AN EFFECTS-BASED APPROACH TO PLANNING

Last Updated: 04 November 2016

The effects-based approach to operations (EBAO) informs every aspect of how the Air Force designs, plans, executes, assesses, and adapts operations. The effects-based approach applies as well to steady-state planning (such as campaign support plans and country plans) as it does for planning the employment of forces (as in the joint air operations plan). This section elaborates the definitions of several key concepts and terms used in EBAO. There is no single "effects-based planning" methodology or process. Rather, understanding the principles of an effects-based approach to operations should yield certain insights and enhance comprehension of many general planning concepts.

Effects

An act…produces not only one effect, but a series of effects. Of these effects, the first alone is immediate; it appears simultaneously with the cause; **it is seen**. *The other effects emerge only subsequently;* they are not seen; *we are fortunate if we* foresee *them* [emphasis in original].

— Frederic Bastiat, What Is Seen and What Is Not Seen

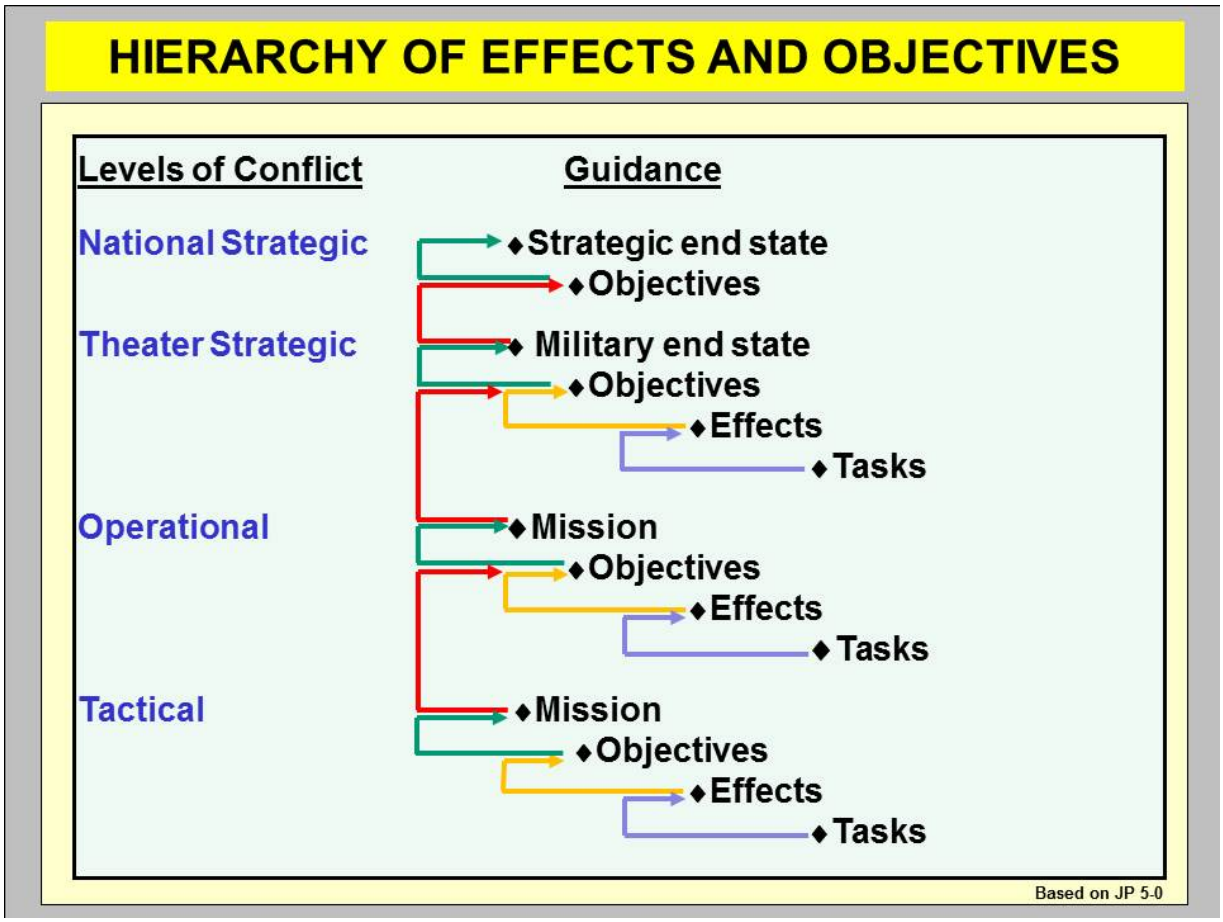
"Effect" refers to "the physical or behavioral state of a system that results from an action, a set of actions, or another effect."[1] Effects are elements of a causal chain that consists of tasks, actions, effects, objectives, and the end state(s), along with the causal linkages that conceptually join them to each other. "Tasks" refer to an action or actions that have been assigned to someone to be performed. Actions are the results of assigned tasks. Actions produce specific direct effects, those effects produce other, indirect effects that **influence** the adversary and other actors within the operational environment, and this chain of cause and effect creates a mechanism through which objectives and ultimately the end state are achieved. The end state is a set of conditions that needs to be achieved to resolve a situation or conflict on satisfactory terms, as defined by appropriate authority.[2]

