% as a prerequisite for initiating the ground offensive. Opinions among the assessment agencies tasked to report on the progress toward achieving that objective varied widely, which complicated the General Schwarzkopf’s decision making. These estimates, in comparison to post war analysis, were shown to have inaccurately reflected the success of air operations against Iraqi ground forces (table 1).

Table 1: Iraqi Armored/Artillery/APC Bomb Damage Assessment Estimates
(Percent degraded, no longer combat capable)

Source of Estimates	Tanks	APCs	Artillery
JCS/CENTCOM	39	32	47
Defense Intelligence Agency	16	13	20
Central Intelligence Agency	12	9	8
Postwar Expert Analysis (estimated)	48	30	60

As of 23 February 1991

Note that none of the analyses provided during the war matched actual results tabulated after Desert Storm, which occurred, in part, because agencies across the strategic and operational decision making spectrum confused the bomb damage assessment (BDA) product with the CA process. In other words, to improve their estimates planners must abandon the prevailing paradigm in which assessment is something that occurs after execution in favor of a paradigm that views assessment as an essential element of predictive battlespace awareness that permeates strategic, operational, and tactical planning activities.

The appearance of technologies that allow warfighters to compress the kill chain from days and hours to minutes requires planning and execution staffs to focus on CA at every step in the planning process. Admittedly, CA can involve more “art” than “science,” particularly since technical advances continue to increase the amount of data available to combatant commanders and complicates their decision making. By embedding CA throughout planning processes, the

assumptions and judgments upon which operational decisions depend can apply consistently from campaign planning through its execution.

This article represents an evolving “thought piece”.¹ Fundamental to the concepts expressed here is the belief that airpower operates across multiple levels of conflict. It may yield strategic, operational, and tactical effects almost simultaneously—not just within a single ATO cycle or within a single campaign phase, but even within the scope of a single tactical sortie. As such, air operations centers (AOC) must develop and integrate parallel processes that will allow them to operate, plan, and assess across the conflict spectrum to anticipate and, ultimately, predict the outcomes of operational and tactical actions.

The activities, products, and processes the AOC provides to the joint force air component commander (JFACC) and to the joint force commander (JFC) must not be merely historical but must also be equally focused on the future. Thus operational commanders must ask not only what has happened, but—perhaps even more importantly—what is likely to happen in the foreseeable future? This challenge moves the assessment calculus well beyond the science of BDA into the art of predicting the battlespace.

Combat assessment (CA) is defined by joint publications as “the determination of the overall effectiveness of force employment during military operations.”² This statement reflects an awareness of how important assessment is to the process of comparing the results of military actions to stated objectives to determine what, if any, mission objectives were met. CA must answer two questions: “How good of a job are we doing (history) and what comes next (prediction)?” In the past, the nature of particular conflicts, technological limitations, and inadequate doctrine combined to cause campaign planners to perceive CA as a historical tool. However, CA is fundamental to every phase of the joint targeting cycle, driving changes in force planning and execution to enhance mission accomplishment by predicting the shape of the future battlespace.³

CA’s predictive aspect begins years before conflict occurs as combatant command staffs collect information for analyzing potential adversary policies and actions. At this point in the planning process, every level of the national security system relies on CA. At the strategic level policy makers establish national objectives that form the basis for subsequent operational planning. Combatant commands translate national security policies into executable military plans that match objectives to courses of action (COA). After national decision makers select specific COA, operational commanders task units to execute plans designed to achieve military objectives. When operations commence, CA must integrate the historical with the predictive to provide commanders and national policy makers with comprehensive tools for directing the course of campaigns.

This view of integrating the historical and the predictive natures of CA describes a paradigm shift from the past when planners focused on assessing the outcome of strategic effects-based operations at the expense of the full spectrum of historical and predictive effects required to control and shape the battlespace. At the operational level, airmen saw their role as one of developing and servicing target lists. From this perspective CA meant analyzing tactical outcomes. Under the new paradigm, airmen should provide JFCs air operations plans that are

designed to produce specific strategic, operational, and tactical effects that achieve assigned objectives. Ideally, such assessments would guide planners to employ options that create an asymmetrical advantage on the battlefield by incorporating the dynamics of multi-dimensional maneuver. CA must determine the overall effectiveness of those actions, and then make valid predictions based on how the effects achieved will shape the campaign battlespace for future operations. In this way, air and space power become fully integrated elements of the JFCs overall campaign strategy rather than merely providing supporting fires for component maneuver forces.

