

12<sup>TH</sup> ICCRTS

“Adapting C2 to the 21<sup>st</sup> Century”

Operational Assessment of Effects Based Strategies

Proposed approaches to measurement  
Assessment in Effects Based Operations  
Tools for Effects Based Assessment

JOHN J. SCHAEFER III, Major, USAF  
ALAN D. KASTNER, Major, USAF

607<sup>th</sup> Combat Plans Squadron  
Unit 2047 – Osan Air Base  
APO, AP 96278-2047

DSN: 315-784-3811

John.Schaefer@osan.af.mil  
Alan.Kastner@Langley.af.mil

## **ABSTRACT**

This paper details an emerging methodology and analytical tool used to conduct operational assessment(OA) of an effects based strategy. Effects based strategies present difficult assessment challenges to commanders because causation between friendly actions and results cannot always be assumed. Commanders must use their cumulative knowledge to make command and control adjustments in order to successfully achieve their objectives. The methodology and tool detailed in this paper serve to allow commanders to make such adjustments with greater confidence.

The opening section of the paper describes how commanders and planners should design an effects based approach to operations in order to facilitate effective operational assessment. The considerations for selecting good objectives, measures of effect (MoE), measures of performance (MoP), and success indicators(SI) are discussed followed by an explanation of the emerging OA tool. When coupled with good objectives, MoEs, MoPs, and SIs, the tool provides commanders with reliable information to adjust their strategy if required. Lastly, the outputs of the analytical tool are discussed with reference to the types of strategy corrections a commander might face. In summary, this emerging methodology promises to provide commanders with the information required to efficiently command and control forces engaged in an effects based approach to operations.

## **A. Operational Assessment when using an Effects Based Approach to Operations**

- **1. Development of Objectives, Effects and Tasks**
  - a. What are they?
  - b. Characteristics of good objectives, effects and, tasks
  - c. Characteristics of bad
- **2. Development of Measures of Effect (MoE) , Measures of Performance (MoP), and Success Indicators (SI)**
  - a. What are they?
  - b. Characteristics of good MoPs, MoEs, and SIs
  - c. Characteristics of bad

## **B. Presentation of Objective – (technique used to analyze data and its impact on operations)**

- **1. Methodologies and tools for turning measures into data**
- **2. Emerging tools for assessing effects based strategies**
  - a. Measuring Performance
  - b. Measuring Effects
  - c. Analyzing the gap between Performance and Effect
    - i. When performance exceeds effect
    - ii. When effect exceeds performance

## **C. Adjusting Effects Based Strategy**

- **1. Doing things right**
- **2. Doing the right things**
- **3. What to do when analysis doesn't match expectations**

**Effective C2 demands that commanders and staffs collaborate in planning (e.g., determining the mission, operational objectives, desired effects, and tasks), preparing for, executing, and assessing joint operations. Commander's critical information requirements (i.e., priority intelligence requirements and friendly forces information requirements) are a key information management tool for the commander and help the commander assess the adversary, operational environment, and friendly capabilities; and identify decision points throughout the conduct of operations.**

JP 3-0 Executive Summary Pg XVII

Joint Publication 5-0 states “Effective Command and Control demands that commanders and staffs collaborate in planning (e.g. determining the mission, operational objectives, desired effects and tasks), preparing for, executing and assessing joint operations.”<sup>1</sup> This quote reflects the focus of this paper. This paper will explain how commanders and planners should use an effects based approach to operations in order achieve desired end states and allow for effective operational assessment. Many existing plans were written before modern assessment methods were developed. Therefore it is sometimes difficult to use emerging assessment methodologies on them. Assessment must begin at the planning stages. Only by planning to assess progress will the commander know if he is on or off plan. The commander does not necessarily have to know exactly how he is going to get to the end state but his plan must include some forethought into how he will know if he is getting there or if he needs to change his strategy. The operational assessment methodology described in this paper works for all levels of war. However, this paper will focus on interactions between the Joint Forces Commander and his components. This level of interaction provides the guidance

---

<sup>1</sup> JP 5-0

components use to develop their objectives, effects, and tasks in support of the JFC's strategy.

Objectives prescribe friendly goals.

Effects describe system behavior in the operational environment – desired effects are the conditions related to achieving objectives.