Objectives at one level may be seen as effects at other, higher levels. **Effects, however, comprise *all* of the results of actions, whether desired or undesired, intended or unintended, immediate or ultimate.** From a military planning perspective, operations should be planned "from the top down," starting with the desired military end

[1] JP 3-0, *Joint Operations*, definition 1.
[2] Note: This description is intended only to clarify the concept of end state, not to supplant the existing doctrinal definition in JP 5-0, *Joint Operation Planning*.

state, determining subordinate objectives needed to bring about that end state, then deriving the effects and causal linkages needed to accomplish the objectives, and finally determining the actions and resources necessary to create those effects. The end state should explain the operation's ultimate purpose—the outcome that is sought. The objectives and effects should explain *what* results are required to attain that outcome. The task and their resultant actions should explain the steps needed to achieve the required results.

Perspective is important here. What may seem like an action to the operational-level warfighter may seem like an objective to warfighters at tactical units. Conversely, what may be an objective for a component commander may seem like an action to the President of the United States. This is illustrated in the figure, "Hierarchy of Effects and Objectives."



Hierarchy of Effects and Objectives

Planners should maintain awareness of the "big picture"—how the component's effects and objectives support the joint force commander's (JFC's) effects and objectives. This is especially important during execution, where it is easy to get caught up in the details of daily processes and lose sight of the end state. For example, "gain and maintain air superiority to X degree in and over area Y for Z period" may be an **objective** for the joint force air component commander (JFACC), but will likely be one of the **effects** the JFC directs the JFACC to deliver (often stated as an execution task) in support of the notional objective "defeat enemy A's offensive into region B." In turn, the JFACC's **objective** may seem like an **action** to the President, who has given the JFC the desired effect of "defeating A's offensive" in order to accomplish his national strategic objective

of restoring stability and maintaining political order in the applicable global region.