A fully integrated CA process focuses planners on assessing how effective military actions are by comparing effects-based objectives with measures of success. Measures of success may be either a measure of performance (MOP)—how efficient a task was in doing things right to meet the objective—or a measure of effectiveness (MOE)—how effective a task was in doing the right thing. Conceived in this way, MOPs/MOEs become prerequisites for CA and the critical ingredient for developing predictive battlespace awareness among JTF planning staffs.

Ultimately, combatant commanders have to make final and binding assessments regarding overall campaign success and the appropriate steps to take next to continue successfully pursuing campaign objectives. Such decisions should occur within a disciplined and repeatable process that leads to a highly accurate, though never perfect, assessment of the campaign's progress.

Tactical Assessment

CA begins with tactical assessment (TA), which has three components: battle damage, munitions effectiveness and mission assessment. Comprehensive TA should focus on the overall effectiveness of force employment by incorporating dynamic information sources such as in-flight reports, mission reports, and intelligence collection/reporting. It should use MOP/MOE to compare the results of the operation to the objectives to arrive at a judgment regarding mission success. At a basic level, the process results in a value judgment of mission success or failure. This judgment becomes one important filter in subsequent operational and campaign assessment processes. TA provides justification for advising commanders regarding how to adjust the overall theater effort to accomplish operational objectives. Viewed in this way, its key contribution to the theater campaign is to provide answers to key questions regarding current operational effectiveness and predicting the battlespace for possible future courses of action.

Proper evaluation of each mission MOP/MOE requires data. This data is called a key indicator and is used to task intelligence, surveillance and reconnaissance assets for collection and exploitation. Further, predictive approaches must integrate with the JFC's target selection and prioritization processes. The most important guide for this prioritization and selection must be a clear understanding of higher-level objectives.

Assessment provides insight into aircraft, munitions, and fusing decisions. Relative to force assignment, delivery parameters will be based on a threat assessment. How much effort is required in each of various airpower mission areas (DCA, OCA, CAS, etc.) will depend on an evaluation of the best way to get the job done. Further, assessment will feed ingress and egress decisions, force packaging, and other similar decisions necessary from a tactics standpoint to ensure tactical mission success. All of this is part of predicting the battlespace.

Analysis, predominantly by the intelligence community, forms the backbone of the assessment process. Traditional thinking has evolved to believe that only the “ints” can provide reliable enough raw data to provide an effective assessment. The “ints,” or intelligence collection disciplines, consist of imagery, signals, measurement and signature, human, and open source intelligence. Beyond the “ints,” however, there are also sources of raw information that augment the assessment picture. These include cockpit and weapon system video, mission reports, situation reports, forward air controller (FAC), and surface component reports (eyes on target), and even live open-source reports. These additional sources of information help assessors produce a relatively comprehensive picture of the battlespace.

Time is the key determinant relative to how many sources of raw data are available for consideration. More raw data does not necessarily allow a more thorough and accurate assessment; and, an 80% answer on time is better than a 99% solution that is too late. As such, those who provide the assessment as well as those who make decisions based upon it must understand the art and limitations of assessment. The assessment is based on information known at the moment and therefore must be an iterative function. As new data becomes available the assessment may, and likely will, change. Previous decisions, made on the basis of less complete information were simply the best decisions at the time. If the decision and subsequent actions are a high enough priority, the time and capability required to collect and assess may become a key-determining factor in when a subsequent decision should be made.

For example, in striking a high priority target, the need to restrike prior to conducting subsequent operations may be paramount. For instance, if the elimination of a double-digit surface to air (SAM) missile site (SA10) clears a path of an upcoming strike package for successful ingress, knowing the site is destroyed could be the linchpin for follow-on packages to use that route. Due to the critical nature of the assessment, it may be prudent to plan for in-flight reporting, mission reporting, perhaps a “boots on the ground eye-ball” report, along with both signals and imagery reconnaissance collection and reporting before making the assessment. To collect all these, and allow the subject matter experts to produce a usable product, will take time. That time may be a worthwhile trade-off; and it may not. The decision-makers have to make a choice, but must also understand the risks and trade-offs required.