Tasks direct friendly action.

#### JP 3-0 pg IV-8

Any discussion of effects based approach to operations requires a common understanding of the objectives, effects, and tasks. Once definitions for these terms are agreed upon, characteristics of good and bad examples of each can be discussed. For this discussion, the modifiers good and bad do not imply that a good objective will win the campaign or that a bad objective will not. Rather, good implies that the objective sets a sound foundation for subordinate commanders to take action that will achieve the end state as quickly as possible and with the least amount of impact on resources.

According to Joint Publication 3-0, “Objectives prescribe friendly goals. The objectives will comprise of the military end state conditions desired by the commander.”<sup>2</sup> Joint Publication 1-0 adds that objectives “need to be clearly defined, decisive, and attainable goals toward which every objective is directed.”<sup>3</sup> Bad objectives do not have these characteristics and are problematic when employing an effects based approach to operations. The following sample objective meets the litmus test of a good objective:

**1. Gain air superiority to ensure friendly air operations in the operational area are unimpeded by Red and that all Blue forces are protected from attack by Red air operations.**

---

<sup>2</sup> JP 3-0 add details

<sup>3</sup> JP 1-0 add details

The staff can ascertain to the effects and tasks that must be accomplished in order to achieve the objective.

Conversely, a poorly written objective such as: “**2. Prevent Red air from affecting Blue forces**” is far less useful to a planning staff. This objective does not clearly define the desired end state for Red air. The nebulous nature of the phrase “from affecting” means the objective is not decisive or clearly defined. For example, if Red air efforts require a simple change in Blue tactics planners cannot claim that Red air is not affecting Blue forces even though the tactical change may be routine and not of consequence to the overall strategy.

*However, first it is important to codify what effect it is that the commander is trying to have on the enemy. In other words, how will the enemy behave if the tasks are working towards the objectives. What actions might the enemy take to show that the blue forces are impacting red operations.*

Effects bridge the gap between objectives and tasks. They also provide the commander a way to break his strategy down into manageable pieces. If all of the effects are achieved, realization of his objective should follow. This will give the commander more confidence that he is using the right strategy towards his objectives and end state. Careful examination of effects will be the first place to indicate that a task or set of tasks has no causal linkage towards an objective. This concept will be expanded upon later in this paper.

An “effect” is the physical or behavioral **state** of a system that results from an action, a set of actions, or another effect. **A set of desired effects contributes to the conditions necessary to achieve an associated military objective.**<sup>4</sup>

---

<sup>4</sup> JP 3-0, IV-8

The action or set of actions described in the referenced text are the tasks. It also bears mentioning that while effects bridge the gap between the objective and tasks, an effect may contribute to the achievement of other objectives. For example, if one of the desired effects of achieving air superiority is to limit or deny communication between higher headquarters and fielded forces, this same effect may also support naval superiority, however, the tasks may be different. In this example, by developing the effects before tasks are assigned, the planners may discover that taking an action against the transmission end contributes to multiple objectives whereas taking action against the receiving end may be less defended but only impacts one objective. By developing effects without specifying ways or means of accomplishment, more options are on the table for the task level planners.

Developing good effects it may require brainstorming to determine actions that indicate an enemy can or can not continue due to Blue actions. Good effects describe an enemy behavior a Blue behavior or action. Continuing the previous example, a good effect towards achieving the example objective might be:

**Objective:**

**1. Gain air superiority to ensure friendly air operations in the operational area are unimpeded by Red and that all Blue forces are protected from attack by Red air operations.**

**Effect:**

**1.A. Red Air Force fighters/bombers do not adversely affect Blue operations.**

This example shows a desired behavioral state of red forces. The planner does not want Red Fighters or Bombers taking any action that will adversely affect what Blue is doing. This effect does not imply that Red fighters must be destroyed or that Red fighters

should not be allowed freedom to taxi. This effect leaves the door wide open to develop tasks. As long as the Red Fighters and Bombers do not adversely affect blue operations, the effect has been achieved.

Conversely language that implies how the objective is to be achieved at the effect level would imply a way or means.