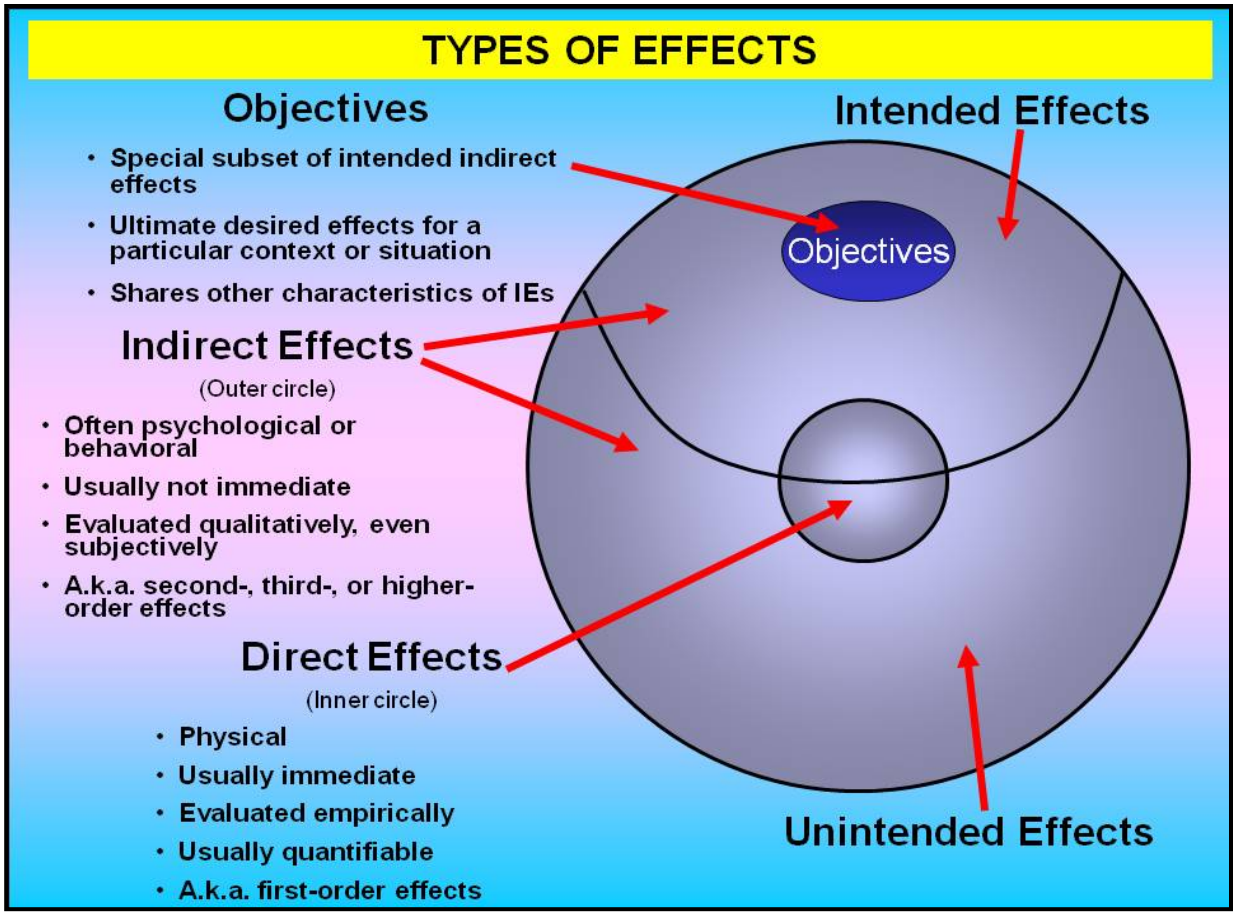
For the purposes of this discussion, it is the operational-level warfighter's perspective that matters—the perspective of both the JFC and the commander, Air Force forces, who is also normally the JFACC—as well as strategists and planners in the AOC. From this perspective, actions are individual sorties, missions, or accomplished tactical tasks. Objectives are the component's tactical and operational-level objectives. Effects are the consequences of tasks, which link tasks to the objectives. From this perspective, a bomb dropped on a particular target is an *action* and the efforts designed to get the bomb there are an element of a tactical *task*. The effects range from direct (the bomb detonates on target and causes damage) through indirect at varying levels (the damage may disable an enemy air defense operations network, for instance, which helps gain air superiority), to objectives ("gain and maintain air superiority to X degree in and over region Y for Z period").

ACTIONS

An action is performance of an activity to create desired effects. In general, there are two broad categories of actions that are relevant at the tactical and operational levels: Kinetic and nonkinetic. Examples of kinetic actions include the use of explosive munitions and directed energy weapons. Examples of nonkinetic actions include use of cyberspace weapons, an information operations radio broadcast to encourage enemy surrender, and employment of electronic warfare capabilities.

TYPES OF EFFECTS

There are **four broad categories of effects**, which often overlap. These categories are: *direct, indirect, intended***,** and *unintended*. Within these categories, especially within the realm of indirect effects, there are many subcategories. A few types (but by no means all) are highlighted in the following section because of their doctrinal implications. Understanding these types of effects is vital to an effects-based approach to war. The relationship among these four types of effects and the objectives, a special subset of intended indirect effects, is shown in the figure, "Types of Effects."



Types of Effects

Direct Effects

Direct effects are the results of action with no intervening effect or mechanism between act and outcome. They are also known as "first-order effects." In most cases they are physical, often immediate, and easy to recognize. They can usually be assessed empirically and can often be meaningfully quantified.