Obviously, the quickest report can come from the strike crew. If collection assets are on station, and that target is highest priority, near real time imagery and signals indicators could add to the crew’s report. As such, a re-strike determination, or a decision to let the follow-on package through, would be possible in short order. Significantly, however, it would have to be thought through in advance, as well as the assessment integral to the next action— and used to set today’s collection priorities.

Beyond collection, analysis, production, and dissemination— the pieces required for the overall assessment process— it is also essential to understand the three processes that combine to form combat assessment. These are: mission assessment, battle damage assessment, and munitions effectiveness assessment. The first two, battle damage assessment and munitions effectiveness assessment, form the foundation for the third and most important process— mission assessment.

BDA is the “timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal against a pre-determined objective.”⁴ (AFPD 14-210). It addresses ALL weapons types; kinetic and non-kinetic. BDA is not the complete and only outcome of the combat assessment process. However, it does address the specifics of weapons impact on target, achievement of the desired results, necessity of reattack, collateral damage, and prediction on possible enemy courses of action.

Further, BDA must also occur at three “effects” levels: 1) a quantitative effect of mission results within minutes to hours of attack; 2) a functional assessment focusing on the effect on the adversary’s functional or operational capability that historically requires 24 to 48 hours to develop; 3) a target system assessment which provides the overall effectiveness against the adversary’s target systems. This is the most complex level and may require days to weeks, depending on the target system.

Munitions effectiveness assessment (MEA) centers on judging if planners chose the optimum weapon system to achieve the desired effect; this involves every aspect of munitions employment (fusing, release parameters, frag pattern, etc.). This allows planners to identify problem areas for future weapon employment. MEA generates recommended changes in methods, tactics, fusing, and/or weapons selection to increase effectiveness in meeting campaign objectives. Also, recommendations for developing new weapon capabilities and techniques evolve from this assessment. Significantly, the type weapon used in the attack will also serve as a guide for imagery interpreters and intelligence analysts to assess effects—and as such, becomes essential information for the analyst to know in order to provide the best assessment product.

Mission assessment (MA) is the third component of TA. Here, analysts evaluate the effectiveness of tasked or apportioned missions and feed component operational assessments and ultimately campaign assessments. The Supported Commander makes the final call on mission effectiveness! At this level there can be a difference between mission efficiency and effectiveness. Overall, MA helps answer the following questions:

- a. Are operations achieving command objectives and intent?
- b. Do operations produce desired and expected effects?
- c. Does the mission require a different level of effort?
- d. How effectively did operations affect enemy action/capability?
- e. What are the specific changes in combat operations required to achieve campaign objectives more effectively?
- f. Does a particular enemy target system require more or less emphasis in future combat operations?
- g. Were there any unanticipated operational limitations?

h. Were there any unintended or undesirable consequences?

An easy pitfall relative to TA is to correlate successful BDA and MEA with mission success. The following provides an example where both MEA and BDA were extremely inefficient, but the overall MA by the supported commander called the mission effective and, therefore, successful. During ground operations in Desert Storm, a US ground maneuver commander realized an opposing and superior force was massing and maneuvering to engage his forces. He called for immediate air support. The mission task requested airpower to prevent the enemy forces from engaging US ground troops. The only air assets available to the AOC were B-52's carrying munitions not optimized for ground maneuver engagement. However, as these were the only available air assets that could meet the time requirement, divert orders were given, and the B-52s dropped their unguided munitions—on the coordinates provided by US forward air controllers. Subsequent imagery revealed craters all over the desert and no destroyed or out of commission enemy vehicles/armor. BDA reported “no apparent damage.” The MEA was “wrong munitions for maneuver armor.” The MA however was successful—upon attack by the B-52's, the enemy forces retreated and did not engage US ground forces.

Operational Assessment

Step two of the overall assessment process is operational assessment (OA). Component commanders and their staffs rely heavily on TA products to develop plans—based on OA—for the future course of the component's operations. Staffs often base OA on ambiguous evidence to provide an assessment of the military operations to date. OA includes a determination of what options the enemy has left, charts future courses of action for component operations and contributes to the JFC's campaign assessment. The OA includes two sets of operational objectives and two military end states: the coalition's and the enemy's. OA analysts recognize that there are numerous political end states: one for each coalition member, one for the host nation, and one for the enemy. However, the Component Commander's overriding concern is this question: who is most likely to achieve his military objectives?