**Objective:**

**1. Gain air superiority to ensure friendly air operations in the operational area are unimpeded by Red and that all Blue forces are protected from attack by Red air operations.**

**Effect:**

**1.A. Red Air Force fighters/bombers are destroyed**

While this effect would answer the objective it would also imply that the objective cannot be achieved until all of the fighters and bombers are destroyed. Also, it would limit the planner to only taking actions that destroys a fighter or a bomber. If the enemy were to conceal his fighters and bombers, the Blue forces may never find them much less destroy them and thereby continue to pour resources against this objective because it has not been achieved.

Tasks are the lowest level that a commander specifies. Mission planners, targeteers and, operators apply their craft to accomplish tasks. Tasks may be lethal or non-lethal. Broadcasting a propaganda message on a radio frequency can be a valid task if it achieves a behavioral effect on the enemy. Tasks are blue actions. Tasks should have a causal linkage to the effect. Well written tasks do not dictate tactics. They clearly define what tactical assets should achieve. Predetermining appropriate tasks can be difficult because tasks are undertaken against a thinking enemy. That enemy may be

quite different culturally and is simultaneously trying to achieve effects against blue forces.

A good task contributes to achieving the objectives and effects. Continuing the previously discussed example, an appropriate task is:

**Objective:**

**1. Gain air superiority to ensure friendly air operations in the operational area are unimpeded by Red and that all Blue forces are protected from attack by Red air operations.**

**Effect:**

**1.A. Red Air Force Fighters/Bombers do not adversely affect Blue operations.**

**Task:**

**1.A.1 Destroy All Red fighters.**

The word destroy in this task is the direct action and red fighters are where the action is to be taken. Note that this task does not address the bombers. That can be a separate task as well as POL, Runways, Aircrew quarters, and aircraft factories. If the task were to read “**1.A.2 Red Fighters can not fly,**” it would not show what action was being taken and would read more like an effect.

Some of the actions will have direct effects and some will have indirect effects. Also, some of the tasks will, have an immediate effect while others will be delayed. Some actions may take more precision but have a longer lasting effect. These are all elements that must be taken into account when developing the tasks. Conservation of resources, priority and speed all figure into the planners approach to achieving the commanders objectives. Just as planners can not predict what behaviors the enemy may exhibit, the planners can not always predict what will cause the desired effects. A brainstorming session will bring all options out and actions can be grouped into a logical task. Before

directing the tasks or wargaming the plan, it is now time to decide how the commander will know that the right tasks are being taken to meet his objectives.

Once the commander has determined his objectives and the staff specifies the effects and tasks that must be accomplished to achieve those objectives, planners need to determine how to measure progress towards those effects and objectives. Measures of effect, measures of performance and, success indicators are the basic categories used to assess progress toward the commander's objectives. These categories must be considered from the beginning stages of planning if commander's hope to use operational assessment to gauge their progress towards their objective.

*Just as objectives are the foundation of a good plan. The measures of effect and performance as well as the success indicators are the foundation for a solid assessment of the plan.*

#### KEY TERMS

measure of performance — A criterion used to assess friendly actions that is tied to measuring task accomplishment.

measure of effectiveness — A criterion used to assess changes in system behavior, capability, or operational environment that is tied to measuring the attainment of an end state, achievement of an objective, or creation of an effect.<sup>5</sup>

#### Measures of Effect

Measures of effect assess changes in system behavior, capability or operational environment. These measures tend to be more qualitative since the amount of enemy reaction is hard to predict but the mere intent of the enemy bears measuring. A good measure of effect must be measurable, reliable and quantifiable.<sup>6</sup> Since effects are qualitative in nature, it is difficult to apply a measure to an effect. If a propaganda

---

<sup>5</sup> JP 5-0, III-61

<sup>6</sup> Source?

broadcast had an intended effect of the enemy putting down his weapon and surrendering. The business of operational assessment demands that measures of effect quantify how much of an effect is being achieved.

## Measures of Performance

Measure of performance measure how Blue is doing towards its tasks. Percent of bombs on target, number of aircraft destroyed, number of air defense systems remaining operational are all representative of things that might be measured. If, in the course of MOP development, the planners discover that they cant measure how they are doing against certain tasks, they will need to reword or rethink the tasks. If it cant be measured how will the commander know that his intentions are being met?