Indirect Effects

Direct effects trigger additional outcomes—intermediate effects or mechanisms that produce additional outcomes or results. These are indirect effects, sometimes also known as "second-," "third-," or "higher-order effects." Indirect effects can be categorized many ways, including physical, psychological, and behavioral. They may also occur in a cumulative or cascading manner, can occur sequentially or in parallel (since they are caused by direct effects that may be applied sequentially or in parallel), and may be intended or unintended and lethal or nonlethal. They are usually displaced from direct effects in time and space, and often can be hard to quantify or measure empirically. They are often assessed or evaluated in qualitative terms. Generally, the less direct the effect—the further removed it is in the causal chain or in time from the initial action—the harder it is to predict before the fact and measure after. Historically, it has proven extremely difficult to predict beyond third-order effects with any degree of certainty.

Direct and Indirect Effects

A practical example of direct and indirect effects might involve a bomb hitting an enemy battlefield command vehicle.

The destruction of the vehicle and its crew by the bomb is the **direct effect** of the tactical action or task.

A part of the direct effect in this case is loss of the command vehicle's command and control (C2) equipment, leading to the indirect effect of degrading the unit's cohesiveness. The vehicle might also have represented a portion of the unit's physical combat capability, which is also degraded by its loss. Loss of so precise a target may help condition enemy troops to abandon their heavy equipment for fear of being killed near them, further degrading combat capability. Neutralization or degradation of the unit may be a tactical level objective. Loss of the vehicle and its crew may also degrade the unit's ability to communicate and function as part of a larger unit, so the capability and cohesion of larger echelons may be affected. If the vehicle contained a commander, this unit's ability to function will probably be further degraded, although if the commander was ineffective and his replacement talented, this may represent a net gain in enemy effectiveness, an unintended effect. If a senior commander was killed in the vehicle, this may have operational-level consequences, rippling down to all the enemy's tactical units and facilitating accomplishment of friendly operational objectives like defeat of the enemy army. If the senior commander was also an enemy national leader, this tactical action may have profound strategic-level consequences, affecting many enemy systems, affecting all instruments of the enemy's power, and greatly hastening achievement of friendly strategic objectives and the end state. All of these outcomes are **indirect effects**.

The principal purpose of military operations is to influence the behavior of the adversary or other actors in the operational environment. Even pure attrition does not ordinarily seek a decrease in the size of an enemy force for its own sake. The purpose of attrition is often to weaken resistance and resolve within the enemy force and its commanders, and incline them toward ceasing resistance altogether, causing the attrited unit(s) to become combat ineffective (as through dissolution as a fighting force or surrender). Of course, this may not hold against very committed enemy units, which may be attrited mainly to reduce their capability. Similarly, an enemy force that is being interdicted will likely not be destroyed outright, but may be *persuaded* that further movement toward its objective will render it combat ineffective.

It should be clear that military operations consisting of nonkinetic action that lead to nonlethal effects are almost purely persuasive, seeking influence without combat. For example, the Berlin Airlift, a very large, purely military resupply effort, directly prevented starvation, indirectly increased West Berlin's resolve, and, over time, influenced Soviet

behavior, leading to the indirect effects of causing the Soviets to abandon their ground blockade of West Berlin through East Germany. The airlift had a further indirect effect of demonstrating to the Soviet Union and its allies that West Berlin could be sustained without resorting to combat, leading to the desired end state of a blockaded West Berlin secured against Soviet aggression. All of these desired results involved influencing adversary behavior without firing a shot.

Objectives are the ultimate desired effects in a particular context or situation—*what* an actor desires to accomplish in a given set of circumstances. **Objectives should be clearly defined, decisive, attainable, and measurable***.* Objectives exist at all levels, from national-strategic down to tactical, and all levels should be logically tied to each other and to the overall end state. All military operations should be directed toward achieving them. It can be beneficial to write objectives as if they were end state conditions, not tasks, since they are conditions required to meet the end state. Frequently, however, tactical objectives tend to be written in terms of tasks. Objectives are a special subset of indirect intended effects and share many of the characteristics of indirect effects, but planners and targeteers should regard effects, in most planning and targeting contexts, as outcomes subordinate to and supporting achievement of the objectives. Objectives are always planned and predicted. Even if a tactical-level "objective" is expressed in terms of direct physical damage ("destroy the enemy command vehicle," or "attrit enemy armor by fifty percent"), the effect being sought is really indirect (degradation of enemy command function and cohesion in the first case, degradation of enemy combat power and ability to act in the second).