Responsibility for OA rests with the component commanders and their staffs. However, within the AOC staff, there must be an OPR to conduct analysis and make recommendations to the component commander. The OA team must be an integral part of the strategy division; taking the “what's been happening” information coming in as TA, overlaying operational considerations, and focusing on the next step of predicting the battlespace. The operational assessment team will provide the foundation for strategy changes, phase shifts, and branch/sequel planning. A simple structure within the strategy division is for it to contain two teams; one for strategy plans and the other to provide OA.

In coordination with the joint forces air component commander (JFACC) and strategy plans the assessment team should define, monitor, assess, and recommend. Specifically the products should define major tasks and measures of success and identify strategy or phase shift triggers; monitor attainment of MOPs/MOEs and adversary actions; assess the efficacy of air strategy by comparing objectives to actual mission outcomes; and recommend improvements, shifts in emphasis, phase changes, and branch development or initiation.

Significantly, the four primary activities of the OA team will require repetitive assessments by subject matter experts—some of the “best and brightest.” The team should have a core group of 6 to 8 permanently assigned analysts. The “core” should include 2 or 3 operators experienced in force application, and knowledgeable in the JFACC’s strategy. Also needed are several intelligence analysts (not necessarily targeteers). Additionally a collection management expert and information warfare professional would significantly enhance the team’s capability to provide the most effective OA products. Numerous “part timers” whose primary duties lay elsewhere within the AOC, but whose expertise is necessary should also be detailed to round out the team on an “as needed” basis.

Beyond the six to eight person core, the intelligence, surveillance, and reconnaissance (ISR) division’s air, space, ground, and maritime analysts will also provide key inputs—both from the combat assessment and the predictive battlespace perspectives. Other significant inputs will come from the ground, maritime, special operations, and space operations disciplines relative to insights into those subordinate commanders’ objectives and assessments.

Campaign Assessment

Step three of the combat assessment process is campaign assessment. Each component (air, ground, maritime, etc) will conduct OA. These support the theater campaign assessment, which is the ultimate responsibility of the joint force commander (JFC). As previously explained, TA provides the foundation for OA. Similarly, each component commander’s OA contributes to the overall campaign assessment. The key shift in thinking is to move beyond historical reporting and move toward predicting the battlespace. The focus of the Campaign Assessment is the military end state, while always remembering there are two sets of operational objectives: the coalition’s and the enemy’s; two military end states: the coalition’s and the enemy’s; and numerous political end states: one for each coalition member, one for the host nation, and one for the enemy. The C/Joint Force Commander’s overriding concern is who is most likely to achieve their desired military end state?

So, what is campaign assessment? It is the joint force commander’s (JFC) judgment as to “how best to accomplish the mission” and combines current execution outcomes with future desired outcomes. It is a collaborative effort among all components to track desired effects at the operational level and identify campaign plan adjustments. Things a JFC should identify include the differences between effects produced and operational and tactical objectives; an identification of what needs to be done to accomplish the mission, and determining whether to continue with current plans, accelerate operations, reattack previously struck targets, or whether to reprioritize or redirect ongoing efforts.

The JFC and his staff lead the campaign assessment. There is only one campaign; although it will have air, land, and sea components; as well as asymmetric, special operations, etc. pieces. Campaign assessment becomes the anticipatory process to determine the future course of the campaign as a whole—often in the absence of confirmable data. It is here the JFC’s professional skill and judgment are key to the elusive “science” of tactical assessment and merge the art and science of military planning and execution. That commander must focus and assess his own campaign objectives, the anticipated goals of his enemies, and the collected operational and

intelligence data to determine who is winning and who is losing. That assessment must answer two questions: what has happened (historical outcomes) and predicting the battlespace for future operations. Thus, campaign assessment is critical to the JFC's strategic assessment.

It is imperative for the JFC and staff to keep in mind that the opponent also has a campaign plan, objectives, and tasks. The enemy's campaign is not a mirror image of ours; and his political and military objectives and end state are probably vastly different from the JFC's. Should it therefore be our objective to reach our end state and deny him his end state, or is our objective to reach our end state and facilitate his ability to reach his end state? As we take away his options, and disrupt his ops tempo, what options does he have left? In short, what is he likely to do next? Take for example a situation where the opposing force might be willing to tolerate (accept) a military defeat—in effect lose the “war.” For some enemy leaders military defeat at a conventional level might be acceptable. US objectives that include a “regime change,” which enemy leaders perceive as a threat to their survival, could “trigger” the use of weapons of mass destruction (WMD). Such effects could lead to an untenable outcome for both the JFC and his opposition's national and military counterparts.