While MOPs and MOEs measure different aspects of the campaign, to be useful, they both must follow similar guidelines. To be useful they should be: relevant, measurable, responsive and resourced<sup>7</sup>. Wargaming and exercising will help distill the MOEs and MOPs down to the basic ingredients.

## Success Indicators

Success Indicators work at the objective level. They may not have a quantitative value nor will they have a responsive quality about them. They are however most useful as a measure of the commander's feelings towards how a campaign is proceeding. The

---

<sup>7</sup> JP 3-0 IV-33

overall goal of Operational Assessment is to use the methodologies presented here to arrive at a scientific measure of the status of the campaign and in turn apply corrections where able or prepare the commander with possible courses of action to take. The success indicators are a last minute vector check to ensure the mathematical model does in fact accurately portray the commander's feelings.

### **Methodologies and tools for turning measures into data**

Once all of the measures of effect and measures of performance are derived it is time to turn the data into information that is timely, accurate and actionable. Obviously there are some effects and therefore measures of effect that will be more important than others. In the example objective, one of the effects is “**Red Air Force Fighters/Bombers do not adversely affect Blue operations.**” However, enemy surface to air missiles and anti-aircraft artillery actions will also figure into whether or not Blue is achieving the desired air superiority effect. That said, different parts of the Red system are less important than others depending on the overarching strategy. Thus those effects should be more heavily weighted when determining the degree to which an objective is achieved.

This same logic applies to tasks. When looking at the enemy system of systems, portions of the system will be more important than others or achieve a desired effect sooner. For example fighters need fuel, pilots, maintainers, and runways to fly. If the fighter is targeted and destroyed, the effect is immediate and permanent. If the POL production of country Red is destroyed, it may effect operations in the future when all reserves run out but the short term effect may be negligible. However, if POL production

capability is destroyed and reserves run out ALL of the fighters may be grounded and the effect is far greater than one bomb, one aircraft.

**A picture tells a thousand words or “You only have 3 minutes to show the commander why he is off plan and what you recommend.**

The staff must first decide on the scale that has finite limits. This paper will use a scale of 0 (worst case) to 1 (best case). Each MOP or MOE will have a value somewhere between 0 and 1. Depending on the campaign it is possible to have close to a hundred or more Tasks/MOPs and dozens of Effects/MOEs. Each one of the MOPs and MOEs will have a value between 0 and 1. The task now at hand is how to blend them into a single snapshot of each Objective. The snapshot must be logical and tell a story to the commander.

### **Method 1**

The first method (see figure 1) is based on an attrition model. This model shows the commander how he and his subordinates are doing on a specific set of tasks. Since some targets are more important than others at a specific moment in time, the tasks are given a weight. The plotted summary is a weighted average of performance of the tasks. As the data is compiled it is up to the staff to interpret the relationship between Blue actions and what Red is doing in the battlespace. This is where art is applied to the science in operational assessment. The staff would then use the MOEs against the weighted MOPs to derive an overall assessment of the objective. Just as two artists would paint a portrait differently, so would two analysts apply the MOEs to the MOPs differently.

As recent conflicts and numerous exercises have demonstrated, commanders are looking for more fidelity in their feedback. If the commander changes strategy or an enemy uses a capability previously deemed insignificant, it is difficult to show trend or historical data while changing the weights given to the tasks. Also it is too easy for the weights to be adjusted to reflect a perception of what is happening. Finally, at the end of the day, the commander not only needs to know what has happened, he needs the “so what”. The staff needs to be able to use the same data they are presenting to the commander to build recommendations for the commander.

This single line does show the commander how he is doing on his task but leaves a lot to be desired on how it ties back to his strategy and whether he is achieving his effect on the enemy. Remember, MOPs measure how Blue is doing on the tasks they have been assigned.