The desired outcome serves as the basis for using an effects-based approach. Effects-based planning starts with the end state and objectives and works to determine what actions and intermediate effects are needed to attain them. **Effects-based design and planning logically tie effects at all levels together and integrate the end state, objectives, effects, and actions into a logical, coherent whole***.* An effects-based plan should be able to explicitly trace the reasons for every tactical action through the hierarchy of tactical effects and objectives, operational-level effects and objectives, to national and strategic ends. Actions that do not support the commander's intended structure of effects and objectives represent a waste of resources.

During planning, the end state and objectives should be known *before* subordinate effects and actions are identified. Planning based on the resources available to carry out a "customary" list of actions leads to "input-based" planning, which focuses on *how* to attack and answers the question, "given my resources, what targets *can* I attack?" It provides no guidance on *why* targets should be struck, or how operations support overarching objectives. Resources will always be limited and effects-based planning cannot take place in a vacuum devoid of resource considerations. Resource considerations may constrain the joint force to follow certain COAs or restrain it from following others. Planning without consideration of resource limitations might lead to plans that are too resource-intensive to execute. Resources, however, should not be the factor that drives design and planning–the end state and objectives should. If the desired end state cannot be reached with given resources, then commanders should appeal for resources that will enable them to reach it, or inform their leadership that the objectives and end state are not realistic given the available resources.

Cumulative and Cascading Effects

Indirect effects can be achieved in a cumulative or cascading manner. Effects that result from the aggregation of many effects are said to be cumulative. These effects typically flow from lower to higher levels of employment.

Some indirect effects ripple through an adversary system, usually affecting other systems. These are called cascading effects. Typically, they flow from higher to lower levels and are the result of affecting nodes that are critical to many related systems or sub-systems.

As a practical matter, some of the most desirable effects have both cumulative and cascading aspects. The point at which a military unit "fails" and ceases to act as a coherent fighting force is a common example. The collapse itself may be triggered by an accumulation of losses (although the precise point at which collapse occurs is often difficult to predict). The unit's collapse, however, may foster significant changes that spread through constituent elements, subordinate units, and other connected or related systems. These are cascading effects.

Cumulative and Cascading Effects

In the C2 vehicle example, the lessening of the enemy unit's combat power through loss of the vehicle would be part of the **cumulative effects** of attack upon the unit, as would the unit's eventual collapse through attrition of many of its vehicles and personnel. The effects of the loss of the combat commander in the vehicle on subordinate and associated units would be a **cascading effect**.

In the case of an integrated air defense system (IADS), air superiority may be achieved through the accumulation of effects against the IADS' components and achieving it may cascade into many other desirable effects, giving the air component greater freedom of action and leading to increasing advantages for other components of the joint force.

An electrical network, as an integrated complex system, demonstrates a different aspect of cascading effects. Bombing many generator halls, substations, and power distribution junctions can cumulatively lead to the desired effect of widespread system failure. However, so can targeting a few critical nodes within the network, then allowing internal system stress to cause successive cascading system-wide failure. Nature has inadvertently caused such effects with US power grids several times and Coalition forces were able to achieve them early in Operation DESERT STORM by attacking a few key Iraqi power plants and distribution nodes.

Cascading effects may accomplish desired ends more effectively than cumulative effects, since removal of critical nodes may ensure more thorough collapse or more complete neutralization than might a cumulative, attritional approach. They may also achieve ends more efficiently, requiring fewer resources to achieve equivalent effects, thus freeing them for other uses. Some systems do not lend themselves to this type of

approach and it may not always be possible to identify or target key nodes, but targeting efforts should strive to do so whenever possible.

Other Types of Indirect Effects: Physical, Psychological, Behavioral, and Functional

Physical effects are the results of actions or effects that physically alter an object or system. Most physical effects are direct, but some may be indirect. Often, unintended or undesirable physical effects, like "collateral damage" can be major concerns in an operation.