While that consideration is at the campaign assessment level, it is clearly critical to the combatant commander's assessment at the theater strategic level. At this level the JFC develops theater joint operations area (JOA) campaign assessment concept of operations (CONOP); developing and exercising tactics, techniques, and procedures; along with establishing requirements for people, training, and equipment. The JFC will also monitor the campaign's progress toward achieving national and theater objectives; fusing OA inputs from component commanders and including the additional inputs from the NCA, JCS, DOD, State, Treasury, etc. In this vein the JFC will assess the usefulness of the campaign strategy and direct changes to theater and component strategy as well as when/how to move to the next campaign phase. This input provides the JFC with information required to make strategy decisions. The JFC must focus on the operational objectives and military end states of both the coalition and the enemy, while understanding the numerous political end states possible: one for each coalition member, one for the host nation, and one for the enemy. The JFC's overriding focus becomes bridging the gap between political objectives and military actions.

Therefore, campaign assessment is the essential process that JFCs use to establish and pursue theater operational objectives. Operational assessment is the linchpin for the JFACC strategy, the joint air and space operations plan, and the air operations directive.

Conclusion

Combat Assessment permeates the targeting process. Assessment products must measure effects achieved by military actions in terms of strategic, operational, and tactical objectives. Combat assessment must take note of the past, but focus on what comes next. The accuracy of that assessment depends on the JFC and his staff's professional skill in the military arts and judgment. Given the necessity to predict what comes next, some error in that prediction becomes acceptable. Predictive battlespace awareness includes: strategic, operational, and tactical levels; political end states, military end states, and military objectives. By properly defining the desired

outcomes (effects) and end-states and laying out the actions to achieve those, the combat assessment process can better focus on winning the war and the peace.

Finally, current planning and targeting processes must move beyond traditional perspectives of what assessment is and should do. Current doctrine views assessment as the final step in a sequential targeting process; in fact, planners should integrate assessment processes and products in every element of strategic, operational, and tactical planning. Only through such integration can JFCs and their staffs direct operational campaigns that out-pace, out-think, and out-fight their adversaries.

Notes

11. In August, 2001, Lt Gen Mike Short USAF, now retired, was preparing to teach an Air Power elective for the Air War College titled “Air Operations Center (AOC) Operations” and asked Air University Intelligence (CADRE/IN) to put together a presentation on combat assessment. That briefing centered on existing published doctrine and began an iterative thought process that has evolved into this article. These ideas have been reviewed and discussed by students, members of CADRE, participants at Blue Flag, and Air Force Mentors (retired flag officers selected by the Air Force chief of staff, which currently include Lieutenant Generals Hurd, Heflebower, Santerelli, Croker, and Short to advise the service on matters of policy and doctrine). Many of the ideas remain contentious and there is still considerable debate among many of those who have evaluated these concepts. The author owes a debt to all involved for their comments and professional insights.

12. Joint Publication (JP) 1-02, Department of Defense Dictionary of Military and Associated Terms, 12 April 2001 (as amended through 9 June 2004), http://www.dtic.mil/doctrine/jel/new_pubs/jp1_02.pdf, which in turn credits JP 3-60, Joint Doctrine for Targeting, 17 January 2002, http://www.dtic.mil/doctrine/jel/new_pubs/jp3_60.pdf. **Combat assessment**—The determination of the overall effectiveness of force employment during military operations. Combat assessment is composed of three major components: (a) battle damage assessment; (b) munitions effectiveness assessment; and (c) reattack recommendation.

13. See JP 3-60 and JP 2-01.1, Joint Tactics, Techniques, and Procedures for Intelligence Support to Targeting, 9 January 2003, http://www.dtic.mil/doctrine/jel/new_pubs/jp2_01_1.pdf.

14. JP 1-02, 63. The timely and accurate estimate of damage resulting from the application of military force, either lethal or non-lethal, against a predetermined objective. Battle damage assessment can be applied to the employment of all types of weapon systems (air, ground, naval, and special forces weapon systems) throughout the range of military operations. Battle damage assessment is primarily an intelligence responsibility with required inputs and coordination from the operators. Battle damage assessment is composed of physical damage assessment, functional damage assessment, and target system assessment. Also called **BDA**.