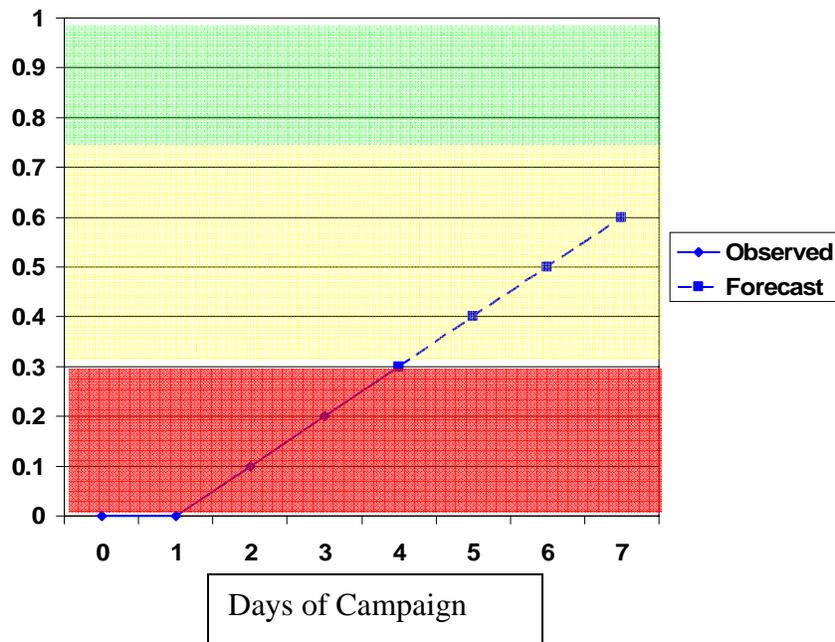


Figure 1

## Method 2

The second method has evolved from the first but has also been helped along by the new planning and assessment constructs set out in JP-5 and JP-3. The assessment is broken into two pieces, Tasks and Effects. The task portion is evaluated similar to method one. A weighted average is given to all of the MOPs in an objective and are plotted along an X-axis (days of the campaign). See figure 2. The biggest change is plotting the effects as their own entity. While not a monumental leap, technically, it is a large step forward in observing, interpreting and reacting to the data.

A commander can see immediately how he is doing on all of his tasks. A value high on the chart will show him that he is doing everything he set out to do against the enemy. However, he can also now see at a moments glance how the enemy's system has been affected. There are three possible combinations. First, the two lines will be parallel

and increasing towards a value of Objective achieved. If the effect line is higher than the task line it will show that the commander is achieving his effect but may be doing so via indirect effects or the enemy is reacting in a way not planned by the staff. Finally, if effects plot out consistently lower than the tasks it may imply that the strategy is flawed or is having little effect on the enemy system.

## Sample Implementation

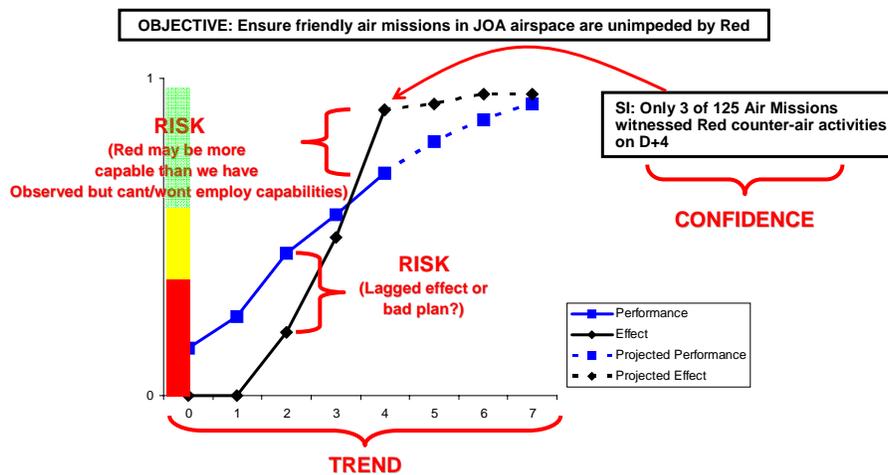


Figure 2

The point of operational assessment is not simply to report events in the battlespace back to the commander. Successful operational assessment enables the commander to adjust his strategy to achieve campaign objectives. Given the fact that it is often impossible to determine causation during a campaign, good operational assessment seeks to answer two questions so the commander can exercise operational art to move closer to his objectives.

**Doing things right?**

First, the commander needs to know if he is doing things right. The performance line depicted on the operational assessment tool provides insight into whether or not the commander is doing the right things. This line shows whether the level of effort put into achieving a particular effect is paying dividends. If the performance line is near the predicted value, friendly forces are able to execute their assigned missions. However, when the performance line is not as predicted the commander should attempt to determine the underlying cause.