Psychological effects are the results of actions or effects that influence the emotions, motives, and reasoning of individuals, groups, organizations, and governments. These may result in changes in the outward behavior of these actors, which are known as behavioral. The term behavioral effects commonly refers to effects on the behavior of living constituents of systems. When the living components of a system act in concert to produce a given function (as when those manning an integrated air defense system [IADS] operate that system), intended behavioral effects may lead to changes in the behavior of the system as a whole. These changes are known as functional effects. While it is seldom possible to measure psychological effects in living systems directly, behavioral results (and related functional results) can be measured. Nonetheless, the intermediate psychological states leading to behaviors can be important to understanding causal mechanisms during planning. In most cases, targeting is intended to produce some effect on enemy behavior (e.g., by changing it, preventing it, compelling it to remain the same, or by removing strategy choices.). Unless the enemy is destroyed outright, all such changes entail a change in the enemy's emotions, motivations, or reasoning. Thus, **there is a psychological component to almost every set of effects in living systems and this component is often among the most important in terms of achieving objectives**, especially at the operational and strategic levels. Operational level objectives have historically entailed defeat of enemy forces, and defeat inevitably involves a psychological component. There are very few instances in history where an enemy, however thoroughly beaten, was completely denied means of resistance. Ultimately, collapse entails a series of choices framed by emotion, motivation, and reason. The same is true of the resistance of an enemy nation or system as a whole at the strategic level. Here, the psychological component is even stronger. In combat or coercive operations, defeat is an event that occurs in the mind of the adversary, who chooses to end resistance or aggression and otherwise act (behave) as we desire. All airpower efforts should contribute to this outcome. Good strategy requires realizing this and tailoring effects to produce the maximum psychological impact upon the enemy. A good example of this is Japan at the end of WW II. The atomic bombings of Japanese cities were intended to demonstrate that the Japanese homeland could be crippled and devastated without invasion—in fact, with relative impunity. The psychological dislocation that the weapons imposed far outweighed their material destructiveness. This psychological impact aided greatly in coercing Japanese surrender, even though the Japanese home islands were still capable of robust defense.

Sequential and Parallel Effects

Sequential, or serial, effects are the results of actions or effects that are imposed one after another. If commanders seek to cause adversary system failure, *it can be better to impose effects in parallel rather than sequentially. Parallel attack has greater potential for causing system-wide failures by placing stress on the enemy system in a manner that overwhelms its capacity to adapt.* This is common sense—everyone is better at handling problems coming one after another from a single source than from many different sources or directions simultaneously. Some of the advantages conferred by parallel attack are purely physical, but many are psychological. Simultaneous stress from many sources is a major cause of psychological strain or breakdown and thus effects-based targeting should attempt to place the enemy under maximum psychological stress through parallel efforts. Even if one is seeking predominantly physical effects, the psychological strain may act in synergy with the physical to have more impact than the physical effects would on their own. Another advantage of parallel operations is that they can take less time to achieve desired effects and objectives. If shortage of time is an overriding concern in a campaign, planners and targeteers should consider a parallel approach.

Sequential and Parallel Effects

In the case of an IADS, an example of sequential effects might be a counterair operation that first takes down early warning radars, then sector operation centers, then airfields and enemy aircraft, and finally now-autonomous enemy missile sites. Parallel effects might be the results of the same operation conducted against all these nodes simultaneously in order to place greater stress on the system and complicate the enemy's adaptation requirements.

Effects from parallel operations come at a cost, however. They are almost always harder to impose, require more resources (except time), are more complex, and should be planned more thoroughly, especially in terms of integration and synchronization of operations. Further, there may be reasons effects cannot or should not be imposed in parallel. In some cases, there may not be sufficient resources or capabilities to impose them in this manner. This was the case in the Combined Bomber Offensive during WW II. There were not enough bombers to attack German systems in parallel until very late in the war, when parallel attack on the transportation and fuel industries became possible (and were effective). In other cases, a sequential approach is necessary because events need to happen in a certain order to enable other effects to take place and ensure success. Some degree of air superiority is almost always required prior to commencing major land or maritime operations.

For example, in the opening minutes of Operation DESERT STORM, certain key early warning nodes were targeted to facilitate penetration of Baghdad's air defenses by other coalition aircraft. This one sequential strike helped guarantee the success of the parallel efforts that followed. In other cases, political considerations may so restrain operations as to make a parallel approach infeasible or unacceptable.

Intended and Unintended Effects

Intended effects are the desired, planned, and predicted outcomes of an action or set of actions. They can be direct or indirect. They should always represent a net gain in terms of accomplishing objectives or the end state. Unintended effects are outcomes of an action that are not part of the original intent. These effects may be undesired or desired, presenting opportunities for exploitation. Almost all actions produce some unintended effects. These can be direct, but are usually indirect. If unplanned, they can also be desirable or undesirable from the friendly point of view, leading to outcomes that help or hinder achievement of friendly objectives. The case of the enemy commander being replaced by a more capable officer is an illustration of an undesired unintended effect. Unwanted civilian injuries or collateral damage to civilian property are examples of unintended effects that are planned, or for which risk is accepted, but which are undesired. Collateral civilian damage, of course, is a major concern for commanders today.

There is another aspect of unintended effects that is easy to overlook in planning. Even successful operations carry a cost in terms of lost opportunities. For example, destroying certain C2 or communications nodes in order to degrade enemy cohesion can remove valuable sources of friendly intelligence, or prevent transmission of surrender guidance by the adversary government. Likewise, destroying transportation nodes like bridges in order to impede enemy movement may interfere with future friendly schemes of maneuver or recovery efforts accompanying conflict resolution.

Effective planning should account for these "opportunity costs." Effective air, space, and cyberspace planning should also account for other components' schemes of maneuver, so that effects created by the airpower component are not undesired effects for the other components. EBAO may often suggest alternatives to outright destruction that can create desired effects without removing future opportunities for exploitation or negatively affect the end state. For instance, in strategic attacks against enemy electrical power, carried out to cripple conflict-sustaining resources and disrupt national leadership functions, planners can use nondestructive weapons to bring down power for a given period, or can destroy only a few critical nodes, in order to avoid wholesale destruction of infrastructure that could impede later stabilization efforts. In other cases, good planning can suggest opportunities for exploitation. In Operation DESERT STORM, planners deliberately took down bridges in Iraq that carried fiber-optic trunks in order to force Iraqi leadership to resort to more exploitable, radio-based communications, an effort that impeded later recovery efforts. This requires the integrated efforts of the entire joint, multinational, and multiagency team.

LINES OF EFFORT

It is very helpful during design and planning to have a tool that depicts the relationship of effects to decisive points (DPs), centers of gravity (COGs), objectives, and other events and concepts, using the logic of purpose–cause and effect. Such a tool is usually arranged in proper time sequence to help commanders and strategists visualize how operations evolve and interact over time. Lines of Effort (LOE) provide just such a tool. [3]