Commanders should examine their actions when operational assessment shows a low performance line compared to the expected result. This situation can indicate that the right things are not being accomplished to enable friendly success. Determining the reasons for low performance can put friendly forces back on track to achieving desired effects. For example, low performance against command and control nodes in the enemy capital may be due to accurate enemy air defenses in that area. Once this is determined, the right thing to do is no longer to continue sending the same types of sorties against the same target sets. The low performance line can be corrected by providing better suppression of enemy air defenses, concentrating on targets in less heavily defended locations or, using stealthy assets to attack these targets. The low performance line can be remedied by adjusting tactics or shifting assets to targets that will enable friendly forces to get through to the command and control targets.

### **Doing the right things?**

Second, the commander needs to know if he is doing the right things. Operational assessment can help answer this question. Comparing the performance and effect lines discussed above can show whether or not he is doing the right things. A high

performance line with a corresponding low effect line can be an indicator that one is not doing the right things. In this case, one side is doing what it set out to do but not having the desired effect on the enemy system. When this occurs, the commander must decide if the time has arrived to try a different strategy to achieve the desired effect. The opposite relationship between the performance and effect lines can also tell the commander if he is doing the right things. If the effect line is high while performance line is low, the commander should evaluate his strategy to achieve the effect in question. There are several possible explanations in this situation. For example, environmental conditions may be impacting both sides. Poor flying weather could produce this relationship if the desired effect was to reduce the number of enemy aircraft sorties by bombing their runways. Since enemy and friendly aircraft are grounded in this situation, the effect is achieved with low performance. In this case the commander may decide not to alter his strategy. Another possible explanation is that secondary effects from another objective are responsible for the high effect line despite poor performance. For instance, the enemy's aircraft may not be flying because efforts against lines of communication have halted the flow of petroleum to their airfields. Insightful operational assessment will identify this scenario and allow the commander to shift assets slated to bomb airfields to attack targets associated with other objectives. Sound operational assessment provides the commander valuable information in either of the scenarios described.

A low performance line coupled with a high effect line can indicate risk the commander is assuming or the need to adjust strategy. When this occurs, the commander should reevaluate if he is doing the right things. This relationship can indicate assumed risk if the reason low performance is achieving high effect is because the enemy force is

simply choosing not to employ an asset at the present time. This situation could arise if the objective is to reduce train traffic to less than 25% of pre-conflict levels and the enemy simply chooses not to use trains. The friendly side's failure to drop key rail bridges results in a low performance line but the desired effect is still achieved. When this situation occurs the commander must choose whether to reallocate efforts to other objectives or continue to target the rail system. If sorties are reallocated, the commander assumes risk because the enemy still has the capability to use the rail system at a later date. On the other hand, continuing to target rail bridges when the desired effect has already been achieved thanks to an enemy decision means fewer sorties are available for other objectives. Continued efforts against the rail system may or may not be the right thing depending on the commander's tolerance for risk in this area.

High performance with low effect can indicate that the selected strategy is flawed. When operational assessment shows this relationship, several assumptions must be examined. First and foremost, the friendly understanding of the enemy system may be wrong. For example, the desired effect may be to induce confusion in a particular elite unit. If the friendly side attempts to achieve this by targeting the unit's officer corps and they are successful eliminate the unit's leadership in accordance with their strategy, they would expect the unit to cease coordinated action. However, if the officers in the enemy unit were merely figureheads appointed based on their relationship to the opposing dictator, their elimination could actually increase the unit's effectiveness when the seasoned non-commissioned officer corps assumes command. This situation illustrates the potential impact when friendly forces do not understand the enemy system.

Even when the basic relationships in the friendly system are understood, high performance does not always assure high effects. Slight variances in the enemy system can impact the level of effort required to achieve desired effects. For example, destroying half of the electrical junctions in a power grid may have no effect due to the system's built in ability to reroute demand. However, destroying 51% of the junctions may be enough to overload the power grid and achieve the desired blackout. Therefore, high performance with low effect may simply indicate that the measures of performance were set too low to achieve the desired effect.

Summary paragraph that highlights the fact that we can easily have the relationships (causation) wrong. OA can highlight disconnects and allow the commander to adjust strategy.