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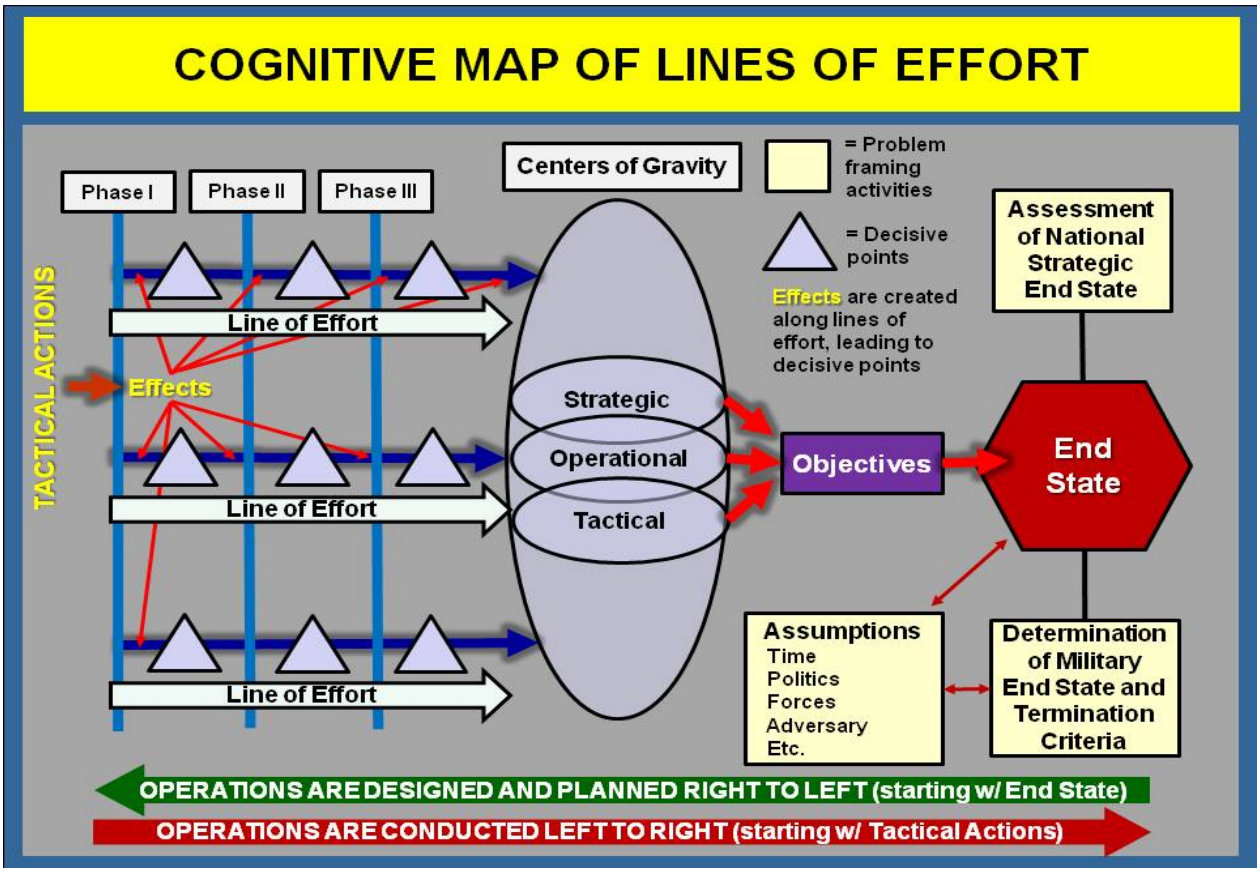
[3] LOEs are similar to physical "lines of operation," but rather are *logical* lines that use the purpose (cause and effect) to focus efforts toward establishing operational and strategic conditions by linking multiple tasks and missions(Joint Publication [JP] 5-0, *Joint Operation Planning*). There are also physical lines of

Commanders and strategists may use LOEs to link multiple actions and effects on nodes and DPs with COGs and objectives to enhance effects-based planning efforts. LOEs help visualize COAs, laying them out in time sequence and helping identify where certain effects should be created and where DPs are located in time relative to other events. LOEs may be particularly useful when working with interagency and multinational partners, helping commanders and strategists visualize how military means can support all instruments of national and multinational power. The aggregate of the effects of all instruments of power (IOPs) acting together form a series of LOEs leading directly to the strategic end state.

There is usually a discrete set of conditions the military will be tasked to deliver. In some cases, a military portion of the end state may actually be a required part of the strategic end state—i.e., the military directly delivers a condition of the strategic end state. In many cases, however, LOEs employing other IOPs are required to complete the strategic condition that military action has enabled or partially achieved.
Each LOE can be broken down into constituent objectives, DPs, effects, and actions or tasks, as illustrated in the figure, "Cognitive Map of Lines of Effort."[4]



Cognitive Map of Lines of Effort

In most cases, single LOEs are connected to other LOEs within the operational environment. The interconnectivity between LOEs can be used to show key decision points that connect the concept of operations with branches and sequels. Potential DPs

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operation: physical lines that define the interior or exterior orientation of a force in relation to the enemy or that connects actions on nodes or decisive points related in time and space to an objectives (JP 5-0).

[4] Adapted from Reilly, *Operational Design*.

should be identified during mission analysis, if possible. The arrangement of operations involves a detailed consideration of how LOEs align with friendly and adversary COGs and the vertical and horizontal relationship of DPs between different LOEs. All LOEs should contribute to accomplishing objectives. Objectives that contribute to accomplishment of subsequent objectives along the same LOE and contribute to accomplishment of objectives in other LOEs may define DPs.

Each LOE can be refined further by including tactical-level objectives, effects, and individual tactical tasks. In theory, given sufficiently sophisticated planning tools, each organization's tasks could be shown as LOEs. Regardless of whether each task is so depicted, however, there is merit in each tasked organization understanding how its assigned task contributes to the overall end state. This helps keep effects-based principles in the minds of all involved in the process and can aid in understanding the cross-domain effects of given actions.